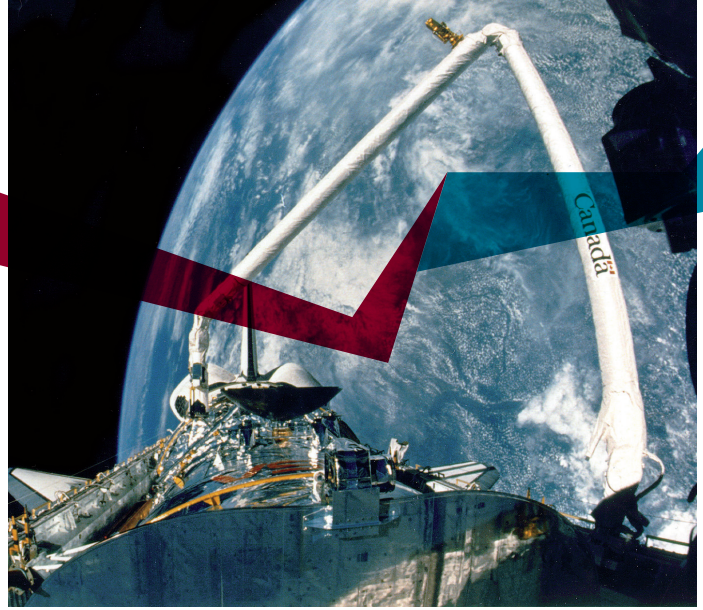
ICCM19
MONTREAL 2013

19th INTERNATIONAL CONFERENCE ON COMPOSITE MATERIALS

JULY 28 TO AUGUST 2, 2013

MONTREAL, CANADA

Composite Materials: The Great Advance



CASCMA
CANADIAN ASSOCIATION FOR COMPOSITE STRUCTURES AND MATERIALS
ASSOCIATION CANADIENNE POUR LES STRUCTURES ET MATÉRIAUX COMPOSITES

19th International Conference on Composite Materials

Date: July 28 Sunday to August 2 Friday, 2013

Place: Palais des congrès,
Montréal, Canada

Host: Canadian Association for Composite Structures
and Materials (CACSMA)

Composite Materials: The Great Advance

CONTENTS

WELCOME ADDRESS

Dear Colleagues,

On behalf of the organizing committee and all of those who have been involved in the preparation for the 19th International Conference on Composite Materials (ICCM19), we wish to welcome all participants of ICCM19. It is our great honor and pleasure to host ICCM19 in Montreal for the first time.

We expect about 1600 participants from around the world representing 47 countries. ICCM19 continues to succeed in the tradition of the ICCM as the biggest and the best conference in composite materials with the contribution of all the participants and the related societies from all over the world. Also it will offer the perfect opportunity to meet colleagues and make friends working in the exciting field of composites.

In ICCM19, the scientific program has been organized into multidisciplinary sessions for specialists in composite materials and its related fields. We have planned 8 plenary lectures and 10 key note lectures. For ICCM19, we have introduced a new format for the poster presentations. This allows the poster presenters more assured audience and more opportunities for presentation. There are about 230 oral sessions (about 1000 oral presentations) and 17 poster sessions (about 200 poster presentations). ICCM19 will provide every participant the best platform to discuss the cutting edge issues which arise from the broad areas of composite materials.

We wish to take this opportunity to thank all the sponsors, and supporters for their generous support for ICCM19. We would like to convey our sincere gratitude to the international members for their valuable support as well as to the members of the ICCM19 organizing committee for their tremendous efforts in making ICCM19 a success.

We wish all of you a fruitful meeting and we hope that you will benefit from the rich scientific discussions, and that your visit to Montreal will last as a pleasant memory.

Professor **Suong Van Hoa**, General Chair of ICCM19

Professor **Pascal Hubert**, Technical program chair of ICCM19

WELCOME ADDRESS

ICCM 19 in Montreal with its theme of Composite Materials: The Great Advance is ready to inspire all of us with a rewarding week of presentations, conversations and reflections as we greet old friends and make new ones. The premier tenet of ICCM is its commitment to bring together all facets of global academic, industrial and government scientists, engineers, faculty and students who dream beyond "possibilities" as they shape the advances in composites. Let this week serve as a catalyst for future collaborations and discoveries until we meet again in Copenhagen in 2015 at ICCM 20.

Professor Ozden Ochoa, PhD., P.E
President, ICCM

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JOURNAL OF COMPOSITE MATERIALS
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ESCM
EUROPEAN SOCIETY FOR COMPOSITE MATERIALS

ICCS17

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AMAC

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Ali Yousefpour	National Research Council of Canada

SESSION DEVELOPERS

Session	Developer	Affiliation	Country
Applications of Composites	Sayata Ghose	The Boeing Company	USA
Automated Composites Manufacturing	Suong V. Hoa	Concordia University	CANADA
Bio Composites	Minh-Tan Ton That	National Research Council	CANADA
Bio-based Composites	David Jesson	University of Surrey	UK
Bio-based Composites	Hans Lilholt	Technical University of Denmark	DENMARK
Biomedical Composites	Denni Kurniawan	Universiti Teknologi Malaysia	MALAYSIA
Carbon Nanocomposites	Bojan Boskovic	Cambridge Nanomaterials Technology Ltd	UK
Civil Engineering Applications	Guijun Xian	Harbin Intstitute of Technology Civil Engineering	CHINA
CNT Nanocomposites	Alan Lau	The Hong Kong Polytechnic University	CHINA
Composites for Automotive Applications	Martin Bureau	National Research Council	CANADA
	David Trudel-Boucher	National Research Council	CANADA
Composites for Space Applications	Francis Martin	Canadian Space Agency	CANADA
	Marie-Josee Potvin	Canadian Space Agency	CANADA
Composites for Space Applications	Wanping Zheng	Canadian Space Agency	CANADA
Composites in Civil Construction	Urs Meier	Materials Science and Technology	SWITZERLAND
Composites in Wind Energy Technology	Simon Joncas	University of Quebec	CANADA
	Rogier Pieter Nijssen	Knowledge Centre of Wind Turbine Materials & Constructions	NETHERLANDS
	Dimitrios Zarouchas	Knowledge Centre of Wind Turbine Materials & Constructions	NETHERLANDS

SESSION DEVELOPERS

Composite Pressure Vessels and Piping	Pierre Mertiny	University of Alberta	CANADA
Damage & Failure	Chandra Veer Singh	University of Toronto	CANADA
Damage Modelling	Stephen Hallett	University of Bristol	UK
	Reza Vaziri	University of British Columbia	CANADA
Damage Tolerance and Impact	Richard Butler	University of Bath	UK
Deformation & Fracture	Constantinos Soutis	University of Sheffield	UK
Experimental Techniques	John Botsis	EPFL	SWITZERLAND
Experimental Techniques	Fin Caton-Rose	University of Bradford	UK
	Pete Hine	University of Leeds	UK
Failure Criteria	Abdul-Salam Kaddour	QinetiQ Group PLC	UK
Fatigue of Composites	Marino Quaresimin	University of Padova	ITALY
Flow & Heat Transfer Modeling	Suresh Advani	University of Delaware	USA
Forming of Advanced Composites and Engineering	Philip Harrison	University of Glasgow	UK
Green Composites	Tri Dung Ngo	National Research Council	CANADA
High Production Rate Technologies	António Torres Marques	MIT Portugal	PORTUGAL
Impact and Dynamic Responses	Serge Abrate	Southern Illinois University	USA
Impact Modeling or Penetration Modeling	Augustin Gakwaya	Laval University	CANADA
Impact Modeling or Penetration Modeling	Raj Das	The University of Auckland	NEW ZEALAND
Interfaces and Interphases	Vijay K Srivastava	Indian Institute of Technology, BHU	INDIA

SESSION DEVELOPERS

Interlaminar Reinforcements	Kunigal Shivakumar	North Carolina A&T State University	USA
	Sandi G. Miller	NASA Glenn Research Center	USA
Interlaminar Reinforcements	Paul Robinson	Imperial College London	UK
Joints	Irene Fernandez	Delft University of Technology	NETHERLANDS
Joints	Shahram Aivazzadeh	University of Burgundy	FRANCE
	Jean Yves Cognard	ENSTA	FRANCE
	Mohd Nasir Tamin	Universiti Teknologi Malaysia	MALAYSIA
Liquid Composite Molding	Francois Trochu	Polytechnique Montreal	CANADA
	Edu Ruiz	Polytechnique Montreal	CANADA
Mechanics of Nanocomposites	Marino Quaresimin	University of Padova	ITALY
	Michele Zappalorto	University of Padova	ITALY
Metal Matrix Composites	Mahmoud Attia	National Research Council-Aerospace	CANADA
Metal Matrix Composites	Jason Lo	Natural Resources Canada	CANADA
Metal Matrix Composites	Sergei T. Mileiko	Russian Academy of Sciences	RUSSIA
Micormechanical Modeling	Igor Tsukrov	University of New Hampshire	USA
Micromechanics/Nanomechanics	Robert Young	University of Manchester School of Materials	UK
Modelling of Laminated Plates and Shells	Antonio J. M Ferreira	Universidade do Porto	PORTUGAL
Multi-functional Composites (Symposium)	B.L. Lee	Air Force Office of Scientific Research (AFOSR)	USA
	James Thomas	US Naval Research Laboratory	USA

SESSION DEVELOPERS

Multi-functional Smart Composites	Alex Kalamkarov	Dalhousie University	CANADA
	Krishna Sri Challagulla	Laurentian University	CANADA
Multi-functional Nanocomposites	ShaoYun Fu	Chinese Academy of Sciences	CHINA
Nanocomposites	Tina Lekakou	University of Surrey	UK
Natural Fibre Composites	Alan Lau	The Hong Kong Polytechnic University	CHINA
	Hao Wang	University of Southern Queensland	AUSTRALIA
Symposium on Marine Composites	Yapa Rajapakse	Office of Naval Research	USA
	Arun Shukla	University of Rhode Island	USA
	Yasushi Miyano	Kanazawa Institute of Technology	JAPAN
Physical Properties	Jens Schuster	University of Applied Sciences Kaiserslautern	GERMANY
Probabilistic Analysis, Reliability and Design	Marcin Kaminski	Technical University of Lodz	POLAND
Processing & Manufacturing Technologies	Abbas Milani	University of British Columbia	CANADA
Processing & Manufacturing Technologies	Arthur Jones	University of Nottingham	UK
	Reza Vaziri	University of British Columbia	CANADA
Processing & Manufacturing Technologies	Peter Middendorf	Universität Stuttgart	GERMANY
Processing & Manufacturing Technologies	Peter Mitschang	Institut für Verbundwerkstoffe GmbH	GERMANY
	Ralf Schledjewski	University of Leoben	AUSTRIA
Stability of Thin Walled Structures	Haim Abramovich	Technion, Israel Institute of Technology	ISRAEL
Stimulus Responsive Polymer and Composites (Symposium)	Jinsong Leng	Harbin Institute of Technology	CHINA
	Andreas Lendlein	Helmholtz-Zentrum Geesthacht GmbH	GERMANY

SESSION DEVELOPERS

Structural Health Monitoring	Alfredo Güemes	Universidad Politecnica Madrid	SPAIN
Structural Health Monitoring	Ahmed Maslouhi	University of Sherbrooke	CANADA
Structural Health Monitoring	Nobuo Takeda	University of Tokyo	JAPAN
Structural Power Materials	Emile Greenhalgh	Imperial College London	UK
	Leif Asp	Swerea SICOMP AB	SWEDEN
Structural Response and Design	Zhongwei Guan	University of Liverpool	UK
Structural Response and Design	Paul Weaver	University of Bristol	UK
Structural Response and Design	Michael William Hyer	Virginia Polytechnic Institute and State University	USA
	Marie-Laure Dano	University of Laval	CANADA
Structural Response and Design	Husham Almansour	National Research Council Canada	CANADA
Sustainable Composites	Manjusri Misra	University of Guelph	CANADA
	Amar Mohanty	University of Guelph	CANADA
Textile Composites	Prasad Potluri	University of Manchester School of Materials	UK
Textile Composites	Alistair McIlhagger	University of Ulster	UK
Textile Technology for Composites	Hiroyuki Hamada	Kyoto Institute of Technology	JAPAN
Thermoplastic Composite Materials	Alfonso Maffezzoli	University of Salento	ITALY
Tribology of Polymer Composites	Klaus Friedrich	Technical University of Kaiserslautern	GERMANY
Weight Reduction Strategy	Stephen W. Tsai	Stanford University	USA

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VOLUNTEERS

Iosif Daniel Rosca (Leader)	Concordia University
Song Chong Hui	Concordia University
Hamidreza Yazdani	Concordia University
Jeffrey Fortin- Simpson	Concordia University
Wendy Xiong	Concordia University
Kulbir Singh Madhok	Concordia University
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Canhui Zhang	Concordia University
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Alvaro Geovany Ramirez Uribe	Ecole Polytechnique
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Mathilde Jean St. Laurent	Laval University

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Jeffica Hannesto	McGill University
Soroush Asgarinia	McGill University
Katherine Hay	McGill University
James Kratz	McGill University
Nicolas Krumenacker	McGill University
Benoit Landry	McGill University
Dominic LeBlanc	McGill University
Arthur Levy	McGill University
Wenjiao Liu	McGill University
Gilles Philippe Picher-Martel	McGill University
Mathieu Preau	McGill University
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Adam William Smith	McGill University
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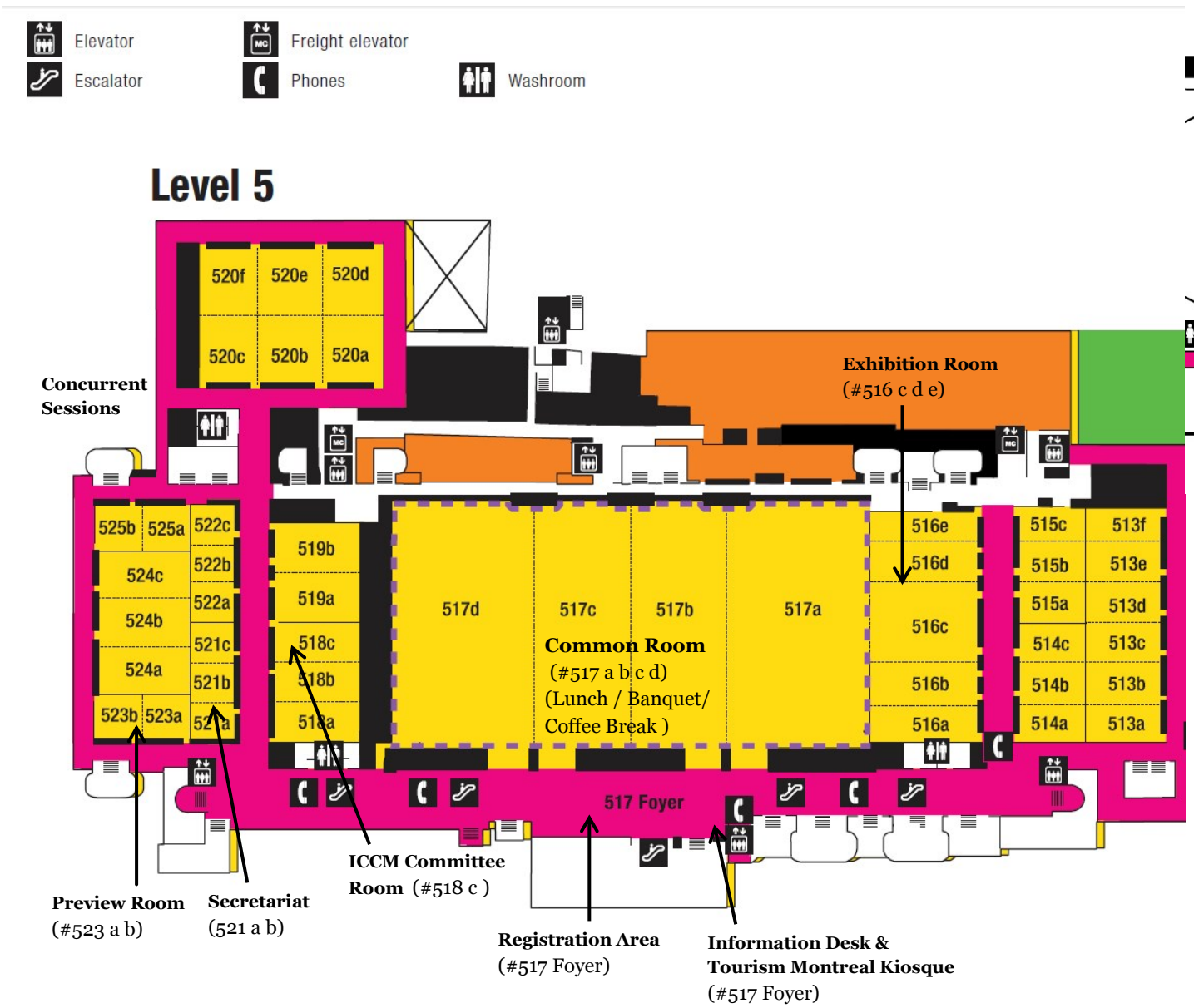
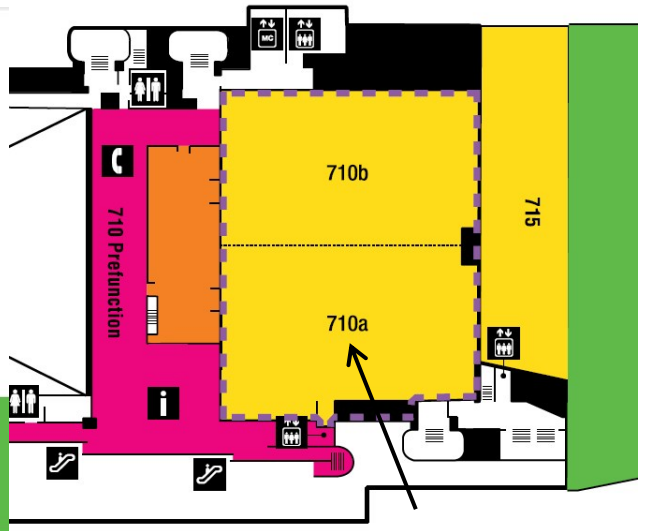
Alexander Steinbrenner	McGill University
Gabrielle Hubert	College Sainte-Marcelline

VENUE FLOOR PLAN



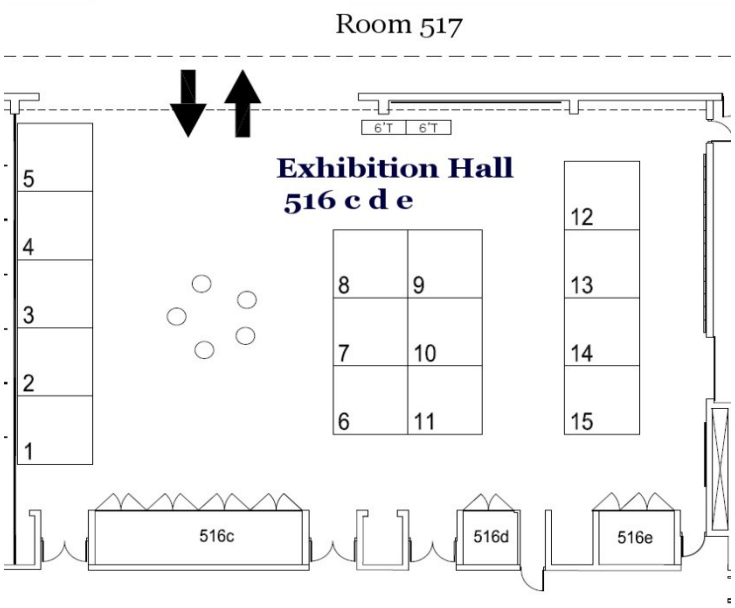


Plenary/ Keynote Lectures
ICCM General Assembly
(#710 a b)

Concurrent Sessions Room List

Room #514 a b c
Room #515 a b c
Room #516ab (**poster session**)
Room #518 a b
Room #519a
Room #519b
Room #520ad
Room #520be
Room #520c
Room #520f
Room #522 a b c
Room #524 a b
Room #524 c
Room #525 a b

EXHIBITION



Venue	Exhibition Hall **516** c d e
Exhibition Schedule	
- Setup	Sunday, July 28th 2:00pm – 6:00pm
- Exhibition Hours	Monday, July 29th 7:00am – 5:00pm Tuesday, July 30th 7:30am – 5:00pm Wednesday, July 31st 7:30am – 5:00pm Thursday, August 1st 7:30am – 3:30pm Friday, August 2nd 7:30am – 12:30pm
- Dismantling	Friday, August 2nd from 12:30pm
- Booth	8' high background and 3' high side dividers in black drape Inclusions: power, wi-fi, identification sign, 1 table with black skirt, 2 chairs

Name of Exhibitors	Booth #
Assembly Guidance Systems Inc, USA	12
Chinese Society of Composite Materials, China	1
Chomarat North America, USA	7
Composites Atlantic Limited, Canada	14
Composites Research Network, Canada	6
Concordia University / Centre for Composites, Canada	8
CREPEC (Centre de recherche sur les systèmes polymères et composites à haute performance), Canada	5
ERFT Composites (Engineering and Flow Technology for Composites), Canada	3
Instron, USA	2
Melbourne Convention Center, Australia	4
Metravib, France	15
Netzsch Instruments North America, LLC, USA	13

CONFERENCE INFORMATION

» REGISTRATION

Registration desks will be open on July 28 till August 2, 2013, on the fifth floor

July 28 (Sun):	16:00 – 18:00
July 29 (Mon) –August 1 (Thurs):	07:30 –18:30
August 2 (Fri):	07:30 – 12:30

» REGISTRATION FEE

Category	On-site Registration
Member	CAD $850
Non-Member	CAD $900
Student	CAD $450
Accompanying Person	CAD $300
Banquet	CAD $100

*All above fees are quoted in Canadian currency.

* All above fees include all applicable taxes (Goods Services Tax "GST"and Quebec Sales Tax "QST").

* All above fees (excluding for Accompanying Person) include a Program Booklet and copy of e- proceedings.

» NAME BADGE

All participants, accompanying persons and exhibitors must wear their name badges to access the conference. You will be given a name badge when you register at the registration desk. If your badge needs correction, please visit the registration desk for a replacement.

» CERTIFICATE OF ATTENDANCE & OFFICIAL RECEIPT

A certificate of attendance for participants and an official receipt for paid registration will be provided onsite at the registration desk during the conference.

» CONFERENCE PAPERS

The program book will contain a summary of each paper of about 50 words. Full papers are included in the proceeding USB. Due to the requests of a few authors, some papers only presented abstracts in the proceeding USB.

» INTERNET

During the period of the conference, standard internet access is available within the conference facilities (5th and 7th floor of the Palais des Congres. The wi-fi password is **iccm192013**

CONFERENCE INFORMATION

» PRESENTATION FILE SUBMISSION

All presenters are requested to directly submit their final presentation file to the designated session room at least 1 hour before their session. IBM computers with Windows Microsoft Office 2010 (English version) will be provided. It is possible for presenters to check their presentation file in the preview room (Room #523 a b). However the presentation files should be directly entered to the computer in each of the session rooms. The use of a McIntosh computer may result in technical problems. Therefore please visit the preview room in advance to check the system to avoid last minute problems.

Preview room operation time: July 28 (Sun): 16:00-18:00 || July 29 (Mon) –Aug 1 (Thur) 07:30 -18:30 || Aug 2 (Fri) 07:30-12:30

» POSTER PRESENTATION

Four-minute oral, room 516 a/b

The poster presentations will be made in sessions in parallel with the oral presentations. Each poster session will have the same time slot of about 80 minutes as other oral sessions. Each poster session will have about 12 posters displayed on poster boards in a room. There will be a chair and co-chair of each session. Presenters at the poster sessions are asked to mount their posters on poster boards about 10 minutes before the beginning of the session. The presenter of each poster will have 4 minutes for oral presentation. After all 12 posters have been presented in series (4 x 12 = 48 minutes), there will be 22 minutes available for further discussion between the presenters and the other participants. The 10 minutes remaining would be dedicated for the removal of the posters of the current session and the installation of the posters for the next session.

» LUNCH

Lunch will be provided on Monday, Tuesday, Wednesday and Thursday. A vegetarian option is available upon request in advance.

» BANQUET

For those who purchase a banquet ticket, it is included with the name badge. The banquet is a good time to network with other participants. There will be a circus performance by Montreal artists. There will also be a band who will play musical instruments made out of composite materials, by students and professor at a Montreal university.

» COFFEE BREAK

Coffee will be served in 517 Common Room during the designated time indicated on the program.

» INFORMATION DESK & TOURISM MONTREAL KIOSK (517 Foyer)

General information about the conference will be available at the information desk located close to the registration area during the conference period. Also a representative from Tourism Montreal will be available (Monday - Thursday) on the 5th floor to provide information about tourism in Montreal and Quebec.

CONFERENCE INFORMATION

» CONFERENCE SECRETATIAT (Room #521 a b)

- Before /after the conference: Tel. 514 848 2424 ext. 7997 at the Concordia University(1515 St Catherine West, EV3.418), see symbol (S) in the map below.
- During the conference: Tel. 514-789-3410, Room 521 a b or email iccm@iccm19.org at the Palais des Congres.

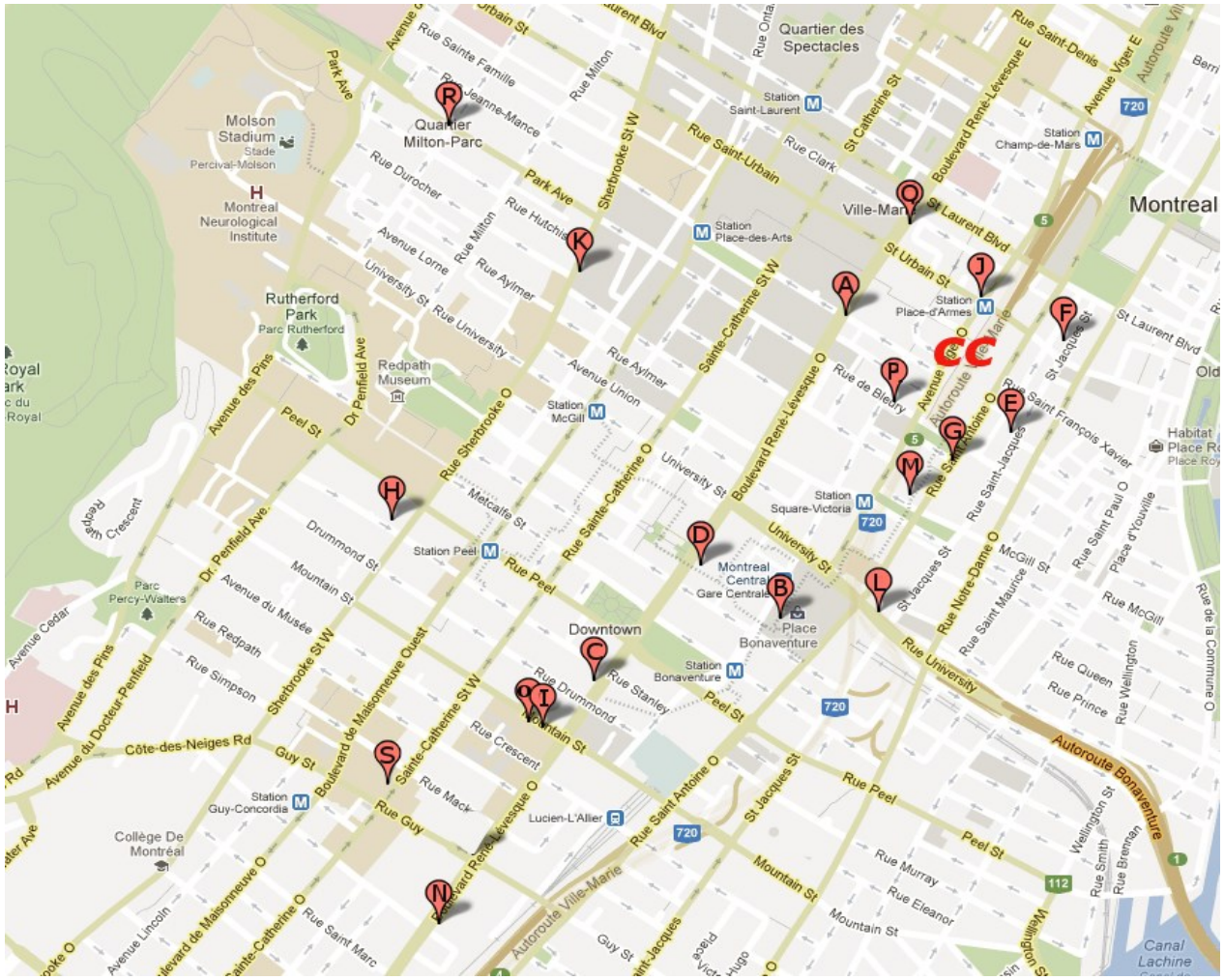
Conference Center (CC): Palais des congres Montreal, 1001 Place Jean-Paul-Riopelle, Montréal (Québec) H2Z 1H2, Canada

» Weather in Montreal

In July – August, the average temperature is around 28 °C . The dress code is semi-formal.

» Hotel Map

- Hyatt Regency (A)
- Hilton Bonaventure (B)
- Sheraton le Centre (C)
- Fairmont The Queen Elizabeth (D)
- Le Westin Montreal (E)
- Hotel Place d'Armes (F)
- Intercontinental (G)
- Sofitel Montreal Golden Mile (H)
- Le Crystal Hotel (I)
- Holiday Inn Select Montreal Centre Ville (J)
- Holiday Inn Midtown (K)
- Delta Centre Ville (L)
- W Montreal Hotel(M)
- Le Nouvel Hotel (N)
- Novotel Hotel (O)
- Dauphin Montreal Downtown (P)
- Travelodge Hotel (Q)
- McGill University-New Residence Hall & Royal Victoria College (R)



CONFERENCE INFORMATION

» TRANSPORTATION: AIRPORT - DOWNTOWN MONTREAL

Transportation between Pierre Elliott Trudeau airport and downtown Montreal can be done in many ways:

- Taxi: Taxi has a flat rate of CAD $40.00 from the airport to downtown + tip. Taxi stand at the airport is outside the arrival area. From downtown, you just stand on the street and wave at a taxi coming by. Most major hotels have taxis waiting outside.
- Shuttle 747: The shuttle has a flat fare of $9 from the airport to downtown for unlimited travel throughout STM bus and métro networks during 24 consecutive hours. It runs 24 hours a day and 7 days a week, at intervals of 10-20 minutes. Ticket can be brought at the fare vending machine at international arrival area, or pay exact amount in coins when boarding. The shuttle stops at a few locations in the downtown area (see map). At the airport, it stands outside the arrival area.
- By car: If you want to rent a car, there are car rental kiosks at the arrival area at the airport. You can ask them for a map to go downtown.

» TRANSPORTATION: IN DOWNTOWN MONTREAL

These hotels are within walking distance to the Palais des Congres. A map of the city, along with metro map are shown. Metro regular tickets are CAD $3 each. A day pass is CAD $9. A weekly pass is CAD $23.75 (valid on shuttle 747). For more information, please go to stm website http://beta.stm.info/en

PLENARY LECTURES

» All plenary lectures are at Room 710 a b (7F)

Time	Topic	Presented by	Chairperson
July 29 Monday			
8:30 – 9:20	**50 years of Advanced Composites Research and Innovation: A Canadian Perspective**	**Anoush Poursartip** (University of British Columbia)	Suong V. Hoa (Concordia University)
13:30 – 14:20	**Hierarchical Biocomposites by Design**	**Markus J. Buehler** (Massachussetts Institute of Technology)	Pascal Hubert (McGill University)
July 30 Tuesday			
8:30 – 9:20	**Vitrimers**	**Ludwik Leibler** (Matière Molle et Chimie, ESPCI)	Tsu Wei Chou (University of Delaware)
13:30 – 14:20	**Fabrication and Evaluation of FRTP using in-situ polymerizable PA6 with AvRTM**	**Goichi Ben** (Nihon University)	Takahira Aoki (University of Tokyo)
July 31 Wednesday			
8:30 – 9:20	**Virtual Testing of Composites: Opportunities and Challenges**	**Anthony Waas** (University of Michigan)	Gregory Odegard (Michigan Technological University)

PLENARY LECTURES

» All plenary lectures are at Room 710 a b (7F)

August 1 Thursday			
Time	**Topic**	**Presented by**	**Chairperson**
8:30 – 9:20	**How to make high performance structural composites multifunctional**	**Xiaosu YI** (AVIC Composite Corporation Ltd)	Stephen Tsai (Stanford University)
13:30 – 14:20	**The challenge of predicting failure in composites**	**Michael Wisnom** (University of Bristol)	Francois Trochu (Ecole Polytechnique Montreal)
August 2 Friday			
8:30 – 9:20	**A review: Carbon Fiber Reinforced composites for automotive**	**Mohini Sain** (University of Toronto)	Hiroyuki Hamada (Kyoto Institute of Technology)

KEY NOTE LECTURES

Time	Topic	Room	Chairperson
July 29 Monday			
9:30 – 10:10	**Recent Advances in ONR composites research** Yapa Rajapakse (Office of Naval Research)	710 a b	Arun Shukla (University of Rhode Island)
11:10 – 11:50	**Stimulus response polymer and multifunctional composites: challenges and prospects** Jinsong Leng (Harbin Institute of Technology)	710 a b	Andrew Johnston (National Research Council Canada)
14:30 – 15:10	**How do carbon nanotube fibers gain their strength** Tsu Wei Chou (University of Delaware)	710 a b	Frank Ko (University of British Columbia)
July 30 Tuesday			
9:30 – 10:10	**Introduction of Society of Automotive Composites Japan -A new wave of composites for automobile industry** H. Hamada Kyoto Institute of Technology and A. Nakai (Gifu University)	710 a b	Johanne Denault (National Research Council Canada)
11:10 – 11:50	**The world wide failure exercise- Strength prediction is not easy--- But we are getting there** Mike J. Hinton (National Composites Center, UK)	710 a b	Reza Vaziri (University of British Columbia)
14:30 – 15:10	**From smart sensing to multifunctional materials: Are we ready for the challenges?** Fu-Kuo Chang (Stanford University)	710 a b	Minoru Taya (University of Washington)

KEY NOTE LECTURES

July 31 Wednesday			
Time	**Topic**	**Room**	**Chairperson**
9:30 – 10:10	**Applications of composite technologies to aerospace systems in KARI** Seung Jo Kim (Korea Aerospace Research Institute)	710 a b	Isabelle Paris (Bombardier Aerospace)
13:30 – 14:10	**Multifunctional composite materials for Bio-Inspired systems allowing autonomic response** B.-L. Lee (Air Force Office for Scientific Research)	710 a b	Nancy Sottos (University of Illinois)
August 1 Thursday			
9:30 – 10:10	**Fusion bonding of thermoplastic composites** Ali Yousefpour (National Research Council Canada)	710 a b	Peter Mitschang (Institut fur Verdunwerkstoffe GMbH)
14:30 – 15:10	**Metal matrix composites** Dale Carlson (GE)	710 a b	Jason Lo (CANMET)

PROGRAM OVERVIEW

Monday - July 29

*Please note that all Plenaries and Keynotes, including sessions directly following a Keynote, will be presented in room 710. Please see highlighted.

	515	519a	514	524ab	524c	522	518ab	520ad	519b	520c	525	520f	520be	516ab
7:00														
8:20	OPENING CEREMONY													
8:30	PLENARY (Room 710) - Anoush Poursartip: "50 years of Advanced Composites Research and Innovation: A Canadian Perspective".													
9:30	CARBON NANO-COMPOSITES 1	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 1	KEYNOTE: RECENT ADVANCES IN ONR COMPOSITES RESEARCH Yapa D.s. Rajapakse	FRACTURE AND DAMAGE 1	FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 1	MODELLING AND SIMULATION I	LCM 1 - SATURATION	NATURAL FIBER COMPOSITES 1	DURABILITY AND AGING 1	STIMULUS RESPONSIVE POLYMER & COMPOSITES SYMPOSIUM I	COMPOSITES FOR BIOMEDICAL APPLICATIONS	DEFORMATION	GREEN COMPOSITES 1	APPLICATIONS (POSTER)
10:10			SYMPOSIUM ON MARINE COMPOSITES 1											
10:50	BREAK													
11:10	CARBON NANO-COMPOSITES 2	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 2	SYMPOSIUM ON MARINE COMPOSITES 2	FRACTURE AND DAMAGE 2	FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 2	MODELLING AND SIMULATION II	LCM 2 - PERMEABILITY	NATURAL FIBER COMPOSITES 2	DURABILITY AND AGING 2	KEYNOTE: STIMULUS RESP.POLY. & MULTIFUNCTIONAL COMP.: CHALLENGES & PROSPECTS Jinsong Leng	BIOMEDICAL COMPOSITES	CHARACTERIZATION 1	GREEN COMPOSITES 2	BIO & GREEN I (POSTER)
11:50										STIMULUS RESPONSIVE POLYMER & COMPOSITES SYMPOSIUM II				
12:30	LUNCH													
13:30	PLENARY (Room 710) - Markus J. Buehler: "Hierarchical Biocomposites by Design".													
14:30	KEYNOTE: HOW DO CARBON NANOTUBE FIBERS GAIN THEIR STRENGTH? Tsu-wei Chou	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 3	SYMPOSIUM ON MARINE COMPOSITES 3	FRACTURE AND DAMAGE 3	FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 3	MODELLING AND SIMULATION III	LCM 3 - PROCESS MODELING I	NATURAL FIBER COMPOSITES 3	BONDED JOINTS 1	STEPHEN TSAI AWARD	BIOCOMPOSITES 1	CHARACTERIZATION 2	GREEN COMPOSITES 3	BIO & GREEN II (POSTER)
15:10	MULTI-FUNCTIONAL NANO-COMPOSITES													
16:30	BREAK													
16:50	MULTI-FUNCTIONAL NANOCOMPOSITES	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 4	SYMPOSIUM ON MARINE COMPOSITES 4	FRACTURE AND DAMAGE 4	FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 4	MODELLING AND SIMULATION IV	LCM 4 - PROCESS MODELING I	NATURAL FIBER COMPOSITES 4	BONDED JOINTS 2	TSAI PANEL	BIO-COMPOSITES 2	CHARACTERIZATION 3	GREEN COMPOSITES 4	BIO & GREEN III (POSTER)
19:00	RECEPTION													
22:00	End													

PROGRAM OVERVIEW

Tuesday - July 30

*Please note that all Plenaries and Keynotes, including sessions directly following a Keynote, will be presented in room 710. Please see highlighted.

	515	519a	514	524ab	524c	522	518ab	520ad	519b	520c	525	520f	520be	516ab
7:30														
8:30	PLENARY (Room 710) - Ludwik Leibler: " Vitrimers".													
9:30	CNT NANO-COMPOSITES	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 5	SYMPOSIUM ON MARINE COMPOSITES 5	FRACTURE AND DAMAGE 5	TEXTILE COMPOSITES 1	MODELLING AND SIMULATION V	LCM 5 - PROCESS MODELING I	INTRODUCTION OF SOCIETY OF AUTOMOTIVE COMPOSITES JAPAN - A NEW WAVE OF COMPOSITES FOR AUTOMOBILE INDUSTRY Hiroyuki Hamada, Asami Nakai	FATIGUE OF COMPOSITES 1	MULIT-FUNCTIONAL SMART COMPOSITES I	STRUCTURAL RESPONSE & DESIGN		LIFE CYCLE ANALYSIS & RELIABILITY	TESTING (POSTER)
10:10								NATURAL FIBER COMPOSITES 5						
10:50	BREAK													
11:10	CNT NANO-COMPOSITES	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 6	SYMPOSIUM ON MARINE COMPOSITES 6	THE WORLD WIDE FAILURE EXERCISE-STRENGTH PREDICTION IS NOT EASY--- BUT WE ARE GETTING THERE Michael John Hinton, Sam Kaddour	TEXTILE COMPOSITES 2	MODELLING AND SIMULATION VI	LCM 6 - PERMEABILITY BENCHMARK WORKSHOP	NATURAL FIBER COMPOSITES 6	FATIGUE OF COMPOSITES 2	MULIT-FUNCTIONAL SMART COMPOSITES II	STRUCTURAL OPTIMIZATION 1	MULTI-SCALE MODELING 1	BIO-INSPIRED COMPOSITES 1	MECHANICAL PROPERTIES (POSTER)
11:50				FRACTURE AND DAMAGE 6										
12:30	LUNCH													
13:30	PLENARY (Room 710) - Goichi Ben: "Fabrication and Evaluation of FRTP using in-situ polymerizable PA6 with AvRTM".													
14:30	EXPERIMENTAL TECHNIQUES	FROM SMART SENSING TO MULTIFUNCTIONAL MATERIALS: ARE WE READY FOR THE CHALLENGES? Fu-kuo Chang	SYMPOSIUM ON MARINE COMPOSITES 7	FRACTURE AND DAMAGE 7	TEXTILE COMPOSITES 3	MODELLING AND SIMULATION VII	LCM 7 - CHARACTERIZATION	NATURAL FIBER COMPOSITES 7	FATIGUE OF COMPOSITES 3	MULIT-FUNCTIONAL SMART COMPOSITES III	STRUCTURAL OPTIMIZATION 2	MULTI-SCALE MODELING 2		MODELING I (POSTER)
15:10		MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 7												
16:30	BREAK													
16:50	EFFECT OF RESIDUAL STRESSES FROM MANU-FACTURING ON PROPERTIES	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 8	SYMPOSIUM ON MARINE COMPOSITES 8	FRACTURE AND DAMAGE 8	TEXTILE COMPOSITES 4	MODELLING AND SIMULATION VIII	OUT OF AUTOCLAVE MANU-FACTURING	NATURAL FIBER COMPOSITES 8	FATIGUE OF COMPOSITES 4	MULIT-FUNCTIONAL SMART COMPOSITES IV	STRUCTURAL HEALTH MONITORING	MULTI-SCALE MODELING 3		MODELING II (POSTER)
18:30	End													

PROGRAM OVERVIEW

Wednesday - July 31

*Please note that all Plenaries and Keynotes, including sessions directly following a Keynote, will be presented in room 710. Please see highlighted.

	515	519a	514	524ab	524c	522	518ab	520ad	519b	520c	525	520f	520bc	516ab
7:30														
8:30	PLENARY (Room 710) - Anthony Wass: "Virtual Testing of Composites: Opportunities and Challenges".													
9:30	CARBON MATRIX & BRAIDED COMPOSITES	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 9	APPLICATIONS OF COMPOSITE TECHNOLOGIES TO AEROSPACE SYSTEMS IN KARI Seung Jo Kim	FRACTURE AND DAMAGE 9	TEXTILE COMPOSITES 5	MODELLING AND SIMULATION IX	PROCESSING I	AUTOMATED COMPOSITES MANU-FACTURING I	FATIGUE OF COMPOSITES 5	HEALTH MONITORING 1	IMPACT & DYNAMIC RESPONSES 1	BISTABLE LAMINATES	MODELLING OF PLATES & SHELLS 1	PROCESSING (POSTER)
10:10			APPLICATIONS 1											
10:50	BREAK													
11:10	PHYSICAL PROPERTIES	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 10	APPLICATIONS 2	FRACTURE AND DAMAGE 10	INTERLAMINAR REINFORCE-MENTS I	MICRO-MECHANICAL MODELING SYMPOSIUM I	PROCESSING II	AUTOMATED COMPOSITES MANU-FACTURING II	FATIGUE OF COMPOSITES 6	HEALTH MONITORING 2	IMPACT & DYNAMIC RESPONSES 2	INTERFACE 1	MODELLING OF PLATES & SHELLS 2	JOINING (POSTER)
12:30	LUNCH													
13:30	MECHANICAL BEHAVIOR	MULTIFUNCTIONAL COMPOSITE MATERIALS FOR BIO-INSPIRED SYSTEMS ALLOWING AUTONOMIC RESPONSE B. Les Lee	APPLICATIONS 3	FRACTURE AND DAMAGE 11	INTERLAMINAR REINFORCE-MENTS II	MICRO-MECHANICAL MODELING SYMPOSIUM II	PROCESSING III	AUTOMATED COMPOSITES MANU-FACTURING III	COMPOSITE STRUCTURES 1	DETECTION & DAMAGE 1	IMPACT & DYNAMIC RESPONSES 3	INTERFACE 2	COMPOSITES IN TURBINES, PIPES AND VESSELS 1	HEALTH MONITORING, MULTI-FUNCTIONAL AND NDE (POSTER)
14:10		MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 11												
14:50	BREAK													
15:10	NANO-COMPOSITES I	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 12 - OPEN DISCUSSION	APPLICATIONS 4	FRACTURE AND DAMAGE 12	PREFORMS 1	MICRO-MECHANICAL MODELING SYMPOSIUM III	PROCESSING IV	AUTOMATED COMPOSITES MANU-FACTURING IV	COMPOSITE STRUCTURES 2	DETECTION & DAMAGE 2	IMPACT & DYNAMIC RESPONSES 4	INTERFACE 3	APPLICTIONS - ENERGY	DAMAGE AND FRACTURE (POSTER)
16:30	GENERAL ASSEMBLY													
18:30	End													

PROGRAM OVERVIEW

Thursday - August 1

*Please note that all Plenaries and Keynotes, including sessions directly following a Keynote, will be presented in room 710. Please see highlighted.

	515	519a	514	524ab	524c	522	518ab	520ad	519b	520c	525	520f	520be	516ab
7:30														
8:30	PLENARY (Room 710) - Xiaosu YI: "How to make high performance structural composites multifunctional".													
9:30	NANO-COMPOSITES II	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 13	APPLICATIONS 5	FRACTURE AND DAMAGE 13	CERAMIC MATRIX COMPOSITES 1	MODELLING AND SIMULATION X	PROCESSING V	AUTOMATED COMPOSITES MANU-FACTURING V	METAL MATRIX COMPOSITES I	NON DESTRUCTIVE EVALUATION 1	IMPACT & DYNAMIC RESPONSES 5	INTERFACE 4	FUSION BONDING OF THERMO-PLASTIC COMPOSITES Ali Yousefpour	IMPACT FATIGUE AND DURABILITY (POSTER)
10:10													THERMO-PLASTIC COMPOSITES 1	
10:50	BREAK													
11:10	NANO-COMPOSITES III	MULTI-FUNCTIONAL COMPOSITES SYMPOSIUM 14	APPLICATIONS 6	FRACTURE AND DAMAGE 14	CERAMIC MATRIX COMPOSITES 2	MECHANICAL PROPERTIES 1	PROCESSING VI	AUTOMATED COMPOSITES MANU-FACTURING VI	METAL MATRIX COMPOSITES II	NON DESTRUCTIVE EVALUATION 2	IMPACT & DYNAMIC RESPONSES 6	INTERFACE 5	THERMO-PLASTIC COMPOSITES 2	NANO-COMPOSITES I (POSTER)
12:30	LUNCH													
13:30	PLENARY (Room 710) - Michael Wisnom: "The challenge of predicting failure in composites".													
14:30	NANO-COMPOSITES IV	ENERGY DEVICES 1	APPLICATIONS 7	FRACTURE AND DAMAGE 15	CERAMIC MATRIX COMPOSITES 3	MECHANICAL PROPERTIES 2	PROCESSING VII	REPAIRS AND MACHINING	CHALLENGES OF APPLYING COMPOSITE MATERIALS TO THE NEXT GENERATION OF AEROENGINES Dale Richard Carlson	NON DESTRUCTIVE EVALUATION 3	IMPACT & DYNAMIC RESPONSES 7	INTERFACE 6	THERMO-PLASTIC COMPOSITES 3	NANO-COMPOSITES II (POSTER)
15:10									METAL MATRIX COMPOSITES III					
16:30	BREAK													
16:50	NANO-COMPOSITES V	ENERGY DEVICES 2	APPLICATIONS 8	FRACTURE AND DAMAGE 16	FRACTURE AND DAMAGE 18	MECHANICAL PROPERTIES 3	PROCESSING VIII	EXPERIMENTAL TECHNIQUES 1	METAL MATRIX COMPOSITES IV	MICRO-STRUCTURES	IMPACT & DYNAMIC RESPONSES 8	INTERFACE 7	THERMO-PLASTIC COMPOSITES 4	STIMULUS RESPONSIVE POLYMER & COMPOSITES & INTERFACES (POSTER)
18:00	COCKTAILS (Cash Bar)													
19:00	BANQUET													
22:00	End													

PROGRAM OVERVIEW

Friday - August 2

*Please note that all Plenaries will be presented in room 710. Please see highlighted.

	515	519a	514	524ab	524c	522	518ab	520ad	519b	520c	525	520f	520be	516ab
7:30														
8:30	PLENARY (Room 710) - Mohini Sain: A review: Carbon Fiber Reinforced composites for automotive".													
9:30		NANOCLAYS 1	APPLICATIONS 9	FRACTURE AND DAMAGE 17	FRACTURE AND DAMAGE 19	MECHANICAL PROPERTIES 4	JOINTS 1	EXPERIMENTAL TECHNIQUES 2	METAL MATRIX COMPOSITES V	COMPOSITE IN CIVIL INFRA-STRUCTURES 1	STRUCTURAL RESPONSE & DESIGN 1	INTERFACE 8	THERMO-PLASTIC COMPOSITES 5	CMC AND MMC (POSTER)
10:50	BREAK													
11:10	CARBON, NANOTUBES & GRAPHENES		APPLICATIONS 10				JOINTS 2	EXPERIMENTAL TECHNIQUES 3		COMPOSITE IN CIVIL INFRA-STRUCTURES 2	STRUCTURAL RESPONSE & DESIGN 2	INTERFACE 9		
12:50	End													

	Room 515	Room 519a	Room 710	Room 524ab	Room 524c
7:00					
8:20	**OPENING CEREMONY**				
8:30	**PLENARY (Room 710) - Anoush Poursartip: "50 years of Advanced Composites Research and Innovation: A Canadian Perspective".** Chair: Suong Hoa				
	CARBON NANOCOMPOSITES 1 Chair: Christopher Kingston	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 1** Chairs: B. Les Lee, Erik T. Thostenson	**SYMPOSIUM ON MARINE COMPOSITES 1** Chairs: Yapa D.s. Rajapakse, Arun Shukla	**FRACTURE AND DAMAGE 1** Chairs: Dineshkumar Harursampath Rajamohan Ganesan	**FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 1** Chairs: Philip Harrison, Frank Ko
9:30	**DEVELOPMENT OF SWCNT/AL2O3 COMPOSITES FOR BALLISTIC APPLICATIONS** Shuqiong Lin(NRC), Benoit Simard(NRC), Dave Morphy (NRC), Mariusz Bielawski(NRC), Peter Au (NRC), Jason Lo(CANMET, NRC), Manon Bolduc(Gov. of Canada), Jingwen Guan(NRC) Efforts were focused on using single walled carbon nanotubes (SWCNTs) as fillers for Al_2O_3 matrix to maximize the mechanical performance of the ceramic composite and minimize the mass loading of CNTs.	**A MATERIALS INFORMATICS APPROACH TOWARDS CREATING FUNCTIONALITY AT INTERFACES IN PMC** John Kieffer(University of Michigan - Ann Arbor), Michael Aldridge(University of Michigan - Ann Arbor), Katherine Sebeck(University of Michigan - Ann Arbor), Chen Shao(University of Michigan - Ann Arbor) We employ a combined computational and experimental approach to elucidate the nature of interphases in epoxy-based polymer matrix composites and develop strategies to improve interface functionality	**RECENT ADVANCES IN ONR COMPOSITES RESEARCH** Yapa D.s. Rajapakse (Office of Naval Research (ONR)) Presentation will provide an overview of research supported by the Solid Mechanics Program of ONR on mechanics of marine composites and composite sandwich structures.	**INTERACTION BETWEEN METALLIC MICRO-FASTENERS AND CARBON-FIBRE COMPOSITE LAMINATES** Philip N Parkes(University of Bath), Richard Butler(University of Bath) A novel metal-composite joining technology is presented. Load transfer is analysed with both high and low fidelity finite element models.	**INFLUENCE OF INTERPLY FRICTION ON THE FORMING OF STACKED UD PREPREG** Malin Akermo(Royal Institute of Technology), Ylva R Larberg(Royal Institute of Technology), Jens Sjolander(Royal Institute of Technology), Per Johan Hallander(Saab AB) The work includes forming simulations of hot drape forming of stacked UD prepreg. Influence of interply friction on forming behavior and wrinkle initiation is investigated.
9:50	**MANUFACTURING OF COMPOSITE LAMINATES WITH PERFORATED CARBON NANOTUBE FOREST CORE** Sei jin Park(University of Michigan - Ann Arbor), Sameh H. Tawfick(Massachusetts Institute of Technology), Anna Christine Brieland-shoultz(University of Michigan - Ann Arbor), A. john Hart(University of Michigan - Ann Arbor) This paper presents a manufacturing process for laminates with a nanocomposite interlayer comprising a micro-perforated carbon nanotube forest, optionally infiltrated with ceramic and/or polymer.	**MODELING THE RESPONSE OF DUAL CROSS-LINKED NANOPARTICLE NETWORKS TO MECHANICHAL DEFORMATION** Anna C. Balazs(University of Pittsburgh), Balaji V. s. Iyer(University of Pittsburgh), Victor V. Yashin(University of Pittsburgh) We developed a hybrid computational model for the response of a network of cross-linked polymer-grafted nanoparticles (PGNs)to an applied deformation.		**ADVANCED CRASH ABSORBERS STITCHED BY NATURAL FIBRES TO IMPROVE EFFECTIVE CRACK GROWTH RESISTANCE** Hessam Ghasemnejad(Kingston University) In the present paper the effects of stitching on the energy absorption and crashworthy behaviour of composite box structures will be studied.	**HYPERELASTIC & HYPOELASTIC MODELS FOR THE MESOSCOPIC ANALYSES OF COMPOSITE REINFORCEMENT DEFORMATION DURING FORMING** Philippe Boisse, Emmanuelle Vidal-sallé, Than Nguyen, Adrien Charmetant (Institut National des Sciences Appliquees de Lyon) Hyperelastic and hypoelastic models for fibre bundles are proposed to compute, at mesocopic scale, the 3D geometry of the deformed woven cell of fabrics during a forming process.
10:10	**ELECTRICAL RESPONSE OF GRAPHENE REINFORCED COMPOSITES UNDER STATIC AND DYNAMIC LOADING** Nicholas Heeder, Arijit Bose, Arun Shukla, Indrani Chakraborty (U. of Rhode Island), Fei Guo, Michael Godfrin, Robert Hurt, Anubhav Tripathi (Brown U.) An experimental study has been performed to understand the electrical response of graphene - reinforced composites under static and dynamic loading.	**VISCOELASTIC BEHAVIOR OF FUNCTIONAL GRADED COMPOSITES USING FINITE ELEMENT METHOD: EXPERIMENTAL AND NUMERICAL ASSESSMENT** Ya Wang(University of Michigan - Ann Arbor), Daniel J. Inman(University of Michigan - Ann Arbor) This paper presents a finite element method (FEM) for damping modeling of a multilayer composite structure, with a viscoelastic core sandwiched between elastic layers including piezoelectric layers.	**CONSTITUTIVE MODELING OF POLYMERIC MATRIX UNDER MULTI-AXIAL STATIC AND DYNAMIC LOADING** Isaac M Daniel(Northwestern University), Brian Werner(Northwestern University) Characterize a matrix resin under multi-axial loading at different strain rates and develop a general three-dimensional elasto-viscoplastic model that incorporates rate effects.	**FATIGUE DELAMINATION: A COMPARISON BETWEEN VIRTUAL CRACK CLOSURE AND COHESIVE ZONE SIMULATION TECHNIQUES** Gregorio Giuliese, Alessandro Pirondi, Fabrizio Moroni (U. of Parma), Andrea Bernasconi, Azhar Jamil(Polytechnic Institute of Milan), Ali Nikbakh (U. of Bologna) A cohesive zone model and the Virtual Crack Closure Technique (VCCT) are applied to simulate fatigue delamination of mode I, mode II and mixed-mode I/II loaded, three-dimensional specimen geometries.	**VALIDATION OF LOCAL STITCHING SIMULATION FOR STITCHED NCF PLY STACKS** Sylvain Bel, Daniel Leutz, Roland Hinterhoelzl, Klaus Drechsler (Technische Universitat Munchen), Alexane Margossian, Uwe Beier (Eurocopter Deutschland GmbH) Handling loose Non-Crimp Fabrics (NCF) ply stacks can be improved by joining the plies together using a local stitching. However, the stitching influences the draping behavior of the ply stack.
10:30	**ELECTRICALLY CONDUCITVE ADHESIVES FOR CFRP COMPOSITES BASED ON NICKEL NANOSTRANDS AND CARBON NANOTUBES** Iosif Daniel Rosca(Concordia University), Suong Hoa(Concordia University) We successfully formulated highly conductive structural adhesives based on nickel nanostrands and single wall carbon nanotubes for metal and CFRP substrates	**BIOINSPIRED NANOSTRUCTURED GLASS FIBRE SURFACE AND COMPOSITE INTERPHASE** Shanglin Gao, Yin hu Deng, Jian wen Liu , Edith Maeder (Leibniz Institute of Polymer Research Dresden) We report the use of graphene nanoplatelets and carbon nanotubes in glass fibre surface coatings and in turn composite interphases for integrating both mechanical and electrical functionalities.	**STUDY OF FLUID-STRUCTURE INTERACTION ON COMPOSITE STRUCTURAL VIBRATION** Young W Kwon(Naval Postgraduate School) This paper studied the effect of FSI on the natural frequency, mode shape, and modal curvature of polymer composites. Experimental tests were conducted for specimens in air and water, respectively.	**DAMAGE BEHAVIOUR IN QUASI-ISOTROPIC CFRP LAMINATES WITH SMALL FIBRE ORIENTATION MISMATCH** Hayato Nakatani(Osaka City University), Shinji Ogihara(Tokyo University of Science) Difference in damage behavior in quasi-isotropic CFRP laminates with fibre orientation angle mismatch of conventional 45° and 15° under tensile or out-of-plane loading was experimentally evaluated.	**EFFECT OF INTER-PLY SLIDING ON THE APPEARANCE OF DEFECTS FOR MULTILAYERED COMPOSITE SHAPING** Samir Allaoui(Universite d'Orleans), Gilles Hivet(Universite d'Orleans), Christophe Cellard(Universite d'Orleans) This paper presents the results of an experimental study of the effect of inter-ply relative sliding on the appearance and amplification of defects for multilayered composite shaping.
10:50	**BREAK**				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
7:00					
8:20	**OPENING CEREMONY**				
8:30	**PLENARY (Room 710) - Anoush Poursartip: "50 years of Advanced Composites Research and Innovation: A Canadian Perspective".** Chair: Suong Hoa				
	MODELLING AND SIMULATION I Chairs: Fin Caton-Rose, Peter Hine	**LCM 1 - SATURATION** Chairs: Edu Ruiz, Suresh G. Advani	**NATURAL FIBER COMPOSITES 1** Chairs: Hans Lilholt, Anh-Dung Ngo	**DURABILITY AND AGING 1** Chairs: Martin Lévesque, Alan Plumtree	**STIMULUS RESPONSIVE POLYMER & COMPOSITES SYMPOSIUM I** Chair: Jinsong Leng
9:30	**INDUSTRIAL APPLICATION OF FIBRE ORIENTATION PREDICTIONS** Dave Brands(SABIC), Claire Martin(SABIC), Warden Schijve() Most weight reduction in PP-LGF Automotive parts is obtained if an-isotropic shrinkage and mechanical material behavior is included in the design process. Accurate fibre orientation prediction is key.	**MODELING OF IN-PLANE VOID TRANSPORT DURING COMPOSITES PROCESSING** John Joseph Gangloff jr.(University of Delaware), Claire Daniel(Institut superieur de mecanique de Paris - SUPMECA), Suresh G Advani(University of Delaware) A model experiment has been developed where a flow cell is injected with a simulated resin and voids. The goal is to maximize the relative void velocity versus the resin for effective void migration.	**CARBON TEMPLATE FROM HEMP HURD POWDER** Zili Yan(University of Southern Queensland), Tian Ma(), Jianchun Zhang(), Hua Zhang(People's Liberation Army), Hao Wang(University of Southern Queensland) Carbon templates of biomorphic silicon/silicon carbide ceramic were fabricated from hemp hurd power with controllable density and narrow pore size distribution.	**ENVIRONMENTAL DURABILITY OF KENAF FIBRE REINFORCED UNSATURATED POLYESTER COMPOSITE** M. Liao Toshihiko HOJO, H. Hamada (Kyoto Inst. Tech.), Y. Yang, Z. Xu(Donghua U.), U. Semo Ishiaku (Ahmadu Bello U.), Z. arifin Mohd Ishak, G. Xian (Harbin Inst. Tech.) The results of this study revealed that environment temperature, moisture content have a significant influence on the kenaf mat reinforced UP composites during degradation process.	**WATER-INDUCED SHAPE MEMORY EFFECT OF EPOXY-BASED SHAPE MEMORY POLYMER** Wenxin Wang(Harbin Institute of Technology), Haibao Lu(Harbin Institute of Technology), Yanju Liu(Harbin Institute of Technology), Jinsong Leng(Harbin Institute of Technology) The novel epoxy-based SMP display good shape memory effect in response to water. This study advocates the design concept and presents some experimental results of the water-induced smart composite.
9:50	**PROPERTY CALCULATION SYSTEM FOR INJECTION AND COMPRESSION MOLDING OF FIBER-FILLED POLYMER COMPOSITES** Xiaoshi S Jin(Autodesk, Inc.), Jin Wang(Autodesk, Inc.), Sejin Han(Autodesk, Inc.) A fiber-filled polymer composite property calculation system for injection and compression molding simulations of fiber-filled polymer composites is presented with a few examples.	**EXPERIMENTAL STUDY ON THE IDENTIFICATION OF SATURATION OF A POROUS MEDIA THROUGH THERMAL ANALYSIS** Maxime Villiere(U. de Nantes), Sébastien Gueroult, Joël Bréard (U. du Havre), Vincent Sobotka, Nicolas Boyard, Didier Delaunay (Centre Nat. de la recherche scientifique CNRS) The aim of this study is to identify the saturation of a fibrous preform by a fluid through thermal analysis.	**WHAT ARE THE POSSIBLE ORIGINS OF THE NONLINEAR TENSILE BEHAVIOUR OF HEMP FIBRES?** Vincent Placet(FEMTO-ST), Frederique Trivaudey(FEMTO-ST), Ousseynou Cisse(FEMTO-ST), M Lamine Boubakar(FEMTO-ST) The aim of this work is to investigate the possible mechanisms responsible for the nonlinear beahviour of hemp fibres and to provide a discussion of state-of-the-art hypotheses.	**EXPERIMENTAL INVESTIGATION OF PHYSICAL AGING EFFECT ON THE MECHANICAL PROPERTIES OFA CARBON/POLYIMIDE BRAIDED COMPOSITE** Simon Dulong(Ecole Polytechnique de Montreal), Martin Lévesque(Ecole Polytechnique de Montreal), Chun Li(National Research Council Canada), Aurelian Vadean(Ecole Polytechnique de Montreal) This work aimed at acquiring knowledge about the thermo-mechanical behavior of a braided composite material for elevated temperature service conditions. Static and aging properties were studied.	**SMART COMPOSITE SURFACE WITH IN-SITU TUNABLE ADHESION BEHAVIOR** Tae-hyung Kang(Seoul National University), Seok bin Hong(Seoul National University), Tae-jun Ko(Seoul National University), Kyu hwan Oh(Seoul National University), Woong-ryeol Yu(Seoul National University) We combine the two-way shape memory composite with the surface patterning method, finally fabricating a smart composite surface that can change its surface morphology and adhesion reversibly
10:10	**REFINED MODELS ON THE WRINKLING OF SANDWICH PANELS UNDER BIAXIAL LOADING** Hsin-piao Chen(California State University, Long Beach), Hsun Chen(California State University, Long Beach) The facing wrinkling of composite sandwich panels have been investigated using two refined models. The deformation in core is decaying exponentially in both refined models.	**VOID MINIMIZATION AND OPTIMIZATION OF INJECTION VELOCITY IN RTM PROCESSING** Christophe Ravey, François Lebel, Edu Ruiz, Hubert Courteau-godmaire, François Trochu (Ecole Polytechnique de Montreal) The goal of this investigation is to find a way to predict the optimal injection velocity in order to reduce the void content in composite parts.	**INFLUENCE OF FIBRE ARCHITECTURE ON IMPACT AND FATIGUE BEHAVIOUR OF FLAX FIBRE-BASED COMPOSITES** Farida/ Bensadoun, Delphine Depuydt, Joris Baets, Aart Willem Van vuure, Ignaas Verpoest (Katholieke Universiteit Leuven) In this study, impact resistance and fatigue behaviour of flax fibre composites for various preform architectures will be investigated in order to assess the durability of the biocomposite material.	**LONG-TERM EXPOSURE OF POLYCYANATE COMPOSITES TO HIGH TEMPERATURE ATMOSPHERE** Yoshiyuki Kobayashi(Tokyo Metropolitan University), Satoshi Kobayashi(Tokyo Metropolitan University) Compressive and tensile strength test of carbon fiber reinforced plastics with polycyanate were conducted in order to evaluate effects of long-term exposure to high temperature air.	**THERMO-MECHANICAL PERFORMANCE AND FATIGUE CYCLING OF NOVEL BISMALEIMIDE-BASED SHAPE MEMORY POLYMER RESIN AND COMPOSITES** Gyaneshwar P. Tandon(University of Dayton), Thao T Gibson(University of Dayton), Richard Coomer(Southwestern Ohio Council for Higher Education), Jeff W Baur(Air Force Research Laboratory) Neat resin and unidirectional laminates were fabricated and their glassy, rubbery and shape memory behavior analyzed under multiple temperature/deformation cycles.
10:30	**MULTI-DISCIPLINARY DESIGN OPTIMIZATION OF SANDWICH CONSTRUCTIONS** Liliane Gilberte Ngahane Nana, Jörg Feldhusen, Stephanie Dallmeier, Benedikt Günther, Thomas Fieder (Rheinisch Westfalische Technische Hochschule Aachen) Sandwich constructions have the major advantage of being lightweight. In addition to that, economic and technical requirements are vital for the potential use of sandwich constructions.	**A MICROMECHANICS BASED MODEL OF RESIN FLOW IN FABRIC WITH CROSS-FLOW AND OVER-FLOW EFFECTS** D. Roy mahapatra A micromechanics model is developed for RTM process considering, chage in pore size, over-flow, cross-flow, and race tracking in context of Darcy's law.	**A METHODOLOGY TO ASSESS THE MECHANICAL BEHAVIOR OF PLANT FIBERS - APPLICATION TO FLAX FIBER ROVINGS UNDER TENSILE LOADING** Antoine Barbulée (ENSICAEN/UCBN/CNRS), Joël Bréard (Université du Havre / CNRS), Jean-Paul Jernot (ENSICAEN/UCBN/CNRS), Moussa Gomina (ENSICAEN/UCBN/CNRS) In this work we investigate the tensile behavior of flax fiber rovings. The usual methods applied to synthetic fibers are indeed unsuitable for plant fibers such as flax.	**ANISOTROPIC ACID PENETRATION IN TRIANGULAR BAR REINFORCED EPOXY COMPOSITE** Bryan Buning Pajarito(University of the Philippines Diliman), Masatoshi Kubouchi(Tokyo Institute of Technology) This work investigated acid penetration in amine-cured epoxy composites reinforced with aligned triangular bars. Acid penetration was found to be fast from the sloped than from flat side of specimen.	**TRANSMISSION ELECTRON MICROSCOPY CHARACTERIZATION OF EFFECT OF GRAPHITE IN ZRB2-BASED COMPOSITES** Liyuan Qin, Songhe Meng, Weihua Xie, Hua Jin, Chenghai Xu (Harbin Institute of Technology) The purpose of this paper is to report the investigation on the microstructure of ZrB2–based ceramic by TEM, and analyze the effect of the graphite flake.
10:50	**BREAK**				

	Room 525	Room 520f	Room 520be		Room 516ab
7:00					
8:20	**OPENING CEREMONY**				
8:30	**PLENARY (Room 710) - Anoush Poursartip: "50 years of Advanced Composites Research and Innovation: A Canadian Perspective".** Chair: Suong Hoa				
	COMPOSITES FOR BIOMEDICAL APPLICATIONS Chairs: Ifty Ahmed, François Barthelat	**DEFORMATION** Chair: Anthony M Waas	**GREEN COMPOSITES 1** Chairs: Asami Nakai, Amar Mohanty		**APPLICATIONS - POSTER** Chairs: Farjad Shadmehri, Gilbert Lebrun
9:30	**PREPARATION AND CHARACTERIZATION OF MWCNTS/PVA COMPOSITE HYDROGELS WITH HIGH MECHANICAL AND ELECTROCHEMICAL PROPERTY FOR BIOMEDICAL APPLICATION** Yudong Zheng, Kun Qiao, Wei Li, Lingling Ren, Yanyi Huang (Beijing University of Science and Technology) Biocompatible MWCNT/PVA composite hydrogels possess the enhanced mechanical properties and wear resistance, in combination with exellent electrical conductivity and electrochemical activity.	**FATIGUE LIFE ASSESSMENT OF INJECTION-MOLDED REINFORCED SHORT FIBRE THERMOPLASTICS: NOTCH EFFECTS** Carole Nadot-martin, Sylvie Castagnet, Yves Nadot (Institut Pprime CNRS ISAE-ENSMA), Andrea Bernasconi, Edoardo Conrado(Polytechnic Institute of Milan) A Through Process Modelling is enhanced to account for the influence of stress gradients on the fatigue life of injected notched samples. Results are compared to a large experimental database	**MULTIVARIABLE OPTIMISATION OF FIBRE REINFORCED HONEYCOMB SANDWICH PANELS** Sanjeev Rao(Centre for Advanced Composite Materials), Jeremy Chen(University of Auckland), Debes Bhattacharyya(University of Auckland) In this paper, failure maps have been constructed for various relative densities of the core. The optimum weight and hence the cost of the sandwich beam was obtained after four parameter optimisation.	9:30	**MECHANICAL CHARACTERIZATION OF NONWOVEN COMPOSITES WITH PET HOLLOW FIBERS AND ELASTOMERIC FIBERS FOR CUSHION MATERIALS** Ki young Kim, Hyo jin An, Dae young Lim, Woo lee Park
				9:34	**COST-SAVING POTENTIALS FOR CFRP PARTS IN EARLY DESIGN STAGES** Konstantin Horejsi, Johannes Noisternig, Olaf Koch, Ralf Schledjewski
				9:38	**SHAPE-ADAPTIVE COMPOSITE MARINE PROPELLERS – ANALYSIS AND OPTIMIZATION** Manudha Thiyunuwan Herath, Sundararajan Natarajan, B. gangadhara Prusty, Nigel St. john
				9:42	**PREPARATION AND THERMAL CHARACTERISTICS OF MORTAR CONTAINING HEXADECANE/XGNP SSPCM** Sughwan Kim, Jungki Seo, Okyoung Chung, Sumin Kim
9:50	**MICRO-PULLWINDING - AN AUTOMATED PRODUCTION TECHNOLOGY FOR MEDICAL DEVICES** Christian Brecher, Michael Emonts, Alexander Brack, Markus Eckert (Fraunhofer Institute for Production Technology) This paper shows the development of a micro-pullwinding technology for the manufacturing of medical devices, which allows the precise adjustment of the mechanical properties independent of each other.	**EXPERIMENTAL VERIFICATION OF SPRINGBACK PHENOMENON ANALYSIS BY FBG SENSORS AND IMAGE PROCESSING METHODS IN C/PPS COMPOSITE** Zdenek Padovec, Hynek Chlup, Milan Dvorak, Milan Ruzicka (Czech Technical University of Prague) Presented paper deals with comparison of analytical solution of the springback angle with two experimental methods - measurement with FBG sensors and image processing.	**EFFECT OF FLAX FIBRES INDIVIDUALISATION ON TENSILE FAILURE OF FLAX/EPOXY UNIDIRECTIONAL COMPOSITE** Guillaume Coroller(Universite de Bretagne Sud) The paper presents the effect of the mechanical properties and the individualization of flax fibers on the tensile properties of unidirectional composites	9:46	**THE APPLICATION OF MEDIUM TEMPERATURE CURED WITH HIGH GLASS TRANSITION TEMPERATURE RESIN SYSTEM ON BICYCLE RIMS** Peichi Chen
				9:50	**DESIGN, MANUFACTURING AND TESTING OF A SMALL-SCALE COMPOSITE MORPHING WING** Francois Michaud, Simon Joncas, Ruxandra Botez
				9:54	**DEGRADATION SMC UNDER HOT WATER IMMERSION** He Luan, Farzana Khan, Kotatsu Hamano, Yang Yuqiu, Yiping Qiu, Hiroyuki Hamada
				9:58	**SAHPE-MEMORY COMPOSITE ACTUATOR WITH SMA AND SMP** Hisaaki Tobushi, Kohei Takeda, Ryosuke Matsui, Syunichi Hayashi
10:10	**NEW COMPOSITES BASED ON BACTERIAL CELLULOSE AND PHAS FOR TISSUE ENGINEERING APPLICATIONS** Paul Octavian Stanescu, Catalin Zaharia, Veronica Fratila,, Eugeniu Vasile(University Politehnica of Bucharest) Bianca Galateanu (University of Bucharest) This work is focused on the synthesis and characterization of composite materials based on BC/PHBHV as biodegradable scaffolds for tissue engineering applications	**CHARACTERISATION OF INELASTIC PROCESSES IN CF TEXTILE REINFORCEMENTS** Magdalena Szpieg(Swerea SICOMP), Maciej Wysocki(Swerea SICOMP) This contribution concerns the development of intrinsic frictional processes and friction between a metallic tool and carbon fibre textile preforms when subjected to compression and shear.	**EFFECTS OF PRESS MOLDING CONDITIONS ON IMPREGNATION AND MECHANICAL PROPERTIES OF CARBON FIBER FABRIC/PA6 FILM COMPOSITE** Ousuke Ishida, Hiroshi Saito, Kiyoshi Uzawa, Isao Kimpara (Kanazawa Institute of Technology) Mitsugu Kimizu, Wataru Okumura (Industrial Research Institute of Ishikawa) The press molding conditions of carbon fiber fabric /polyamide6 were evaluated with film stacking method and we optimized the molding temperature for the economic manufacturing process.	10:02	**EVALUATION OF THERMAL CYCLING INFLUENCE ON PEI/CARBON FIBER COMPOSITES WITH AEROSPACE APPLICATION** Natassia Lona Batista, Edson Cocchieri Botelho, Koshun Iha
				10:06	**THERMOELECTRIC PROPERTIES OF NI/TIO2-X COMPOSITES** Yun Lu, Katsuhiro Sagara, Yusuke Matsuda, Liang Hao, Hiroyuki Yashida, Jinxiang Chen
				10:10	**REINFORCING AND COMPATIBILIZING EFFECT OF NANO SIZE MONTMORILLONITE ON HIGH DENSITY POLYETHYLENE-POLYAMIDE6 COMPOSITES** Hajnalka Hargitai
				10:14	**MECHANICAL PROPERTIES OF THICK COMPOSITE PIPES REINFORCED WITH MULTILAYER BRAID** Yusuke Shimizu, Asami Nakai, Akio Ohtani, Uozumi Tadashi, Kinzo Hashimoto
10:30	**THERMO-MECHANICAL CHARACTERIZATION OF NANO-HYDROXYAPATITE AND CELLULOSE REINFORCED POLY(LACTIC ACID) COMPOSITES WITH PROSPECTIVE APPLICATIONS FOR BONE** Arman Mahboubi soufiani, Masoud Salehi, Mikael Skrifvars (University College of Boras), Sung-woo Cho (Royal Institute of Technology) Evaluation of thermal, mechanical and viscoelastic properties of combinatorial thin composite films of PLA, n-HAp and two types of regenerated cellulose, applicable in bone tissue engineering.	**EXPERIMENTAL INVESTIGATION OF THE EXTENSION/TWIST COUPLING IN ROTATING COMPOSITE LAMINATES** Damien Reveillon(FEMTO-ST), Vincent Placet(FEMTO-ST), Stani Carbillet(FEMTO-ST), Emmanuel Foltete(FEMTO-ST), Patrick Sandoz(Universite de Franche-Comte) Optical and extensometric measurements have been used to study the extension/twist coupling behaviour of a laminated plate subjected to a rotating field.	**ELABORATION AND CHARACTERIZATION OF BIOCOMPOSITES FROM RICE HUSK, WHEAT HUSK AND PLA** Thao Tran(Ecole des Mines d'Alès), Jean-charles Benezet(Ecole Nationale Superieure des Mines d'Ales), Anne Bergeret(Ecole des Mines d'Alès) The objective of this study was to investigate the possibility that rice husk and wheat husk can be used as fillers in biocomposite systems.		
10:50	**BREAK**				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
10:50	BREAK				
	CARBON NANOCOMPOSITES 2 Chair: Christopher Kingston	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 2** Chairs: Chris Lynch, John Kieffer	**SYMPOSIUM ON MARINE COMPOSITES 2** Chairs: C.t. Sun, Michelle Stephanie Hoo Fatt	**FRACTURE AND DAMAGE 2** Chairs: Dineshkumar Harursampath Rajamohan Ganesan	**FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 2** Chairs: Philip Harrison, Frank Ko
11:10	**MECHANICAL PROPERTIES OF MULTI-WALLED CARBON NANOTUBE BUCKYPAPER BY POLYVINYLPYRROLIDONE ADHESIVES** Qianli Liu, Min Li, Jing Guo, Yizhuo Gu(Beihang University), Yanxia Li, Zuoguang Zhang (Beijing University of Aeronautics and Astronautics) PVP was used as dispersant during the dispersion process for preparing MWNT buckypaper to enhance its mechanical properties.In addition, three kinds of functionalized MWNT buckypapers were fabricated.	**COMPLIANT MULTIFUNCTIONAL WING STRUCTURES FOR HARVESTING SOLAR ENERGY** Hugh Alan Bruck(University of Maryland at College Park) New experimental and analytical principles for guiding multifunctional design of compliant wing structures with solar cells for MAVs are developed. Effects of front spar compliance are analyzed.	**UNDERWATER RESPONSE OF COMPOSITE PANELS SUBJECTED TO NEAR-FIELD BLAST LOADING** Arun Shukla(University of Rhode Island), Frank Livolsi(University of Rhode Island), Daniel Gracia(University of Rhode Island), James Leblanc(Naval Undersea Warfare Center) Experimental studies were performed to understand the Underwater Explosive [UNDEX] response of composite panels when exposed to near-field explosive loading in different environments.	**NOVEL COMPOSITE-COMPOSITE JOINING TECHNOLOGY WITH THROUGH THICKNESS REINFORCEMENT FOR ENHANCED DAMAGE TOLERANCE** Steffen Stelzer(Montanuniversitat Leoben), Stephan Ucsnik(Austrian Institute of Technology), Jürgen Tauchner(FACC AG), Thomas Unger(Montanuniversitat Leoben), Gerald Pinter(Montanuniversitat Leoben) A novel bonding technology that aims at combining form-fit and adhesive bonding with an integrative joint approach is presented in this paper.	**FORMING PARTS WITH ALIGNED MULTI WALL CARBON NANOTUBES** Per Johan Hallander(Saab AB) The aim of this work is to investigate influence of a composite manufacturing process on aligned MWCNTs. The study showed shear induced slip lines in all areas experiencing shear.
11:30	**ENHANCED CARBON NANOTUBE FIBER AND FILM BY A HIGH TOUGHNESS EPOXY** Yanan Liu, Yizhuo Gu, Min Li (Beihang University), Kun Wang, Zuoguang Zhang (Beijing U. Aeronautics and Astronautics), Dongmei Hu, Qingwen Li (Chinese Academy of Sciences), The tensile strength and modulus of CNT fiber and CNT film were efficiently improved by introducing a high toughness epoxy resin. The mechanism of the improvement was also analyzed.	**SMP FILLED HONEYCOMB AS A RECONFIGURABLE SKIN: MODEL AND EXPERIMENTAL VALIDATION** Richard V Beblo, John P Puttmann(University of Dayton), Nathanial E Deleon, James J Joo, Gregory W Reich (Air Force Research Laboratory) To aid in the design and optimization of a reconfigurable skin, an analytical model predicting the mechanical response of an SMP filled honeycomb is presented with experimental validation.	**BLAST PARAMETER EFFECTS IN FULL SCALE AIR BLAST ON SANDWICH COMPOSITE PANELS** John Philip Dear(Imperial College of Science) Research has been performed into blast testing of glass fiber reinforced polymer (GFRP) foam sandwich composites in air situations. Modelling has also been performed .	**COUPLING OF PLANAR GROWTH AND MATRIX CRACKING IN MODE III DELAMINATION TOUGHNESS TESTING** Allison Lynne Johnston(Syracuse University), Barry D Davidson(Syracuse University) This work determines the reason for the observed dependence of apparent mode III toughness on delamination length for a split-shear torsion test, and generalizes the results for other mode III tests.	**EVALUATION OF DAMAGE DEVELOPMENT OF NON-CRIMP FABRIC COMPOSITES WITH A CIRCULAR HOLE BASED ON MULTI-SCALE ANALYSIS** Tetsusei Kurashiki(Osaka University), Yoshitaka Matsushima(Osaka University), Yuki Nakayasu(Osaka University), Masaru Zako(Osaka University) Damage development of NCF composites with a circular hole was estimated by mesh superposition method. The stiffness reduction has same tendency with the numerical and experimental results.
11:50	**INTERFACIAL STRESS TRANSFER IN GRAPHENE OXIDE NANOCOMPOSITES** Zheling Li(University of Manchester), Robert Young(University of Manchester), Ian A. Kinloch(University of Manchester) Raman D band downshifted as the interfacial stress transfer in GO/PVA nanocomposites. And the alignment of GO layers in the composites has been characterized by polarized Raman spectroscopy.	**ADAPTIVE COMPOSITE PANEL WITH EMBEDDED SMA ACTUATORS: DESIGN, MANUFACTURING AND TESTING** Simon Lacasse(Ecole de Technologie Superieure), Charles Simoneau(Ecole de Technologie Superieure), Patrick Terriault(Ecole de Technologie Superieure), Vladimir Brailovski(Ecole de Technologie Superieure) This work aims at developing models and manufacturing technology applicable to adaptive panels actuated by active SMA elements embedded into a passive composite laminate host structure.	**SNAP-THROUGH INSTABILITY, DELAMINATION AND DAMAGE PROGRESSION IN AIR AND WATER BACKED CURVED SANDWICH STRUCTURES** Romesh Batra(Virginia Polytechnic Institute and State University (Virginia Tech)), Jian Xiao(University of Michigan - Ann Arbor) We use coupled boundary element method (BEM) and the finite element method (FEM) to analyze transient plane strain deformations of a curved sandwich structure exposed to a shock wave.	**ANALYTICAL AND FINITE ELEMENT ANALYSES ON RELIABILITY OF CARBON FIBRE REINFORCED PLASTICS** Heng-yi Chou, Sébastien Joannès, Anthony R. Bunsell, Alain Thionnet (Ecole Nationale Superieure des Mines de Paris) Lifetime prediction is a key challenge for composite materials. A FE model and AE technique led us to an intrinsic safety factor below which the material would be unreliable for long term use.	**A SIMULATION APPROACH FOR TEXTILE COMPOSITE REINFORCEMENTS** Thomas Gereke, Oliver Doebrich, Matthias Huebner, Chokri Cherif (Technische Universitat Dresden) A macroscopic material model for finite element simulations of textile forming processes is introduced that reflects the specific material behavior of textiles and their nonlinear character.
12:10	**STUDY ON MECHANICAL PROPERTIES OF MODIFIED GRAPHENE/EPOXY NANOCOMPOSITES** Muchun Liu(Beihang University), Meihong Ge(Beijing Oriental Hanson Curtain Wall Technology Co. Ltd.), Song Yang(Beijing UFT Conference&Exhibition Co. Ltd) We prepared two kinds of modified graphene and tested the impact strength of modified/epoxy nanocomposites, the reason why the epoxy matrix is enhanced or failed has been discussed.	**FROM ATTACHED SMA WIRES TO INTEGRATED ACTIVE ELEMENTS – A SMALL STEP?** Moritz Hübler(Institut fuer Verbundwerkstoffe GmbH), Martin Gurka(Institut fuer Verbundwerkstoffe GmbH), Ulf Paul Breuer(Institut fuer Verbundwerkstoffe GmbH) A close look is taken at two of the main challenges for the manufacturing of new hybrid laminates. These challenges are directly linked to the special behavior of the integrated SMA filaments.	**RESPONSE OF CYLINDRICAL COMPOSITE STRUCTURES TO UNDERWATER IMPULSIVE LOADING** Siddharth Avachat(Georgia Institute of Technology), Min Zhou(Georgia Institute of Technology) The objective of this analysis is to characterize the dynamic deformations and damage response of curved sandwich composites subjected to high intensity underwater impulsive loads.	**EXPERIMENTAL CHARACTERISATION OF THE PROGRESIVE FAILURE OF GRID-SCORED SANDWICH STRUCTURES IN WIND TURBINE BLADES** Steffen Laustsen(Aalborg University) The initiation and progression of failure in a grid-scored sandwich laminate is investigated when subjected to either uni- or multi-axial quasi static loading conditions.	**MULTI-SCALE MODELLING OF FIBRE BUNDLES** Nilanjan Das chakladar(University of Manchester), Partha Mandal(University of Manchester), Prasad Potluri(University of Manchester) The research deals with modelling of fibre assemblies with a view to increase the computational efficiency without restricting the fibre count to predict the intra-yarn fibre interactions.
12:30	**LUNCH**				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 710
10:50	BREAK				
	MODELLING AND SIMULATION II Chairs: Augustin Gakwaya, Zhongwei Guan	**LCM 2 - PERMEABILITY** Chairs: Philippe Boisse, François Trochu	**NATURAL FIBER COMPOSITES 2** Chairs: Amar K. Mohanty, Manjusri Misra	**DURABILITY AND AGING 2** Chairs: Martin Lévesque, Alan Plumtree	**STIMULUS RESPONSIVE POLYMER & COMPOSITES SYMPOSIUM II** Chair: Marie-Laure Dano; Andrew Johnston
11:10	**FINITE ELEMENT MODELING OF BALLISTIC IMPACT ON MULTI-LAYER WOVEN FABRICS** Deju Zhu(Hunan University), Barzin Mobasher(Arizona State University), S.d. Rajan(Arizona State University) A material model of woven fabric has been also implemented in LS-DYNA and was validated by comparing the FE simulation with the NASA ballistic test results.	**EFFECT OF SPECIMEN HISTORY ON MEASURED IN-PLANE PERMEABILITY OF FABRICS** Andreas Endruweit(University of Nottingham), Xuesen Zeng(University of Nottingham), Andrew C Long(University of Nottingham) The effect of the specimen history on the fabric structure is characterised. Its correlation with varying permeability for different batches of reinforcement fabrics is studied.	**THE RECOVERY, REPROCESSING AND REUSE OF WASTE GLASS FIBRE FABRICS: CLOSED-LOOP RECYCLING** Claire Fiona Wait, Nicholas Shotton-gale, Mohammed Shafiq Irfan, Surya Pandita, Liwei Wang, Mark Paget, Roger Price, John James, Gerard Fernando (University of Birmingham) This study illustrates procedures developed to recover waste glass fibre fabric produced during a weaving process and manufacture filament wound tubes to replace cardboard tubes used in the factory.	**PREPARATION AND CHARACTERISATION OF NANOPARTICLE-DOPED COMINGLED COMPOSITES FOR IMPROVED FIRE PERFORMANCE** Spyros Anastasios Tsampas(Swerea SICOMP), Patrik Sven Fernberg(Swerea SICOMP), Giovanni Camino(Polytechnic Institute of Turin), Marco Monti, Per Blomqvist() The study focuses on the enhancement of fire behaviour of composites through the development and use of nanoparticle modified polymer fibres in their manufacturing.	**STIMULUS RESPONSIVE POLYMER AND MULTIFUNCTIONAL COMPOSITES: CHALLENGES AND PROSPECTS** Jinsong Leng (Harbin Institute of Technology) Stimulus Responsive Polymer and Composites are materials that have one or more properties can be significantly changed in a controlled fashion by external stimuli.
11:30	**NUMERICAL MODELLING OF PERFORATION RESISTANCE OF FOAM-BASED SANDWICH PANELS** Jin Zhou(University of Liverpool), Wesley James Cantwell(Khalifa University of Science Technology and Research), Zhongwei Guan(University of Liverpool) The FE model for foam based sandwich structures has been developed to model the impact response of oblique impact and conditions on pressure difference in an aqueous support and air.	**INFLUENCE OF THE SHEARING OF TEXTILES ON THE IN-PLANE PERMEABILITY** Matthias Arnold(Institut fuer Verbundwerkstoffe GmbH), Massimo Cojutti(Audi AG), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) In this paper the influence of textile shearing on the in-plane permeability is investigated. The permeability values can be used as material parameters for filling simulations.	**INTERFACIAL ADHESION AND MECHANICAL BEHAVIOUR OF NATURAL FIBRE COMPOSITES: EFFECT OF SURFACE ENERGY AND PHYSICAL ADHESION** Carlos Anibal Fuentes, Le Quan Ngoc Tran, Christine Dupont-gillain, Aart Willem Van vuure, Ignaas Verpoest (Katholieke Universiteit Leuven) An integrated physical-chemical-micromechanical approach is presented in order to study and control the interfacial adhesion strength in composite materials with a natural fibre reinforcement.	**EFFECT OF HUMIDITY AND TEMPERATURE ON THE CURING AND AGING OF A ROOM TEMPERATURE EPOXY ADHESIVE** Émilie Charette, Edith roland Fotsing, Catherine Billotte, Edu Ruiz, Julian Gutiérrez (Ecole Polytechnique de Montreal), Daniel Grenier(Cent. de recherche indus. du Quebec CRIQ), Impact of hygrothermal aging on the curing kinetics and the mechanical properties of epoxy adhesive was investigated using DSC and DMA and gravimetric measurements.	
11:50	**MODELING WING LEADING EDGE MADE WITH SLM LATTICE CORE AND CFRP SKIN** Matthew Smith(), Zhongwei Guan(University of Liverpool), Wesley J Cantwell(), Bob Mines(University of Liverpool) This paper presents numerical modeling of structural impact response of wing leading edge (WLE) made with SLM lattice core and CFRP skin.	**OPTICAL PERMEABILITY MESUREMENTS OF NCF: INFLUENCE OF MATERIALPROPERTIES ON THE 2D PREFORM PERMEABILITY** Ralf Schledjewski(Montanuniversitat Leoben), Harald Grössing(Montanuniversitat Leoben) 2d permeability behavior of NCF is determined, used as input parameters for filling simulations and the prediction quality of mold filling simulation is verified	**FLAME RETARDANT KENAF/PLA BIOCOMPOSITES: EFFECT OF AMMONIUM POLYPHOSPHATE** Donghwan Cho(Kumoh National University of Technology) In the present study, we studied how incorporation of ammonium polyphosphate into PLA influences the flame retardancy and the mechanical and thermal properties of kenaf/PLA biocomposites.	**EXPERIMENTAL AND NUMERICAL STUDIES OF HYGROTHERMAL AGING OF BIO-COMPOSITE SHORT FIBER HEMP / POLYPROPYLENE** Karim Bensalem, Lotfi Toubal, Jean-christophe Cuilliere, Vincent Francois (University of Quebec at Trois-Rivieres), Papa birame Gning(Universite de Bourgogne) Experimental and numerical study of the influence of water aging on the mechanical behavior of hemp short fibers reinforced polypropylene bio-composite.	**NANOPAPER ENABLED SHAPE-MEMORY POLYMER COMPOSITE FOR ELECTRICAL ACTUATION** Haibao Lu(Harbin Institute of Technology) The purpose of this work is to provide details of all aspects of the nanopaper enabled SMP composites from fundamentals to applications on an intermediate level.
12:10	**REALIZING WISHFUL DREAM --TO PREDICT LAMINATE ULTIMATE STRENGTH UPON INDEPENDENT CONSTITUENT PROPERTIES ONLY** Zheng-ming Huang(Tongji University), Ling Liu(Tongji University) A long-term dream is to predict ultimate strength of a laminate under any load only upon mechanical properties of its constituents measured independently. This article shows this dream is achievable	**DETECTION OF PERMEABILITY VARIATIONS IN FOR EARLY QUALITY ASSESSMENT IN LIQUID COMPOSITE MOLDING** Claudio Di Fratta, Luigi Di lillo, Florian Klunker, Paolo Ermanni (Swiss Federal Institute of Technology, Zurich) This work investigates a pressure sensor based approach to detect permeability variations during Liquid Composite Molding processes, with the aim to obtain early information on the product quality.	**POLYPROPYLENE/KENAF COMPOSITES: THEIR MECHANICAL/FIRE RETARDANT PROPERTIES AND FIBER LENGTH RETENTION IN TWIN SCREW PROCESSING** Debes Bhattacharyya(University of Auckland) This paper studies twin screw compounding behaviour and degradation of kenaf fibres with polypropylene matrix for improving the thermal and mechanical characteristics of injection moulded products.		**DESIGN AND CHARACTERIZATION OF FILAMENT-WOUND COMPOSITE SHELLS REINFORCED BY GRID** Zaiwen Lin(Harbin Institute of Technology) This advanced polymer structure significantly improved the payload capabilities and enabled the AGS structure to have a high mechanically resistive capability in practical applications.
12:30	LUNCH				

	Room 525	Room 520f	Room 520be		Room 516ab
10:50	**BREAK**				
	BIOMEDICAL COMPOSITES Chairs: Christopher Hansent, François Barthelat	**CHARACTERIZATION 1** Chairs: Ignaas Verpoest, Mehdi Hojjati	**GREEN COMPOSITES 2** Chairs: Asami Nakai, Anh Dung Ngo		**BIO & GREEN I - POSTER** Chairs: Farjad Shadmehri, Gilbert Lebrun
11:10	**BIOMECHANICAL PROPERTIES OF RESORBABLE COMPOSITE BONE FRACTURE REPAIR PLATES** Ifty Ahmed(University of Nottingham) This paper presents biomechanical (flexural and torsional) studies conducted on rabbit tibiae using novel resorbable composite plates for bone fixation applications.	**CORRELATIONS OF MECHANICAL AND IONIC CONDUCTION PROPERTIES WITH BICONTINUOUS MORPHOLOGIES OF STRUCTURAL ELECTROLYTES** N. Shirshova, A. Bismarck, E. Smith Greenhalgh, M. S p Shaffer, J. Hg Steinke (Imp. Col. of Sci.), S. Carreyette (Cytec), P. Johansson, M. Marczewski, P. Jacobsson (Chalmers U. Tech.), G. Kalinka, M. Wienrich (BAM Fed. Inst. for Mat. Res.& Testing) Effect of morphology on ionic conductivity and mechanical properties of the structural electrolytes comprising of industrial epoxy resin an ionic liquid based electrolyte will be discussed	**STUDY ON CHEMICAL TREATMENT OF CELLULOSE FIBER TO IMPROVE HEAT RESISTANCE AND THE MECHANICAL PROPERTY OF COMPOSITE MATERIALS USING TREATED FIBER** Si Ha(Kyoto Institute of Technology), Teruo Kimura(Kyoto Institute of Technology), Haruhiro Ino(Kyoto Institute of Technology), Akihiro Suzuoka() To improve heat resistance property of cellulose fiber, TEOS treatment is proposed. The heat resistant cellulose fiber reinforced composite has higher tensile strength even after long molding time.	11:10	**CHARACTERIZATION AND TREATMENT OF WATER HYACINTH FIBERS FOR NFRP COMPOSITES** Terence Palad Tumolva
				11:14	**MEAN AND VARIATION BASED FUZZY CHARACTERIZATION OF YOUNG'S MODULUS OF A FLAX/EPOXY BIOCOMPOSITE MATERIAL** Reza Soufian Khakestar, Lotfi Toubal, Luc Laperriere, Kossi Fabrice Sodoke
				11:18	**INFLUENCE OF FABRICATION CONDITIONS ON PROPERTIES OF PLA/PBAT WOOD COMPOSITE STRAND** Nattakarn Hongsriphan
				11:22	**PREPERATION AND CHARACTERIZATION OF GREEN COMPOSITE USING LACTIC ACID MODIFIED LIGNIN** Sung hoon Kim, Jongshin Park
11:30	**IN VIVO TESTING OF A PHOSPHATE GLASS FIBRE / PLA COMPOSITE USING A RABBIT TIBIA MODEL** Andrew James Parsons(University of Nottingham) In vivo study of a phosphate glass fibre reinforced PLA composite in a (non-fracture) rabbit tibia model, compared to a metal control. The study focused on composite degradation and tissue response.	**PREDICTION OF ATTENUATED GUIDED WAVES PROPAGATION IN CARBON FIBER COMPOSITES** Matthieu Gresil(University of South Carolina), Victor Giurgiutiu(University of South Carolina - Columbia) The advancement of composite materials in aircraft structures has led to on increased need for technologies that are able to detect and assess damage present in composites structures.	**PREPREG STYLE FABRICATION OF ALL-CELLULOSE COMPOSITES** Jeremias Schuermann(University of Canterbury), Tim Huber(University of Guelph), Mark P. Staiger(University of Canterbury) All-cellulose composites are fabricated using a prepreg style manufacturing process. Fabrication flexibility is investigated. The composites are examined and mechanical properties are determined.	11:26	**CHARACTERISATION OF THE MECHANICAL AND THERMAL DEGRADATION BEHAVIOUR OF NATURAL FIBRES FOR LIGHTWEIGHT AUTOMOTIVE APPLICATIONS** José luis Rudeiros-fernández, James Thomason, John Liggat, Maria Soliman
				11:30	**SILK HYDROGEL COMPOSITE SCAFFOLD CONTAINING HYDROXYAPATITE NANOCRYSTAL** Kim Hyung hwan, Kang Min ji, Park A reum, Kim Shin hwan, Park Young hwan
				11:34	**POLYLACTIC ACID/HALLOYSITE NANOCOMPOSITES FILMS BY SOLVENT CASTING METHOD** Rangika Thilan De silva, Pooria Pasbakhsh
				11:38	**PHOSPHORUS-CONTAINING FLAME RETARDANT COMPOISITES WITH RAMIE FIBER AND POLY(LACTIC ACID)(PLA)** Tao Yu, Yan Li
11:50	**A TEXTILE-BASED VIABLE COMPOSITE STENT FOR VASCULAR APPLICATION** Valentine Gesche(Aachen University) In this work, the correlation between textile process parameters and mechanical properties of a composite implant, the so called BioStent, was investigated.	**FOREIGN OBJECT INDUCED FIBER UNDULATION INFLUENCE ON MECHANICAL PROPERTIES OF COMPOSITE LAMINATE** Henrik Herranen(Tallinn University of Technology), Alar Kuusik(Tallinn University of Technology), Henri Lend(Tallinn University of Technology), Steffen Czichon(Elan-Ausy GmbH), Jaan Kers(Tallinn University of Technology), Marko Piirlaid(Tallinn University of Technology) The fiber undulation around elliptical foreign object inside GFRP laminate is investigated and the resin pockets at the ends of foreign object are minimized through optimization procedure.	**INVESTIGATION OF SI-GEL-NR INTERACTION IN SI-GEL/NR VULCANIZATE AND THE EFFECT OF PEG ON THE RUBBER VULCANIZATED** Chanchai Thongpin(Silpakorn University) The addition of PEG could act as an activator in vulcanization reaction of 15Si-gel/NR+PEG and 15PSi/NR+PEG. Crosslink density was enhanced.	11:42	**APPLICATION OF FURAN RESIN TO GREEN COMPOSITES AND THE EFFECT OF PEROXIDE ON FURAN RESIN CURING** Hiroha Tanaka, Masatoshi Kubouchi, Saiko Aoki, Terence Palad Tumolva
				11:46	**TENSILE PROPERTIES OF BAMBOO,JUTE AND KENAF MAT-REINFORCED COMPOSITES** Zhilan Xu, Jungang Li, Mengyuan Liao, Yuqiu Yang, Hiroyuki Hamada
				11:50	**IMPACT MODIFICATION OF WASTE PLASTIC/WOOD FLOUR COMPOSITES VIA STRUCTURAL MODIFICATION** Adel Ramezani kakroodi, Yasamin Kazemi, Denis Rodrigue
12:10	**LOCK-IN THERMOGRAPHIC INSPECTION OF A HOLE DEFECT IN DENTAL COMPOSITE RESTORATION** Ja-uk Gu(Hanyang University), Nak-sam Choi(Hanyang University) The infrared lock-in thermography method showed the effectiveness for detecting the hole defects of dental composite restoration under an optimum test condition.	**STRAIN-SOFTENING RESPONSE OF LAMINATED COMPOSITES UNDER COMPRESSION** Navid Zobeiry(University of British Columbia), Reza Vaziri(University of British Columbia), Anoush Poursartip(University of British Columbia) The strain-softening response of composites is obtained by conducting compact compression tests and analyzing the strain-field data obtained using the digital image correlation technique.	**MECHANICAL CHARACTERIZATION OF PLA-BAMBOO FIBERS GREEN COMPOSITE** Fernando Ramirez(Universidad de Los Andes), Mauricio Gonzalez(Universidad de Los Andes), Nelson Eduardo Barrera(Universidad de Los Andes), Sebastian Castellanos(Universidad de Los Andes) The potential use of the composite prepared with the biodegradable polyester polylactide (PLA) as a matrix and natural bamboo-guadua fibers as reinforcement is explored through mechanical testing.	11:54	**NEW FLAX/EPOXY AND CF/EPOXY COMPOSITE MATERIALS FOR BONE FRACTURE PLATE APPLICATIONS: A BIOLOGICAL AND WETTABILITY STUDY** Zahra Shaghayegh Bagheri, Ihab El-sawi, Asma Amleh, Emil H. Schemitsch, Rad Zdero, Habiba Bougherara
12:30	**LUNCH**				

	Room 710	Room 519a	Room 514	Room 524ab	Room 524c
12:30	LUNCH				
13:30	PLENARY (Room 710) - Markus J. Buehler: "Hierarchical Biocomposites by Design". Chair: Pascal Hubert				
	MULTI-FUNCTIONAL NANOCOMPOSITES Chairs: Frank Ko, Brian George Falzon	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 3** Chairs: Hugh Alan Bruck, Wonbong Choi	**SYMPOSIUM ON MARINE COMPOSITES 3** Chairs: Isaac M. Daniel, Roberta Massabo	**FRACTURE AND DAMAGE 3** Chair: Sam Kaddour	**FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 3** Chair: Youqi Wang
14:30	**HOW DO CARBON NANOTUBE FIBERS GAIN THEIR STRENGTH?** Tsu-wei Chou (University of Delaware) The current efforts provide fundamental understanding of the electromechanical behavior of CNT fibers and facilitate future optimal design of their performance in multifunctional composites.	**SIMULATIONS OF THERMOMECHANICAL PERFORMANCE OF SMP-BASED MICROVASCULAR SYSTEMS** H. jerry Qi(University of Colorado at Boulder), Kai Yu(University of Colorado at Boulder), Jeffery W. Baur(Air Force Research Laboratory), David M Phillips(Air Force Research Laboratory) Polymer composites with microvascular systems were investigated by using finite element based simulations and design guidelines were proposed for such systems.	**SANDWICH BEAM WITH INTERNAL RESONATORS SUBJECTED TO BLAST LOADS** Bhisham N Sharma(Purdue University), C.t. Sun(Purdue University) We analyze the behavior of sandwich beams with internal resonators under broad spectrum loads such as blast loads. The performance of resonators tuned to different resonance frequencies was studied.	**RECENT PROGRESS ON BENCHMARKING CRACKING AND DAMAGE MODELS FOR FIBRE REINFORCED POLYMER COMPOSITES** Sam Kaddour(QinetiQ Ltd), Paul A Smith(University of Surrey), Michael John Hinton(National Composites Centre), Shuguang Li(University of Nottingham) This paper brings to conclusion Part A of the WWFE-III. It gives an account of the lessons learnt, a comparison between the predictions of the models for all the 13 Test Cases	**SHAPING ANALYSIS OF A NON-CRIMP 3D ORTHOGONAL WEAVE E-GLASS COMPOSITE REINFORCEMENT** Juan Francisco Pazmino(Polytechnic Institute of Milan), Valter Carvelli(Polytechnic Institute of Milan), Stepan V. Lomov(Katholieke Universiteit Leuven) Formability of a single layer E-glass non-crimp 3D orthogonal woven reinforcement (3WEAVE®-3Tex Inc) is experimentally investigated. The study involves two moulds, tetrahedral and double-dome.
14:50		**CARBON FIBRE REINFORCED EPOXY COMPOSITES WITH VARIABLE STIFFNESS FOR USE IN MORPHING AEROSTRUCTURES** Paul Robinson(Imperial College of Science), Henry Maples(Imperial College of Science), Alexander Bismarck(Imperial College of Science), Oliver Gaite(Imperial College of Science), Stephen Smith(Imperial College of Science) An investigation of a controllable stiffness composite is described including stiffness measurement, theoretical prediction and trials to integrate heating and actuation in the novel composite.	**RESIDUAL STRENGTH OF FULL SCALE GRP LAMINATES WITH RANDOMLY DISTRIBUTED FRAGMENT DAMAGES** Sohrab Kazemahvazi(Royal lnstitute of Technology), Martin Nilsson(), Dan Zenkert(Royal lnstitute of Technology) The strength of laminates with fragment damages has been investigated experimentally. A model has been developed to predict the residual strength and is validated against the experiments.	**CHALLENGING LESSONS FROM THE SECOND WORLD-WIDE FAILURE EXERCISE (WWFE-II):** Sam Kaddour(QinetiQ Ltd), Michael John Hinton(National Composites Centre) This paper is a summary of the WWFE-II and gives an account of the lessons learnt and the gaps which need to be bridged.	**TRANSITIONAL BEHAVIOUR OF PREPREGS IN AUTOMATIC FIBRE DEPOSITION PROCESSES** Dmitry Ivanov(University of Bristol), Carwyn Ward(University of Bristol), Kevin Potter(University of Bristol) The paper discusses a duality in the material response of a toughened epoxy system. Understanding of the transition from squeezing to bleeding flow is crucial for the design of consolidation program.
15:10	**EROSIVE AND ABRASIVE WEAR RESISTANCE OF TRANSPARENT NANOCOMPOSITE COATINGS FILLED WITH SILICA NANOPARTICLES** Zhong Zhang(National Center for Nanoscience and Technology) The colloidal and pyrogenic nanosilica particles were employed to prepare transparent polymer coatings. The erosive and abrasive wear were studied.	**TOWARD COMPUTATIONAL SMART MATERIALS WITH CONTROLLABLE STIFFNESS** Michael A Mcevoy(University of Colorado at Boulder), Nicholas D. Farrow(University of Colorado at Boulder), Nikolaus Correll(University of Colorado at Boulder) We present a periodic composite material that embeds sensing, actuation, communication and computation. The material allows accurate control of its stiffness using distributed, networked control.	**SHOCK FOCUSING IN WATER IN A CONVERGENT CARBON FIBER COMPOSITE STRUCTURE** Chuanxi Wang(University of Southern California), Veronica Eliasson(University of Southern California) This work studied the effect of the underwater explosion on water-filled convergent carbon fiber structures. Both experiments and numerical simulations have been carried out.	**NUMERICAL STUDY OF THE EFFECT OF NYLON 6,6 ELECTROSPUN NANOFIBROUS MATS TO THE DELAMINATION STRENGTH OF CFR-EPOXY COMPOSITE LAMINATES** Fabrizio Moroni, Alessandro Pirondi, Gregorio Giuliese (University of Parma), Seeram Ramakrishna(National University of Singapore) Giangiacomo Minak, Roberto Palazzetti, Andrea Zucchelli (University of Bologna) In the present work authors investigate the influence of the electrospun nanofibrous mats as interlaminar reinforcements to be used composite laminate.	**CHARACTERIZATION OF CURED NCF COMPOSITES USED IN THE FORMING OF WIND TURBINE BLADES** Cynthia Mitchell(University of Massachusetts at Lowell), James A. Sherwood(University of Massachusetts at Lowell), Konstantine A Fetfatsidis(University of Massachusetts at Lowell), Lisa Dangora(University of Massachusetts at Lowell), Jennifer L. [illegible] Beam-shell finite element model to calculate the cured composite material properties. Method automatically tracks evolution of yarns during the forming process.
15:30	**PREPARATION AND PROPERTIES OF MMT/EPOXY/CARBON FIBER MULTI-SCALE COMPOSITE** Shijie Zhang(Xi'an Aerospace Composite Materials Research Institute) The MMT/epoxy resin nanocomposite and MMT/epoxy/carbon fiber multi-scale composite were prepared using organic montmorillonite. And their mechanical and thermal behaviour were evaluated.	**HIGH STROKE ACTUATION OF ALIGNED CNT-PARAFFIN COMPOSITE FILMS** Davor Copic(University of Michigan - Ann Arbor), A. john Hart(University of Michigan - Ann Arbor) We fabricate high-stroke thin film actuators via infiltration of pre-bucked CNT forests with paraffin wax. The films expand reversibly by 20% in the vertical direction upon heating to 175 C.	**EFFECT OF FLUID-STRUCTURE INTERACTIONS ON UNDERWATER IMPLOSION DYNAMICS** James Seabury Briscoe(University of Maryland at College Park), Sung Won Lee(University of Maryland at College Park) The paper details the response of marine structures to dynamic loading from underwater implosions in an effort to mitigate the emitted pressure waves felt by other nearby structures.	**NEW DEVELOPMENTS IN ONSET THEORY FOR ONSET OF RESIN FAILURE IN FIBRE REINFORCED COMPOSITES** Shen hin Lim(University of New South Wales), Donald Wainwright Kelly(University of New South Wales), Garth Morgan Kendall Pearce(University of New South Wales), B. gangadhara Prusty(University of New South Wales), Alan Crosky(University of New South Wales) This paper presents recent work on the recently developed Onset Theory to emphasise its application to onset of irreversible damage in carbon fibre and glassy polymeric resins.	**TEMPERATURE AND RATE DEPENDENT MULTI-SCALE SHEAR MODELLING OF MOLTEN THERMOPLASTIC ADVANCED COMPOSITES** Philip Harrison(University of Glasgow), Nuno Curado-correia(INEGI - Institute of Mechanical Engineering and Industrial Management) Modelling the forming of advanced thermoplastic composites by linking the shear parameters of a hypo-elastic constitutive model to predictions of a multi-scale energy model.
15:50	**ANALYSIS OF CARBON NANOTUBE INTEGRATED COMPOSITE STRUCTURES USING MULTISCALE APPROACH** Zeaid Hasan(Arizona State University), Aditi Chattopadhyay(Arizona State University) The use of nanocompsoites in structural level components to improve their overall performance against unique composite failure modes is presented in the following study.	**REPLICA MOLDING OF LIQUID CRYSTAL POLYMER MICROSTRUCTURES FOR ACTIVE SURFACES** Davor Copic(University of Michigan - Ann Arbor), Assaf Ya'akobovitz(University of Michigan - Ann Arbor), A. john Hart(University of Michigan - Ann Arbor) Liquid crystal polymer microstructure actuators are fabricated over large areas using a replica molding technique, and their anisotropic shape change upon illumination is characterized.	**STRESS AND STRAIN FIELDS IN SANDWICH T-JOINTS SUBJECTED TO SIMULATED SLAMMING LOADS** Mark Battley(University of Auckland), James Flett(University of Auckland), Tom Allen(University of Auckland) Digital image correlation and finite element analysis are used to characterise the stress and strain fields in sandwich panels with bulkhead T-joints subjected to simulated water slamming loads.	**A NOVEL STRENGTH MODEL FOR UNIDIRECTIONAL FIBRE-REINFORCED COMPOSITES WITH REALISTIC FIBRE PACKINGS** Ignaas Verpoest(Katholieke Universiteit Leuven), Yentl Swolfs(Katholieke Universiteit Leuven), Larissa Gorbatikh(Katholieke Universiteit Leuven) This paper presents a new strength model for unidirectional composites. The stress redistributions in random and ordered packings are calculated and incorporated into a strength model	**EFFECT OF TEXTILE ARCHITECTURE ON ENERGY ABSORPTION OF WOVEN FABRICS SUBJECT TO BALLISTIC IMPACT** Cheng-chou Eric Yang(University of Melbourne), Phuong Tran(University of Melbourne), Tuan Ngo(University of Melbourne), Priyan Mendis(University of Melbourne), Bill Humphries(CSIRO) The aim of this study is to investigate the effect of fabric architecture towards its impact resistance through material testing and FE modeling in meso-scale.
16:10	**EFFECT OF CURRING PARAMETERS ON DISPERSION AND ELECTRICAL CONDUCTIVITY OF EPOXY/CNT COMPOSITES DEFINE BY IMAGE ANALYSIS** Ewelina Ciecierska(Technical University of Warsaw), Anna Boczkowska(Technical University of Warsaw), Krzysztof Jan Kurzydlowski(Technical University of Warsaw) In our work the focus is put on dispersion of CNT in the epoxy matrix cured at different temperature. The quantitative analysis was made how different curing parameters influences on CNT dispersion.	**MULTIFUNCTIONAL COMPOSITES BY SEGMENTATIONAND ASSEMBLY** Thomas Siegmund(Purdue University), Somesh Khandelwal(Purdue University) Segmentation and assembly is an approach to create hybrid materials. Two examples are presented, a tensegrity and a tesserae composite.	**IMPACT PROPERTIES OF WATER EXPOSED GFRP LAMINATES WITH OUTERMOST STEEL LAYERS** Ezequiel Poodts(University of Bologna), Daniele Ghelli(University of Bologna), Tommaso Maria Brugo(University of Bologna), Riccardo Panciroli(Polytechnic Institute of New York University), Giangiacomo Minak(University of Bologna) The aim of the study is to determine the possibility of using the fiber metal laminates concept to avoid hygrothermal degradation of marine vessels, replacing the gel coat with a thin layer of steel.	**CRUSHING OF COMPOSITE STRUCTURES AND PARAMETER IDENTIFICATION FOR MODEL DEVELOPMENT** Sindy Engel(Technische Universitat Bergakademie Freiberg), Christian Boegle(BMW Group), Dirk Lukaszewicz(BMW Group) Rectangular braided tubes made of C-fibre/epoxy are crushed axially and oblique. Data is evaluated by means of response surface methodology.	**RESPONSE SURFACES OF MECHANICAL BEHAVIOR OF DRY WOVEN FABRICS UNDER COMBINED LOADINGS** Mojtaba Komeili(University of British Columbia), Abbas Milani(University of British Columbia) Meso-level model of a glass woven fabric is identified from standard tests and used to conduct virtual experiments and extract complex macro-level behavior of the material under combined loading.
16:30	BREAK				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
12:30	LUNCH				
13:30	PLENARY (Room 710) - Markus J. Buehler: "Hierarchical Biocomposites by Design". Chair: Pascal Hubert				
	MODELLING AND SIMULATION III Chairs: Goran Ferlund, Raj Das	**LCM 3 - PROCESSING** Chairs: Suresh G. Advani, Christophe Hahn	**NATURAL FIBER COMPOSITES 3** Chair: Tri-Dung Ngo	**BONDED JOINTS 1** Chairs: Shahram Aivazzadeh, Stéphane Fontaine	**STEPHEN TSAI AWARD** Chair: Paul A. Smith
14:30	**EXPERIMENTAL AND NUMERICAL STUDY OF THE CURE INDUCED DEFORMATIONS IN COMPOSITES PRODUCED BY VACUUM INFUSION** Antoine Parmentier(Cenaero), Benoit Wucher(Cenaero), Philippe Martiny(Cenaero) The comparison between experimental and simulation results of the present study have helped highlighting important factors requiring attention in modelling the cure-induced deformations.	**A STUDY OF CONSOLIDATION EQUILIBRIUM IN COMPOSITE PARTS MADE BY FLEXIBLE INJECTION** Joffrey Renaud(Ecole Polytechnique de Montreal), Philippe Causse(Ecole Polytechnique de Montreal), Edu Ruiz(Ecole Polytechnique), François Trochu(Ecole Polytechnique de Montreal) This work studies the consolidation equilibrium during the fabrication of composite parts by flexible injection in order to quantify the abilities of this new process in terms of void content.	**EFFECT OF REPROCESSING CYCLES ON MORPHOLOGY AND PROPERTIES OF ETHYLENE VINYL ACETATE (EVA) COPOLYMER/OLIVE HUSK FLOUR COMPOSITES** Mustapha Kaci(Universite de Bejaia) Investigation of the reprocess-ability of EVA copolymer/olive husk flour composites in an extruder in presence of ethylene/butyl acrylate/glycidyl methacrylate used as compatibilizer.	**IMPROVEMENT IN THE ADHESIVE PROPERTY OF CHEMICALLY STABLE POLYMERIC MATERIALS AND FRP** Hitoshi Kanazawa(Fukushima University) Polymeric materials such as PP, PET, silicone resins, fluorocarbon resins, etc. and FRP were modified by a simple technique and adhered to other materials with usual adhesives including starch.	**INNOVATIVE GLASS-CERAMIC MATRIX COMPOSITES: PROCESSING AND CHARACTERIZATION** Anais Farrugia(Institut Clément Ader), Gilles Dusserre(Institut Clément Ader), Thierry Cutard(Institut Clément Ader), Magali Rollin(), Stephanie Fouquet(Herakles) A new kind of glass-ceramic matrices for structural composites was developed for continuous thermal exposure applications. How does the manufacturing process impact the properties of these composites?
14:50	**DIRECT MEASUREMENT OF OUT-OF-PLANE AND IN-PLANE CURE SHRINKAGE STRAIN IN COMPOSITES BY EMBEDDED FIBER-OPTIC SENSORS** Shu Minakuchi(The University of Tokyo) This study developed a fiber-optic-based method that can evaluate directional dependency of cure in an autoclave. The results showed that cure of unidirectional composites is transversely anisotropic.	**HIGH-PRESSURE RTM PROCESS VARIANTS FOR MANUFACTURING OF CARBON FIBER REINFORCED COMPOSITES** Raman Chaudhari(Fraunhofer Institute for Chemical Technology (ICT)), Michael Karcher(Fraunhofer Institute for Chemical Technology (ICT)), Peter Elsner(Fraunhofer Institute for Chemical Technology (ICT)), Frank Henning(Fraunhofer Institute for Chemical Technology (ICT)) The current paper address new variants of the RTM process namely high-pressure injection RTM and high-pressure compression RTM and analyzes the influence of process variables on the laminate quality.	**EXPERIMENTAL AND THEORETICAL STUDY OF THE TENSILE MODULUS OF NEEDLE PUNCHED HEMP FIBER MAT COMPOSITES** Mahi Fahimian(University of Manitoba), Raghavan Jayaraman(University of Manitoba) Effect of different needle punch density and manufacturing pressure on tensile modulus of hemp mat composites have been studied experimentally and theoretically.	**ADHESIVE BONDING CHARACTERISATION OF COMPOSITE JOINTS** King Jye Wong(Universite de Bourgogne), Xiaojing Gong(Universite de Bourgogne), Shahram Aivazzadeh(Universite de Bourgogne), Mohd N Tamin(Universiti Teknologi Malaysia) This work focuses on the characterisation of the adhesive bonded composite joints using different patch stacking sequences, adhesives and surface treatment methods.	**POLY (VINYL ALCOHOL)/GRAPHENE OXIDE FIBER PREPARED BY GEL PROCESS** Seira Morimune(Kobe University) Poly(vinyl alcohol)/graphene oxide nanocomposite fibers were prepared through gel process, followed by hot drawing. The drawn nanocomposite fibers showed high mechanical and thermal properties.
15:10	**AN APPROACH TOWARDS A BASIC MATERIALS CHARACTERIZATION FOR THE SIMULATION OF PROCESS INDUCED DEFORMATIONS** Mathias Peter Hartmann(Technische Universitat Munchen), Matthias Strebinger(Technische Universitat Munchen), Roland Hinterhoelzl(Technische Universitat Munchen) Parameters for the essential property development models to simulate process induced deformations are estimated based on a minimal set of dynamic scanning calorimetry (DSC) and rheometer tests.	**INVESTIGATION OF INFLUENCING PARAMETERS WITH RESPECT TO FILLING TIME IN VIBRATION ASSISTED RTM PROCESSES** Reinhold Meier(Technische Universitat Munchen), Julian Heim(Technische Universitat Munchen), Swen Zaremba(Technische Universitat Munchen), Klaus Drechsler(Technische Universitat Munchen) Epoxy resins show shear thinning behavior. Influencing parameters for the creation of additional shear rates via a vibration engine resulting in lowered resin viscosity are studied by means of DoE.	**MECHANICAL TESTING OF SCALED CELLULOSE NANO-FIBER BASED COMPOSITES MADE USING MICRO-RTM PROCESS** Bamdad Barari(University of Wisconsin - Milwaukee), Krishna M. Pillai(University of Wisconsin - Milwaukee) This paper discusses the results of the tensile and three-point bending tests conducted with Cellulose nano fiber-based and other composites.	**INVESTIGATION ON THE FAILURE MECHANISMS OF COMPOSITE FASTENERS WITH COUNTERSUNK HEAD IN QUASISTATIC AND FATIGUE LOADING** Martin Schuett(Technische Universitat Hamburg-Harburg), Hans Wittich(Technische Universitat Hamburg-Harburg), Clémence Vernier(Bishop GmbH), Frank Nussbaeumer(Bishop GmbH), Karl Schulte(Technische Universitat Hamburg-Harburg) This investigation presents a detailed study on the failure mechanisms of composite fasteners with countersunk head in quasistatic and fatigue loading.	**A NEW MULTI-PHYSICS MOLECULAR DYNAMICS FINITE ELEMENT METHOD FOR DESIGNING GRAPHENE BASED NANO-STRUCTURES** Andre Antoine renaud Wilmes(Imperial College of Science), Silvestre T Pinho(Imperial College of Science) A new Multi-Physics Molecular Dynamics Finite Element Method is derived from first principles, implemented in commercial FE software and shown to be equivalent to MD at reduced a computational cost.
15:30	**NUMERICAL MODELLING OF GRADED FOAM BASED SANDWICH STRUCTURES SUBJECTED TO IMPACT** Jin Zhou(University of Liverpool), Zhongwei Guan(University of Liverpool), Wesley J Cantwell() The low velocity impact response of sandwich structures based on layered foams cores have been investigated both experimentally and numerically.	**INVESTIGATION OF CNT FILTERING ACCORDING TO IN-PLANE AND OUT-OF-PLANE LCM INJECTION STRATEGIES** Timo Grieser(Institut fuer Verbundwerkstoffe GmbH), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) Different injection strategies are applied to control the filtering of CNTs during the impregnation of technical textiles. The change of resistance was utilized as CNT distribution indicator.	**NATURAL FIBER REINFORCED BIOCOMPOSITES: EFFECT OF FIBER TREATMENTS BY ULTRASOUND** Mohammad Dalour Beg(Universiti Malaysia Pahang) Raw empty fruit bunch (EFB), alkali treated EFB and simultaneous ultrasound-alkali treated EFB fibers of oil palm were incorporated in poly(lactic acid) (PLA) for fabricating biocomposites.	**GLOBAL AND LOCAL INFLUENCE OF STACKING SEQUENCE ON THE STRENGTH OF ADHESIVELY BONDED JOINTS OF CFRP LAMINATES** Jerome Rousseau(Universite de Bourgogne), Purimpat Satthumnuwong(University of Phayao) This experimental study shows the concurrent global and local influences of the stacking sequences on the strength of adhesively bonded single lap joints of carbon/epoxy laminates	**CONTRIBUTIONS TO THE PROCESS MODELLING OF RESIN INFUSION UNDER FLEXIBLE TOOLING (RIFT) MANUFACTURING FOR COMPOSITE AEROSTRUCTURES** Robert Samuel Pierce(Monash University), Brian George Falzon(Queen's University Belfast), Mark Thompson(Monash University), Romain Boman(Universite de Liege) This work summarises contributions to a predictive and complete process model for RIFT manufacturing which aims to substitute costly trial and error practices for large composite aerostructures.
15:50	**NUMERICAL EVALUATION OF PERIODIC BOUNDARY CONDITION ON THERMO-MECHANICAL PROBLEM USING HOMOGENIZATION METHOD** Muhammad Ridlo erdata Nasution(Tokyo Metropolitan University), Naoyuki Watanabe(Tokyo Metropolitan University), Atsushi Kondo(Tokyo Metropolitan University) Asymptotic expansion homogenization is performed to analyzed composite structure by applying periodic boundary condition (BC). New method is proposed by relieving periodic BC in thickness direction.	**PREFORM COMPACTION AND DEFORMATION DURING THROUGH-THE-THICKNESS IMPREGNATION** David Becker(Institut fuer Verbundwerkstoffe GmbH), Markus Brzeski(Institut fur Verbundwerkstoffe GmbH), Dominik Linster(Request Pending), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) Compaction and permeability studies are compared with a new simultaneous approach for the investigation of hydrodynamic compaction of textile reinforcements during through-the-thickness impregnation.		**LASER THROUGH-TRANSMISSION WELDING OF WHITE-PIGMENTED GLASS-PEI TO CARBON-PEI** Dustin Louis Dequine(Fiberforge Corporation) Laser through-transmission welding (LTTW) of fiber-reinforced glass & carbon fiber thermoplastic composites is an effective low-cost, high-volume joining method for advanced composite structures.	**GAS PERMEABILITY OF PARTIALLY SATURATED FABRICS** Thomas Anthony Cender(University of Delaware), Pavel Simacek(University of Delaware), Suresh G Advani(University of Delaware) A partially impregnated pre-preg consisting of a resin film layered on a dry fabric was studied to determine its in-plane permeability to gas as a function of resin saturation in the fabric.
16:10	**NUMERICAL ANALYSIS ON CURE-INDUCED DEFORMATION OF FIBROUS COMPOSITE LAMINATES** Pan Li(Shandong University), Yuxi Jia(Shandong University), Peng Qu(Shandong University), Xiaoxia Wang(), Shanlong Li(Shandong University) In this study, we used two finite element models to make a comparison, and then dicuss when the simpler elastic model is the better choice in FEA.	**PREFORM INFLUENCE ON MECHANICAL BEHAVIOR OF STIFFENED PANELS MANUFACTURED BY LIQUID RESIN INFUSION** Thomas Bonnemains(Universite de Bretagne Occidentale), Eric Lolive(Universite de Bretagne Occidentale), Franck Le poulain(Universite de Bretagne Occidentale) In this paper, stiffened panels manufactured using LRI process are considered. The influence of the type of preform (powdered or knitted) on the mechanical properties of the part is studied.		**NUMERICAL AND EXPERIMENTAL INVESTIGATION OF COMPOSITE BOLTED JOINTS REPAIRED WITH INSERTS** Evangelos Ioannis Avgoulas(Imperial College of Science), Sergio Tejada(Imperial College of Science), Cesare Stocchi(Imperial College of Science), Paul Robinson(Imperial College of Science), Silvestre T Pinho(Imperial College of Science) A finite element and experimental investigation of the static mechanical behaviour of single-lap composite joints, with countersunk bolts, repaired with metallic inserts.	**MODELING ELASTIC PROPERTIES OF RANDOMLY ORIENTED FIBER COMPOSITES** Hadi Moussaddy(Ecole Polytechnique de Montreal), Daniel Therriault(Ecole Polytechnique de Montreal), Martin Lévesque(Ecole Polytechnique de Montreal) The elastic properties of randomly oriented fiber composites were determined using 1) finite element homogenization of the representative volume element and 2) analytical micromechanical models.
16:30	BREAK				

	Room 525	Room 520f	Room 520be	Room 516ab
12:30	LUNCH			
13:30	PLENARY (Room 710) - Markus J. Buehler: "Hierarchical Biocomposites by Design". Chair: Pascal Hubert			
	BIOCOMPOSITES 1 Chairs: David Jesson, Hao Wang	**CHARACTERIZATION 2** Chairs: Jens Schuster, Hiroyuki Hamada	**GREEN COMPOSITES 3** Chairs: Larry Lessard, Johanne Denault	
14:30	**CYTIDINE FUNCTIONALIZATION PROMOTES SYNERGISTIC MECHANICAL PROPERTIES IN NACRE-MIMETIC NANOCOMPOSITES** Lahja Martikainen(Aalto University), Andreas Walther(Aachen University), Olli Ikkala(Aalto University) Functionalization of polymer-coated colloidal nanoplatelets with cytidine groups allows synergistic increase of strength and strain in nacre-mimetic lamellar self-assembly films.	**INFLUENCE OF TEMPERATURE ON PHASE TRANSITIONS IN GLASS FIBER REINFORCED EPOXIES FOR ELECTRICAL SLOT INSULATION** Rudi Velthuis(ABB Schweiz AG - Corporate Research), Anastasia Peitz(ABB Schweiz AG - Corporate Research) The paper shows the usage of various techniques (DSC, TMA, DMA, dielectrical spectroscopy) for the characterization of phase transitions in GF-reinforced epoxies used for generator slot insulation.	**BASALT FIBER REINFORCED POLY(LACTIC ACID) COMPOSITES FOR ENGINEERING APPLICATIONS** Tibor Czigany(Budapest University of Technology and Economics), Jozsef Gabor Kovacs(Budapest University of Technology and Economics), Tamas Tabi(Budapest University of Technology and Economics) In our work, it was demonstrated that it is possible to reinforce bio-based polymers with natural resource based basalt fibres to produce polymer composites suitable for engineering applications.	
14:50	**APPLICATION OF BIOMECHANICAL PRINCIPLES FOR DESIGN OF COMPOSITE STRUCTURES** Andrey Malakhov(Institute of Machines Science), Alexander Polilov(Institute of Machines Science) The paper presents modeling of wood structure, namely fiber distribution in a branch-trunk junction. The method of composite structure design using curvilinear fibers trajectories is offered.	**IMPROVEMENT OF IMPREGNATION AND MECHANICAL PROPERTIES OF CFRTP COMPOSITES BY MICRO-BRAIDED YARNS** Patcharat Wongsriraksa(Kanazawa Institute of Technology), Asami Nakai(Gifu University), Kiyoshi Uzawa(Kanazawa Institute of Technology), Isao Kimpara(Kanazawa Institute of Technology) To evaluate the impregnation state and mechanical properties of the composite, the CF/TP composites were fabricated and to improve the both properties by using surface treatment on carbon fiber.	**DEVELOPMENT OF MULTI-SCALE BIOCOMPOSITES FROM FLAX, NANOCELLULOSE AND EPOXY BY RESIN INFUSION** Steven Phillips(McGill University), Larry Lessard(McGill University), Pascal Hubert(McGill University), Peiyu Kuo(University of Toronto), Mohini Sain(University of Toronto), Cristian Demaria(McGill University) Composites were prepared from flax and nanocellulose by resin infusion and subjected to void analysis, impact and short beam tests. The results highlight how nano-modifiers can affect part quality.	
15:10	**FAST AND SCALABLE SELF-ASSEMBLY APPROACHES TO BIOINSPIRED NANOCOMPOSITE FILMS AND COATINGS** Andreas Walther(Aachen University) Bioinspired films via fast self-assembly in water based yield excellent mechanical properties (E=45 GPa, UTS>300MPa) and attractive functionalities (transparency, gas barrier, fire shielding).	**STUDY ON DYNAMIC RESPONSE OF FRP FLOAT FOR LIGHT SEAPLANE** Kazuki Wakizaka(Nihon University), Yoshio Aoki(Nihon University), Akihisa Tabata(Nihon University), Goich Ben(Nihon University) we conducted alighting experiments and numerical simulations of FRP Seaplane floats on the basis of the alighting positions specified in the Airworthiness Standards.	**MECHANICAL PROPERTIES OF GLASS SHORT FIBER/WOOD POWDER/POLYPROPYLENE HYBRID COMPOSITES** Ying Yu(Kyoto Institute of Technology), Yuqiu Yang(Donghua University), Manabu Nomura(), Hiroyuki Hamada(Kyoto Institute of Technology) The effect of Glass fiber/wood powder/pp hybrid composites hybridization was evaluated. The elastic modulus was predicted by using the rule of hybrid mixtures equation and classical lamination theory.	
15:30	**ENGINEERING AND MODELING OF TENSILE STRENGTH OF PAPER-THERMOSET COMPOSITES** Henri Kroeling(Technische Universitat Darmstadt), Sabrina Mehlhase(Technische Universitat Darmstadt), Narmin Nubbo(Fraunhofer Institute for Structural Durability and System Reliability LBF), Johanna Fleckenstein(Fraunhofer Institute for Structural Durability and System Reliability LBF), Angelika Fedres(), Frank Miletzky(PTS Fiber based Paper making processes refining and fractionation change paper and composite properties strongly. A model is given to predict the composite tensile strength over a wide range.	**STUDY AND SIMULATION OF THERMAL CONDUCTIVITY OF ORGANIC MATRIX COMPOSITES** Bénédicte Reine(Institut Clément Ader), Jeremy Di tomaso(), Gilles Dusserre(Institut Clément Ader), Philippe A Olivier(Institut Clément Ader) In this paper models were developed to improve the thermal conductivity of thermoset filled matrix and heat transfer of the composite with carbon fibre reinforcements and matrix effective properties.	**FABRICAION AND MECHANICAL PROPERTIES OF 3D JUTE FABRICS REINFORCED COMPOSITES** Jieng-chiang Chen(Vanung University), Chang-mou Wu(National Taiwan University of Science and Technology), Zi-jie Lin(Vanung University), Yi-an Teng(Feng Chia University) Manufacturing and mechanical properties of three-dimensional (3D) jute fabrics composites were investigated in current research. The 3D composites have good flexture strength.	
15:50	**COLLOIDAL INONIC SELF-ASSEMBLY BETWEEN ANIONIC NATIVE CELLULOSE NANOFIBRILS AND CATIONIC BLOCK COPOLYMER MICELLES INTO BIOMIMETIC NANOCOMPOSITES** Miao Wang. Anna Olszewska, Janne Ruokolainen, Janne Laine, Monika Österberg, Olli Ikkala (Aalto University), Andreas Walther(Aachen University), Jani-markus Malho, Felix h. Schacher (Friedrich-Schiller Universitat Jena), Mikael Ankerfors, Lars A. Berglund (Royal Institute of Technology) We present a facile ionic self-assembly between native cellulose nanofibrils and cationic amphiphilic block copolymer micelles with rubbery core towards biomimetic nanocomposites.	**THERMAL CONDUCTIVITY MEASUREMENT OF GFRP AT CRYOGENIC TEMPERATURE** Kazuki Hayakawa(Tokyo Institute of Technology), Takayoshi Inoue(Tokyo Institute of Technology), Yuji Suzuki(Tokyo Institute of Technology) A temperature compensation method using thermal contact resistance of a specimen-thermocouple was proposed and applied to thermal conductivity measurements of GFRPs in the cryogenic temperature.	**FIRE RESISTANCE CELLULOSIC FIBERS FOR GREEN POLYMER COMPOSITES** T.-D. Ngo, M.-T. Ton-That, W. Hu (National Research Council of Canada) An innovative and sustainable treatment approaches to retard the burning of cellulosic fibers for composite production in which a minimum amount of non-toxic and low cost inorganic chemicals	
16:10	**BIO-INSPIRED NACRE-LIKE COMPOSITES VIA SIMPLE, FAST, AND VERSATILE TECHNIQUES SUCH AS DOCTOR-BLADING** Seyed mohammad Mirkhalaf valashani(McGill University), Francois Barthelat(McGill University) Here we present a simple and fast method based on doctor blading to fabricate bio-inspired composites with interesting combination of stiffness, strength and ductility.	**IMPROVED THERMAL PROPERTIES WITH HYBRIDIZATION OF THE FILLERS FOR THERMOPLASTIC MATERIALS** Jozsef Gabor Kovacs(Budapest University of Technology and Economics), Andras Suplicz(Budapest University of Technology and Economics) The aim of the research was to develop high thermal conductivity materials by using multiple fillers. Synergetic effect was found and proved between fillers while the thermal conductivity was doubled.		
16:30	BREAK			

	BIO & GREEN II - POSTER Chairs: Michael Richard Kessler, Sean McKay
14:30	**CFRP RECYCLING USING DEPOLYMERIZATION OF ACID ANHYDRIDE CURED EPOXY RESIN** Katsuji Shibata, Mitsuru Sasaki
14:34	**PROCESSING AND PROPERTIES OF NATURAL FIBERS REINFORCED THERMOPLASTIC AND THERMOSSETING COMPOSITES** Joao Francisco Silva, Joao Pedro Nunes, Ana Catarina Duro, Bruno Francisco Castro
14:38	**A STUDY ON THE MECHANICAL PROPERTY OF GLASS/JUTE INTER-LAMINATE HYBRID FABRIC COMPOSITE** Shunyu Tang, Zhiyuan Zhang, Masayuki Kitamura, Yuqiu Yang, Hiroyuki Hamada
14:42	**FIBRE CHARACTERISATION OF STEAM THERMAL PROCESS RECYCLED CARBON FIBRE/EPOXY COMPOSITES** Maxime Boulanghien
14:46	**INFLUENCE OF POLYURETHANE SURFACE TREATMENT ON BASALT REINFORCED THERMOSETTING EPOXY RESIN MATRIX COMPOSITES: MECHANICAL AND THERMAL PROPERTIES** Yang Jiahui, Mengyuan Liao, Zhenjin Cui, Hiroyuki Hamada, Yuqiu Yang
14:50	**THE RELIABILITY ANALYSIS OF THE METHYL METHACRYLATE HARDENED HYBRID POPLAR WOOD** Weidan Ding, Dexiang Wu, Ahmed Koubaa, Abdelkader Chaala, Cuicui Luo
14:54	**RECYCLING OF AUTOMOTIVE SHEET METAL-FIBRE REINFORCED PLASTIC-HYBRID STRUCTURES** Bernd Siewers, Christian Lauter, Joerg Niewel, Thomas Troester
14:58	**STUDY ON PROPERTIES OF COMPOSITES REINFORCED BY HEAT-TREATED GLASS FIBRES SIMULATING THERMAL RECYCLING CONDITIONS** Ulf Nagel, Chih-chuan Kao, James Thomason
15:02	**ESTIMATION OF MECHANICAL PROPERTIES FOR FIBER REINORCED COMPOSITES WITH WASTE FABRIC AND POLYPROPYLENE FIBER** Yuki Murakami, Tetsusei Kurashiki, Daiki Tanabe
15:06	**EFFECT OF PLASMA SURFACE TREATMENT OF RECYCLED CARBON FIBER ON THE MECHANICAL PROPERTIES OF RECYCLED CFRP** Hooseok Lee, Yukio Ozaki, Masachika Yamane, Jun Takahashi, Isamu Oshawa
15:10	**FLAX FILLED THERMOPLASTIC BIOCOMPOSITE DEVELOPMENT FOR AUTOMOTIVE APPLICATIONS** Stephen Meatherall, Frank Wheeler
15:14	**BACTERIAL CELLULOSE-SYNTHETIC POLYMER COMPOSITES FOR BONE TISSUE ENGINEERING** Catalin Zaharia, Paul Octavian Stanescu, Izabela Cristina Stancu, Bianca Galateanu, Eugeniu Vasile
15:18	**LIGNIN FIBERS FOR PRODUCTION OF GREEN NANOCOMPOSITES** Vida Poursorkhabi, Manjusri Misra, Amar K Mohanty

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
16:30	BREAK				
	MULTI-FUNCTIONAL NANOCOMPOSITES Chairs: Brian George Falzon, Behnam Ashrafi	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 4** Chairs: Daniel J. Inman, A. John Hart	**SYMPOSIUM ON MARINE COMPOSITES 4** Chairs: Romesh Batra, John Philip Dear	**FRACTURE AND DAMAGE 4** Chair: Sam Kaddour	**FORMING OF ADVANCED COMPOSITES & ENGINEERING FABRICS 4** Chairs: Frank Ko, Youqi Wang
16:50	**MULTI-SCALE MODELING OF INTERFACIAL BEHAVIOR OF CNT/POLYMER COMPOSITE BY MD AND CFE METHOD** Qingsheng Yang(Beijing University of Technology), Xia Liu(Beijing University of Technology) A pull-out test of a single CNT embedded within a polymer matrix is simulated by a FEM combined with MD simulation.	**HIGH PERFORMANCE, ELECTROLYTE-FREE TORSIONAL AND TENSILE CARBON NANOTUBE YARN COMPOSITE MUSCLES** R. H. Baughman, M. D. Lima, N. Li, M. Jung de andrade, S. Fang, J. Oh, G. Spinks, M. Kozlov, C. S. Haines, D. Suh, J. Foroughi, S. Jeong Kim, Y. Chen, T. Ware, M. Kyoon Shin, L. Dantas Machado, A. F. Fonseca, J. D. w. Madden, W. Voit, D. S. Galvão Artificial muscles based on carbon nanotube composite yarns are described, which provide ultra-fast, giant-force, large-stroke torsional and tensile actuation and millions of reversible cycles.	**EFFECT OF FOAM CRUSHING IN DOUBLE-CURVATURE SANDWICH PANELS SUBJECTED TO BLAST** Michelle Stephanie Hoo fatt(University of Akron), Dushyanth Sirivolu(University of Akron) This paper presents an analytical model for the blast response of a double-curvature, composite sandwich panel with polymeric foam core.	**EXPERIMENTAL AND NUMERICAL STUDY OF THE MICRO-MECHANICAL FAILURE IN COMPOSITES** Danial Ashouri vajari(Technical University of Denmark), Karolina Martyniuk(Technical University of Denmark), Bent F Sørensen(Technical University of Denmark), Brian Nyvang Legarth(Technical University of Denmark) The interfacial parameters are characterized by comparing the experimental results with the FE analysis. Subsequently, the progressive interfacial damage evolution is studied.	**USING LS-DYNA TO SIMULATE THE FORMING OF WOVEN-FABRIC REINFORCED COMPOSITES** Corey Morris(Advanced Composite Materials and Textile Research Laboratory), Lisa Dangora(University of Massachusetts at Lowell), James A. Sherwood(University of Massachusetts at Lowell) This paper presents how LS-DYNA can be used to investigate how choices in the processing parameters can influence part quality.
17:10	**PREPARATION OF GRAPHENE WITH CONTROLLED REDUCTION DEGREE AND STUDY OF ELECTROMAGNETIC PROPERTIES OF THEIR NANOCOMPOSITES** Qi Dong(Beihang University), Yan Zhao(Beihang University), Yijun Jiang(COMAC Sadri), Xionggang Shen(Beihang University) Various reduced graphene oxide were synthesized. The electromagnetic properties of their nanocomposites were studied. Their improvement of properties shows a potential application in nanocomposites.	**HIGHLY TWISTED DOUBLE-HELIX CARBON NANOTUBE YARNS** Yuanyuan Shang(Harbin Institute of Technology) We show that CNTs can be made into a highly twisted double-helix structure by twist-spinning process. The structure is a stable and hierarchical configuration, which has unique mechanical properties.	**DELAMINATION DAMAGE IN LAMINATED SHELLS** Roberta Massabo(University of Genoa), Francesca Campi(University of Genoa) An efficient model, based on delamination fracture mechanics and a homogenization to reduce unknowns, is proposed for shells loaded dynamically. Applications highlight the advantages of the approach.	**MIXED-MODE FRACTURE ANALYSIS OF DELAMINATION USING NON-LINEAR EXTENDED FINITE ELEMENT METHOD** Damoon Motamedi(University of British Columbia), Abbas Milani(University of British Columbia) Non-linear Extended Finite Element Method (XFEM) has been employed to model the mixed mode bending test of a UD composite laminate. The model prediction is evaluated using reported experimental data.	**RUBBER PAD FORMING OF GLARE CRUCIFORM USING NUMERICAL AND EXPERIMENTAL ANALYSIS** Ravishankar Subbaramaiah(University of New South Wales), B. gangadhara Prusty(University of New South Wales), Garth Morgan Kendall Pearce(University of New South Wales), Shen hin Lim(University of New South Wales), Donald Wainwright Kelly(University of New South Wales), Pradeep Thomas() Rubber pad formability of fiber metal laminates to develop retrofitable hat-shaped energy absorbing component using numerical analysis and experimental techniques.
17:30	**ELECTROMAGNETIC PROPERTIES OF COBALT–REDUCED GRAPHENE OXIDE (CO-RGO)/ EPOXY COMPOSITES** Yan Wang(Beijing University of Aeronautics and Astronautics), Yan Zhao(Beihang University), Yuqin Su(Beihang University), Xiaohua Lu(Tsinghua University) Adding graphene decorated with cobalt nanoparticles in polymer can enhance both dielectric and magnetic properties of polymer matrix composites at the same time	**BENDING AND MECHANICAL BEHAVIORS OF CNF/PPY CONDUCTIVE SINGLE-LAYER COMPOSITE MATERIAL** Cheol Kim(Kyungpook National University) Single-layer CNF/PPy composite films were fabricated by the electrochemical polymerization process, and their electrical conductivities and bending deformations were measured.	**INDENTATION AND PENETRATION LAWS VALIDATED FOR COMPOSITE LAMINATES DIFFERENT IN FIBRES AND MATRIX** Valentina Lopresto(University of Naples Federico II), Giancarlo Caprino(University of Naples Federico II), Antonio Langella(University of Naples Federico II) The impact behavior of laminates made of glass fibres in phenolic resin and basalt fibre in epoxy matrix was studied.	**INVESTIGATION OF THE FAILURE BEHAVIOR OF SHORT-FIBER-REINFORCED THERMOPLASTICS WITH MOLDED IN HOLES** R. byron Pipes(Purdue University) Injection molded tensile bars made of glass-fiber-reinforced Polyamide 66 (33% fiber volume fraction) with molded in 4 mm holes were subjected to tensile load in order to study their failure behavior.	**FORMING OF NONCRIMP FABRIC COMPOSITES WITH EMBEDDED CABLING** Alexander Stefanov Petrov(University of Massachusetts at Lowell), Jennifer L. Gorczyca(University of Massachusetts at Lowell), James A. Sherwood(University of Massachusetts at Lowell), Lisa Dangora(University of Massachusetts at Lowell), A hybrid finite element discrete mesoscopic approach is used to model the forming of composite parts using a unidirectional glass prepreg non-crimp fabric (NCF)with embedded cabling..
17:50	**EFFECT OF HUMIDITY ON ELECTRICAL CONDUCTIVITY OF CARBON NANOTUBE-MODIFIED EPOXY** Behnam Ashrafi(National Research Council Canada) The effect of humidity on the electrical conductivity of a CNT-modified epoxy material was examined. It was observed that humidity can significantly influence the conductivity due to moisture ingress.		**MODELLING OF THE DELAMINATION OF LAMINATED GLASS RESISTING BLAST LOADING** Paolo Del linz(Imperial College of Science), John Philip Dear(Imperial College of Science) Composite PVB laminated glass windows minimize the damage and risk of injury during blast events. The after glass cracking delamination process is modeled to improve the understanding of the material.	**EFFECT OF EMBEDMENT LENGTH ON THE PERFORMANCE OF SHEAR-STRENGTHENED RC BEAMS WITH L-SHAPED CFRP PLATES** Amir Mofidi(McGill University), Sébastien Thivierge(Ecole de Technologie Superieure), Omar Chaallal(Ecole de Technologie Superieure), Yixin Shao(McGill University) This paper presents results of an experimental investigation on reinforced concrete (RC) T-beams retrofitted in shear with prefabricated L-shaped carbon fibre-reinforced polymer (CFRP) plates.	**CONSOLIDATION OF BRAID-BASED CFRP STRUCTURES** Martina Bulat(Universitat Stuttgart), Larissa Von wascinski(Universitat Stuttgart), Peter Middendorf(Universitat Stuttgart), Hartmut Roedel(Technische Universitat Dresden) Effects of pressurized expandable mandrels on the laminate structure and their properties. Focused on hollow CFRP structures based on braided preforms.
18:10			**NON-EXPLOSIVE METHODOLOGY FOR DYNAMIC BLAST LOADING OF WIDE AREA COMPOSITE ARMOR PANELS** Daniel Whisler(University of California, San Diego), Hyonny Kim(University of California, San Diego), Ken-an Lou() A non-explosive technique for dynamic pulse loading of composite sandwich armor panels has been developed to represent explosive blasts based on impact/momentum transfer principles.	**PROCESSING EFFECT ON THE DAMAGE TOLERANCE OF RANDOMLY-ORIENTED STRANDS THERMOPLASTIC COMPOSITES** Benoit Landry(McGill University), Pascal Hubert(McGill University) Impact tests were performed on randomly-oriented strands thermoplastic composites. The influence of process-induced defects was measured by comparing low and high pressure processed panels.	**SIMULTANEOUS BINDING AND TOUGHENING CONCEPT FOR TEXTILE REINFORCED IN SITU POLYMERIZED CYCLIC BUTYLENE TERETHPHALATE COMPOSITES** Wangqing Wu(Technische Universitat Clausthal) A new concept consisting of binding and toughening has been proposed and verified for efficient and qualified manufacturing of textile reinforced pCBT composites.
19:00	RECEPTION				
22:00	End				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
16:30	BREAK				
	MODELLING AND SIMULATION IV Chairs: Goran Ferlund, Raj Das	**LCM 4 - PROCESS MODELING I** Chairs: Peter Mitschang, Andreas Endruweit	**NATURAL FIBER COMPOSITES 4** Chair: Tri-Dung Ngo	**BONDED JOINTS 2** Chairs: Shahram Aivazzadeh, Stéphane Fontaine	**TSAI PANEL** Chair: Stephen W. Tsai
16:50	**CURE CYCLE MONITORING OF LAMINATED CARBON FIBER-REINFORCED PLASTIC BY FIBER BRAGG GRATINGS IN MICROSTRUCTURED OPTICAL FIBER** C.Sonnenfeld, T. Geernaert, S. Sulejmani, H. Thienpont, F. Berghmans (Vrije U. Brussel), G. Luyckx (Ghent U.), F. Collombet, Y.H. Grunevald, B. Douchin, L. Crouzeix, M. Torres(Inst. Clément Ader), K. Chah(U. de Mons), P. Mergo(Maria Curie-Sklodowska U. Lublin), We use fiber Bragg grating based sensors in microstructured optical fibers and in conventional ones to assess the strain built up in a carbon fiber reinforced polymer material during its manufacturing	**MODELING OF NON-ISOTHERMAL LIQUID COMPOSITE MOLDING: THE HEAT DISPERSION ISSUE** Pavel Simacek(University of Delaware), Suresh G Advani(University of Delaware) The paper addresses the effects of heat dispersion model on modeling of liquid composite molding process, both the predicted temperature field and flow patterns.	**CARBOHYDRATE DERIVED CO-POLY(LACTIDE) AS COMPATIBILISER FOR BACTERIAL CELLULOSE REINFORCED POLYLACTIDE NANOCOMPOSITES** Koon-yang Lee(Imperial College of Science), Thanit Montrikittiphant(Imperial College of Science), Min Tang(Imperial College of Science), Charlotte Williams(Imperial College of Science), Alexander Bismarck This paper describes the use of a novel carbohydrate derived copolylactide as compatibiliser to improve the tensile properties of BC reinforced polylactide nanocomposites.	**PROPOSAL OF A COHESIVE ZONE MODEL SUITABLE FOR THE STUDY OF BONDED JOINTS** Azalia Moradi(ONERA), Cedric Huchette(ONERA), Thomas Vandellos(ONERA), Dominique Leguillon(Centre National de la recherche scientifique CNRS) This work proposes a suitable cohesive zone model taking into account the joint thickness effects. The validity domain of this CZM is defined through a comparison between initiation tests.	**NEW VALUES IN LAMINATE DESIGN AND MANUFACTURING** Stephen W Tsai(Stanford University) A recent invention of bi-angle thin-ply non crimp fabric (NCF), with a trade-name C-Ply, offers values in laminate design and manufacturing beyond these traditional restrictions.
17:10	**STUDY ON NEW SURFACE PRETREATMENTS OF PAINTING TO CFRP LAMINATES** Tomoyuki Suzuki(Aichi Science and Technology Foundation), Hirohito Hira(Daido University) New surface pretreatment methods of CFRPs were investigated. Ozone exposure and laser irradiation were applicable for the improvement of painting property of polyphenylene sulfide (PPS)/CF laminate.	**PROCESS INDUCED DEFORMATION OF AIRCRAFT STRUCTURAL COMPONENTS** Paul A Trudeau(Bombardier), Hasan Salek(Bombardier), Marc-andre Jette(Bombardier), Pascal Hubert(McGill University), Cristian Demaria(McGill University), Genevieve Palardy(McGill University) A curved fuselage C-frame manufactured using RTM has been studied under various curing conditions and the part deformations were measured.	**A NEW BIODEGRADABLE BIOPLASTIC TERNARY BLEND AS NEW MATRIX SYSTEM FOR BIOCOMPOSITE USES** Kunyu Zhang(University of Guelph), Amar K Mohanty(University of Guelph), Manjusri Misra(University of Guelph) In this work,a entirely biodegradable and renewable ternary blend system were fabricated using as matrix for biomass fiber. The mechanical properties were evaluated in this work.	**A COMPUTATIONAL TOOL FOR THE ANAYSIS AND DESIGN OF STRUCTURAL ADHESIVE JOINTS** Konstantinos N. Anyfantis(Technical University of Denmark) This work presents the potential of a mixed-mode cohesive model for modeling ductile adhesive joints with similar or dissimilar adherents.	**RECENT DEVELOPMENTS IN AUTOMATED COMPOSITES MANUFACTURING** Suong Hoa(Concordia University) The availability of automated tape layup (ATL) and automated fiber placement (AFP) machines has facilitated many advances in the automation of the manufacturing of composite structures.
17:30	**THEORETICAL FAILURE ENVELOPES OF OPEN HOLE COMPOSITE LAMINATES WITH A- AND B-BASIS ALLOWABLES ESTIMATED FROM SMOOTH SPECIMEN PROPERTIES** Jeffrey Tsewei Fong, Nathanael Alan Heckert, James Filliben(National Institute of Standards and Technology(NIST)), Carlos Alberto Cimini Jr, Jose daniel Diniz Melo(Universidade Federal do Rio Grande do Norte) A case study is presented where A-basis and B-basis design allowables failure envelopes for open hole specimens were numerically obtained for a quasi-isotropic carbon fiber-epoxy laminate.	**PROCESSING WARPAGE OF ASYMMETRIC COMPOSITE PANELS MANUFACTURED BY RESIN TRANSFER MOLDING** Philippe Causse(Ecole Polytechnique de Montreal), Edu Ruiz(Ecole Polytechnique), François Trochu(Ecole Polytechnique de Montreal) This study uses experimental techniques as well as numerical modeling to investigate the impact of the injection stage on the residual distortion associated with Resin Transfer Molding process.	**TPI EFFECT ON RESIN IMPREGNATION IN VARTM AND ITS MECHANICAL PROPERTIES FOR NATURAL FIBER COMPOSITES** Junji Noda(Yamaguchi University) The purpose of this study is to investigate the effect of TPI of natural fiber yarns on resin impregnation properties and its mechanical properties for natural fiber composite molded by VaRTM.	**INFLUENCE OF IMPACT AND STRAIN RATE ON THE RESPONSE OF ADHESIVELY BONDED SINGLE LAP JOINTS** Babak Soltannia(Dalhousie University), Babak Ahmadi moghadam(Dalhousie University), Farid Taheri(Dalhousie University) In this paper the effect of high strain rate on the shear response of single lap joints mating composite adherends, over a loading range of 1-4 m.sec-1 is investigated.	**DEVELOPMENT OF CFRP BODY STRUCTURE FOR LEXUS LFA AND THE TECHNOLOGY ADVANCEMENT TOWARDS MASS PRODUCTION** Nobuya Kawamura(Toyota Motor Corporation) Development of LEXUS LFA began originally with a white aluminum body. Challenge to develop a complete original CFRP car body structure in parallel to the aluminum body from 2004 as a backyard project.
17:50		**MULTI-OBJECTIVE INFUSION OPTIMIZATION IN VACUUM ASSISTED RESIN TRANSFER MOULDING (VARTM) USING GENETIC ALGORITHMS** Giacomo Struzziero(Cranfield University), Alex Skordos(Cranfield University) Optimization, using Genetic algorithms, of gate location and temperature profile for non-isothermal filling, in order to minimize filling time and final degree of cure	**FLEXURAL FATIGUE BEHAVIOUR OF NEW ENGINEERED BIOCOMPOSITES FROM POLY (3-HYDROXYBUTYRATE-CO-HYDROXYVALERATE) (PHBV)/POLY (BUTYLENE ADIPATE-CO-TEREPHTHALATE) (PBAT) BLENDS AND SWITHGRASS** Anh dung Ngô(Ecole de Technologie Superieure), Manjusri Misra, Vidhya Nagarajan (University of Guelph), Amar K Mohanty(University of Guelph), Martin Cardonne, Mohamed Khay(École de technologie supérieure - Université du Québec) The addition of 0.75 parts by weight compatibilizer, poly diphenylmethane diisocyanate (pMDI), improved flexural static and fatigue strength of PHBV-PBAT blend with 30 wt% switchgrass biocomposite	**ADHESIVE BOND TESTING BETWEEN COMPOSITE LAMINATES BY LASER SHOCKWAVE LOADING** Jean-pierre Monchalin(National Research Council Canada) On-going developments at NRC of a bond strength proof testing technique based the generation with a high energy laser of a tensile shockwave that could pry apart weak bonds will be presented.	**PRACTICAL SOLUTIONS TO TRL BARRIERS IN THE DEVELOPMENT OF COMPOSITE APPLICATIONS** Dustin Louis Dequine(Fiberforge Corporation) This paper examines the primary issues causing the invisible TRL barriers from an industry perspective and provides highly practical solutions to overcome them.
18:10		**INDUSTRIAL SIMULATION OF LIQUID RESIN INFUSION BY THE FINITE ELEMENT METHOD** Arnaud Dereims(Ecole Nationale Superieure des Mines de St-Etienne), Sylvain Drapier(Ecole Nationale Superieure des Mines de St-Etienne), Jean-michel Bergheau(Ecole Nationale d'Ingenieurs de Saint-Etienne), Patrick De luca() An advanced and robust modeling method, coupling fluid flows with porous mechanics, in order to anticipate infusion time and thickness variation during infusion and post-infusion, is presented.	**STUDY OF THE REPROCESSING EFFECTS ON THE BEHAVIOR OF THE PVC/ALFA COMPOSITES COMPATIBILIZED WITH PVC-G-MA** Amar Boukerrou(Universite de Bejaia), Dalila Hammiche(Universite de Bejaia), Alain Bourmaud(Universite de Bretagne Sud), Hocine Djidjelli(Universite de Bejaia), Yves Grohens(Universite de Bretagne Sud) This work aims to study the reprocessing effects on alfa fiber reinforced polyvinylchloride (PVC/alfa) composites with and without PVC-g-MA used as compatibilizer.	**DESIGN AND VALIDATION OF THE PRIMARY STRUCTURE AND BONDED JOINTS FOR THE NEXT GENERATION LARGE CANADARM TESTBED** Peter P. Krimbalis(MDA Corporation), Drazen Djokic(National Research Council Canada), Gavin Scott Hay(MDA Corporation), Rick Cole(National Research Council Canada) This paper focuses on the design, analysis and validation of the primary structural elements and adhesive bonded joints employed in the Next Generation Large Canadarm (NGLC).	
19:00	RECEPTION				
22:00	End				

	Room 525	Room 520f	Room 520be		Room 516ab
16:30	BREAK				
	BIOCOMPOSITES 2 Chairs: David Jesson, Hao Wang	**CHARACTERIZATION 3** Chairs: Jens Schuster, Rudi Velthuis	**GREEN COMPOSITES 4** Chairs: Larry Lessard, Johanne Denault		**BIO & GREEN III - POSTER** Chairs: Michael Richard Kessler, Sean McKay
16:50	**STRUCTURAL QUALITY BIOCOMPOSITES OF TREATED FLAX FIBER WITH EPOXIDIZED SUCROSE SOYATE RESIN** Christopher Taylor(North Dakota State University), Taylor Krosbakken(North Dakota State University), Chad A Ulven(North Dakota State University), Adlina paramarta(North Dakota State University), Dean Webster(North Dakota State University) Biocomposites composed of flax fiber and epoxidized sucrose soyate resin or synthetic epoxy resin were processed and characterized. Improved performance was obtained with the new biobased resin.	**EFFECTIVE PROPERTIES FOR FIBER COMPOSITES WITH RHOMBIC PATTERN AND IMPERFECT INTERFACE** Harald Berger(Otto-von-Guericke Universitat Magdeburg) A numerical homogenization approach is presented to calculate effective properties for fiber composites with rhombic fiber arrangement. The model includes imperfect contact between the phases.	**COMPOSITE RECYCLING: CHARACTERIZATION OF AN END OF LIFE WIND TURBINE BLADE** Justine Beauson(Technical University of Denmark), Jakob Ilsted Bech(Technical University of Denmark), Povl Brøndsted(Technical University of Denmark) Wind turbine blades mainly made of composite do not have any end of life solution and are therefore disposed of landfill. This issue is nowadays problematic and solutions are needed.	16:50	**BLENDING OF POLY(LACTIC ACID) AND ACRYLONITRILE BUTADIENE STYRENE FOR USE AS BIO-COMPOSITE MATRIX** Ryan Vadori, Amar K Mohanty, Manjusri Misra
				16:54	**POLY(3HYDROXYBUTYRATE-CO-3HYDROXYVALERATE) / CLAY NANOCOMPOSITES FOR PACKAGING APPLICATIONS** Birgit Bittmann, Rebeca Bouza, Luis Barral
				16:58	**MECHANICAL PROPERTIES OF NATURAL FIBERS REINFORCED POLY(LACTIC ACID) BASED COMPOSITES** Putinun Uawongsuwan, Narongchai O-charoen, Hiroyuki Hamada
17:10	**UTILIZATION OF FLAX FIBERS AND GLASS FIBERS IN A BIO-BASED RESIN** Nassibeh Hosseini(North Dakota State University), Chad A Ulven(North Dakota State University), Dean Webster(North Dakota State University) A biobased polyurethane was reinforced with flax fiber and tested against a comparable fiberglass reinforced polyurethane. Certain mechanical and thermal property results were shown to be equivalent.	**CONDUCTIVITY AND DIELECTRIC RESPONSE OF CARBON-BASED COMPOSITES IN A BROAD FREQUENCY RANGE** Dmitry Nuzhnyy(Academy of Sciences) Conductivity and dielectric response of dielectric - conductor composites (multiwalled carbon nanotubes-polyethylene terephthalate, alumina-carbon nanofibers) were studied around percolation threshold	**INVESTIGATING THE FLEXURAL PROPERTIES OF BAMBOO FIBRE - PP COMPOSITES CONSOLIDATED UNDER INERT ATMOSPHERE** Eduardo Trujillo, Jan Vertommen, Lina Osorio, Aart Willem Van vuure, Jan Ivens, Ignaas Verpoest (Katholieke Universiteit Leuven) UD bamboo fibre – PP composites were produced at different temperatures under different environments to characterize the effect of thermal degradation on properties during the manufacturing process	17:02	**COMPATIBILIZATION OF POLYLACTIDE-BASED FLAX FIBER BIOCOMPOSITES** Andrea Arias, Marie-claude Heuzey, Michel A. Huneault, Cristina Kawano
				17:06	**CASTOR OIL BASED BIO-URETHANE NANOCOMPOSITES** Ji hoon Yu, Jae hong Go, Jin-san Yoon, In kyung kim, Kyurin Kim, Eun-ju Lee, Eun-soo Park
				17:10	**PLASTICIZATION OF CO-PRODUCTS FROM BIOETHANOL INDUSTRIES: POTENTIAL USES IN BIOCOMPOSITES** Rajendran Muthuraj, Manjusri Misra, Amar K Mohanty
				17:14	**USING FACTORIAL STATISTICAL METHOD FOR OPTIMIZING CO-INJECTED BIOCHAR COMPOSITES** Matthew J. Zaverl, Amar K Mohanty, Manjusri Misra
				17:18	**A FACTORIAL DESIGN OF DISTILLERS' GRAINS BASED BIOCOMPOSITES: A PATH TO SUSTAINABILITY OF CORN ETHANOL** Nima Zarrinbakhsh, Fantahun M Defersha, Amar K Mohanty, Manjusri Misra
17:30	**THERMAL PROPERTIES AND STABILITY OF PET-HEMP FIBERS COMPOSITES** Aimé sylvain Fotso Talla(University of Quebec at Chicoutimi), Francois Godard(University of Quebec Abitibi-Temiscamingue), Fouad Erchiqui(University of Quebec at Chicoutimi) PET-Hemp fibers (1%, 5%, 10%, 15%, and 20%) were compounded at 240°C, 250°C, and 260°C and the impact of fibers load and mixing temperature evaluated	**CORRELATION OF TRANSDUCER FREQUENCY AND SIGNAL/NOISE RATIO OF THIN WALLED FILAMENT WOUND CFRP-TUBES INSPECTED BY ULTRASONICS** Jens Schuster(Fachhochschule Kaiserslautern) The paper describes a technique to inspects thin walled tubes for aircrafts by ultrasonics and the evaluation of properties such as signal/noise ratio, frequency, and defects size.	**A COMPLETE MICROSTRUCTURAL AND MECHANICAL CHARACTERIZATION OF BAMBOO TECHNICAL AND ELEMENTARY FIBERS** Lina Osorio, Eduardo Trujillo, Frederic Lens(University of Leiden), Jan Ivens, Aart Willem Van vuure, Ignaas Verpoest (Katholieke Universiteit Leuven) The microstructure of bamboo fibers has been characterized to understand both the mechanical behavior of the technical fibers as well as to predict the mechanical properties of the elementary fibers.	17:22	**RECYCLING OF MARKET CFRP/CFRTP WASTE FOR MASS PRODUCTION APPLICATION** Haowen Wei, Tatsuro Akiyama, Hooseok Lee, Masachika Yamane, Jun Takahashi, Isamu Ohsawa, Tetsuhiko Murakami,
17:50	**CURE AND THERMO-MECHANICAL CHARACTERISTICS OF BIO-BASED POLYESTER COMPOSITES USING HYDROPEROXIDE INITIATORS** Eldon Triggs(Tuskegee University), Michael Wells(), Mahesh Hosur(Tuskegee University), Alfred Tcherbi-narteh(Tuskegee University), Shaik Jeelani(Tuskegee University) The use of IS-300™ initiator will allow the better control of component thermo-mechanical properties and further increase the service life of natural fiber composites.	**3D DIC MEASUREMENT OF TUBULAR BRAIDED COMPOSITES** Garrett W Melenka(University of Alberta), David S Nobes(University of Alberta), Jason P Carey(University of Alberta) Tubular braid composites are manufactured in open or closed mesh configurations. A new 3D DIC method was developed to measure the circumferential strain distribution of tubular braided composites.	**INVESTIGATION OF STRENGTH RECOVERY OF RECYCLED HEAT TREATED GLASS FIBRES THROUGH CHEMICAL TREATMENTS** Eduardo Saez Rodriguez(University of Strathclyde), James Thomason(University of Strathclyde), Liu Yang(University of Strathclyde) The study reports on the strength of thermally treated commercial glass fibres after acid treatment and silanization of the fibre surface.		
18:10	**EFFECT OF FIBRE TREATMENTS ON WATER ABSORPTION AND TENSILE PROPERTIES OF FLAX/TANNIN COMPOSITES** James Njuguna(Cranfield University), Jinchun Zhu(Cranfield University) The investigation shows the effects of fibre treatments on water absorption and tensile properties of flax/tannin biocomposites,which could offer environmental benfits in vehicel applications.	**THERMAL STRESSES IN FIBER REINFORCED COMPOSITES** George Zhenghong Zhu(York University), Shen Gong(York University) This paper investigates the interfacial thermal stresses in fiber reinforced composites. Analysis results show that there is an optimal thermo-elastic mismatch of fiber and matrix.	**RECYCLING OF HIGH PERFORMANCE THERMOPLASTIC COMPOSITES WITH HIGH VOLTAGE FRAGMENTATION** Clemens Dransfeld(University of Applied Sciences and Arts Northwestern Switzerland), Maxime Roux(University of Applied Sciences and Arts Northwestern Switzerland), Nicolas Eguemann(Cross Composite AG), Lian Giger(Cross Composite AG) It could be demonstrated that high voltage fragmentation is a suitable method for recycling of carbon fibre reinforced thermoplastic polymers from cradle to cradle.		
19:00	RECEPTION				
22:00	End				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
7:30					
8:30	**PLENARY (Room 710) - Ludwik Leibler: " Vitrimers".** Chair: Tsu-Wei Chou				
	CNT NANOCOMPOSITES 1 Chairs: Brian Wardle, Daniel Theriault	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 5** Chair: Yong Chen	**SYMPOSIUM ON MARINE COMPOSITES 5** Chairs: Yasushi Miyano, Dayakar Penumadu	**FRACTURE AND DAMAGE 5** Chair: Erian Armanios	**TEXTILE COMPOSITES 1** Chairs: Prasad Potluri, Stepan V. Lomov
9:30	**FABRICATION AND MECHANICAL PROPERTIES OF CARBON NANOTUBE COMPOSITE MICROTRUSSES** Sei jin Park, Anna Christine Brieland-shoultz, A. john Hart(University of Michigan - Ann Arbor), Matthew R. Maschmann, Jeffery W. Baur(Air Force Research Laboratory), Sameh H. Tawfick(Massachusetts Institute of Technology), Michael De volder Novel micro-scale CNT trusses are fabricated by a spatially modulated growth process, and infiltrated with ceramic, enabling wide-range tuning of their deformation mechanism and mechanical properties.	**INTEGRATION OF LINEAR THERMOELECTRIC MODULES COMPOSED OF LOW AND INTERMEDIATE TEMPERATURE P- AND N-TYPE METALLIC SEMICONDUCTORS INTO COMBUSTION CHAMBER** Minoru Taya(University of Washington) This paper is aimed at design of integrated TEG made of light weight and low cost materials into combustion chamber	**EFFECT OF SEA WATER CONFINEMENT ON CYCLIC FATIGUE BEHAVIOR OF MARINE COMPOSITES** Akawut Siriruk(University of Tennessee - Knoxville), Dayakar Penumadu(University of Tennessee - Knoxville) Sea water confinement effect on the cyclic fatigue behavior of matrix dominated carbon fiber/vinyl ester facings are evaluated in term of numbers of cycles to failure and tangent modulus degradation.	**DUCTILE STEEL FIBER/EPOXY COMPOSITES WITH MODIFIED ADHESION** Michaël Guy Callens, Larissa Gorbatikh, Ellen Bertels, Bart Goderis, Mario Smet, Ignaas Verpoest (Katholieke Universiteit Leuven) Annealed stainless steel fibres combine both a high stiffness and a high strain-to-failure. The research goal is to understand the mechanical behaviour as a function of the fiber/polymer adhesion.	**TOWARDS REALISTIC GEOMETRIC MODELING OF WOVEN FABRICS** Guillaume Couégnat(Universite Bordeaux I), Hichem Ayadi(Universite Bordeaux I), Clément Saurat(Universite Bordeaux I), Eric Rohmer(Universite Bordeaux I) This paper proposes a numerical relaxation-based simulation procedure to obtain a realistic geometric model of woven fabrics from an initial idealized description.
9:50	**THE STUDY OF METHYL METHACRYLATE HARDENED HYBRID POPLAR WOOD** Weidan Ding(University of Quebec Abitibi-Temiscamingue), Ahmed Koubaa(University of Quebec Abitibi-Temiscamingue), Abdelkader Chaala() Six-year-old hybrid poplar woods were impregnated with methyl methacrylate (MMA). The Physical, mechanical and surface properties of control and MMA-hardened woods were investigated.	**PROCESS-STRUCTURE-PROPERTY RELATIONSHIP FOR ORGANIC SEMICONDUCTORS GROWN BY ORGANIC VAPOR JET PRINTING** Olga Shalev(University of Michigan - Ann Arbor), Max Shtein(University of Michigan - Ann Arbor), Shaurjo Biswas(University of Michigan - Ann Arbor) We review the requirements for small molecular organic materials and relate them to processing methods, outlining the properties of materials critical to achieving control over the deposition process.	**EFFECT OF WATER ABSORPTION ON TIME-TEMPERATURE DEPENDENT STRENGTH OF UNIDIRECTIONAL CFRP** Yasushi Miyano(Kanazawa Institute of Technology), Syuhei Hara(Kanazawa Institute of Technology), Masayuki Nakada(Kanazawa Institute of Technology) Our developed accelerated testing methodology is applied to discussing of the effect of water absorption on the strengths of CFRP.	**MIXED MODE THROUGH THICKNESS FRACTURE OF POLYMER MATRIX COMPOSITE** Jamal Jamali(University of Western Ontario), Jeff Wood(University of Western Ontario) The propagation of a through-thickness crack in a UD composite subjected to mixed mode loading was studied using the CTS geometry in order to assess the associated crack propagation energy.	**DRAPEABILITY OF GLASS AND STEEL FIBRES KNITTED FABRICS** Marcin Barburski(Technical University of Lodz), Stepan V. Lomov(Katholieke Universiteit Leuven), Kristof Vanclooster(Toray Industries Inc.), Ignaas Verpoest(Katholieke Universiteit Leuven) The aim of the work is analysis the drapeability of glass and steel fibres knitted fabrics cover to the two moulds. Full-field strain measurement is performed using 3D DIC measurements
10:10	**INTERLAMINAR SHEAR STRENGTH OF C-SIC BASED COMPOSITES REINFORCED WITH HEAT TREATED C FIBERS** Jixiang Dai(Dalian University of Technology), Zhiqiang Wei(Dalian University of Technology), Jian Li(Dalian University of Technology), Zhaofu Zhang(Dalian University of Technology), Jianjun Sha(Dalian University of Technology) The present investigation reveals the the interlaminar shear strength of 2D C/C-SiC composites increased with increasing the heat treatment temperature of C fibers.	**ELECTROMECHANICAL CHARACTERIZATION OF BARIUM TITANATE COATED CARBON FIBERS** Christopher Bowland(University of Florida), Zhi Zhou(University of Florida), Henry Sodano(University of Florida) Barium titanate grown on carbon fiber using a novel growth process will be characterized to determine the electromechanical properties of the multifunctional fiber.	**EFFECT OF COMBINED ENVIRONMENTS ON THE FATIGUE OF CARBON FIBER-VINYLESTER COMPOSITES** Chad S. Korach(State University of New York at Stony Brook), Arash Afshar(State University of New York at Stony Brook), Heng tseng Liao(State University of New York at Stony Brook), Fu-pen Chiang(State University of New York at Stony Brook) Effects of cyclic loading on carbon fiber-reinforced vinylester composites after combined UV and moisture exposures is determined by modulus changes and post-loading three-point bending.	**STACKING SEQUENCE EFFECTS IN OVER-HEIGHT COMPACT TENSION TESTS OF QUASI-ISOTROPIC LAMINATES** Xiaodong Xu, Michael R Wisnom, Stephen Richard Hallett(University of Bristol), Navid Zobeiry, Steven A Leslie, Anoush Poursartip, Reza Vaziri (University of British Columbia) In the present paper, quasi-isotropic OCT specimens with different stacking sequences were tested. An FE method using interface elements was applied to understand the damage pattern.	**MECHANICAL BEHAVIOUR OF 3D WOVEN COMPOSITES UNDER TENSION, COMPRESSION AND BENDING** Shuo Dai(Loughborough University), Paul Cunningham(Loughborough University), Simon Marshall(), Christopher Silva() This paper presents the elastic and strength properties of the 3D woven composites under tension compression and bending together with a discussion of the predominant failure mode.
10:30	**REAGGLOMERATION OF CARBON NANOTUBES DURING PROCESSING OF EPOXY NANOCOMPOSITES** Mostafa Yourdkhani(McGill University), Pascal Hubert(McGill University) Dispersion stability of carbon nanotubes in an epoxy resin is investigated. Rheological measurements and hot stage microscopy are used to study the reagglomeration of nanotubes during cure cycle.	**LAYER-BY LAYER ASSEMBLED MULTIFUNCTIONAL COMPOSITES** Nicholas A. Kotov, Jian Zhu Layer-by-layer assembled (LBL) composites present exceptional mechanical properties for many components. The current status and the future outlook of multifunctional LBL composites will be presented.	**EXPERIMENTAL INVESTIGATION OF THE EFFECT OF UV RADIATION AND SALT WATER ON THE DYNAMIC PROPERTIES AND FAILURE OF CARBON FIBER-VINYLESTER COMPOSITES** Maen Alkhader(State University of New York at Stony Brook), Chad S. Korach(State University of New York at Stony Brook), Fu-pen Chiang(State University of New York at Stony Brook) This work aims to quantify the effect of extended exposure to UV radiation and salt water on the high-strain-rate properties and dynamic failure of carbon fiber-reinforced vinylester composites	**STRESS CONTOUR UTILIZATION FOR ESTIMATING INTERFACIAL PROPERTIES OF FIBER/MATRIX COMPOSITE** Bentang Arief Budiman(Tokyo Institute of Technology), Kosuke Takahashi(Tokyo Institute of Technology), Kazuaki Inaba(Tokyo Institute of Technology), Kikuo Kishimoto(Tokyo Institute of Technology) The estimation of interfacial properties was proposed by comparing stress contour of simulation and experiment. Characteristic lengths on stress contour were found to aid in estimating them.	**MODELLING EFFECTS OF GEOMETRIC VARIABILITY ON MECHANICAL PROPERTIES OF 2D TEXTILE COMPOSITES** Mikhail Matveev(University of Nottingham), Andrew C Long(University of Nottingham), Ivor Arthur Jones(University of Nottingham), Guan Lu(First Aircraft institute, AVIC) Variability of yarn path was experimentally studied with micro-CT. Statistically equivalent model was generated. The results of numerical mechanical analysis were compared with experimental results.
10:50	**BREAK**				

	Room 522	Room 518ab	Room 710	Room 519b	Room 520c
7:30					
8:30	**PLENARY (Room 710) - Ludwik Leibler: " Vitrimers".** Chair: Tsu-Wei Chou				
	MODELLING AND SIMULATION V Chairs: Stephen Richard Hallett, Silvestre T. Pinho	**LCM 5 - PROCESS MODELING I** Chairs: Veronique Michaud, Edu Ruiz	**NATURAL FIBER COMPOSITES 5** Chairs: Johanne Denault, Asami Nakai	**FATIGUE OF COMPOSITES 1** Chairs: Marino Quaresimin, Masahiro Arai	**MULTI-FUNCTIONAL SMART COMPOSITES I** Chairs: Edris Hassan, Alex L. Kalamkarov
9:30	**A PARTITION-OF-UNITY METHOD FOR MODELING COUPLED THERMO-MECHANICAL PROBLEMS IN FRP LAMINATES SUBJECTED TO IMPACT** Awais Ahmed(Delft University of Technology), Lambertus Johannes Sluys(Delft University of Technology) A fully coupled thermomechanical model is presented for the analysis of crack growth.Partition-of-unity approach is exploited to model discontinuities in displacement, temperature and heat flux fields	**MONITORING AND SIMULATION OF THE VACUUM INFUSION PROCESS** Alper Aktas(University of Southampton), Stephen Boyd(University of Southampton), Ajit Shenoi(University of Southampton) A vacuum infusion process monitoring methodology incorporating thermocouples and simulation of the vacuum infusion process were studied for an unsaturated polyester resin system.	**INTRODUCTION OF SOCIETY OF AUTOMOTIVE COMPOSITES JAPAN - A NEW WAVE OF COMPOSITES FOR AUTOMOBILE INDUSTRY** Hiroyuki Hamada (Kyoto Institute of Technology) Asami Nakai (Gifu University) In the automobile industry, weight saving of car bodies is being tried to reduce fuel consumption. Composite materials as represented by CFRP have been expected to be used instead of metal parts.	**STATIC AND FATIGUE PROPERTY OF MODE I CRACK ON CFRP LAMINATE TOUGHENED WITH CNF INTERLAYER** Masahiro Arai(Shinshu University), Marino Quaresimin(University of Padua), Masaki Hojo(Kyoto University) The static and fatigue crack property of mode I crack was investigated with CFRP beam. It was shown that CNF interlayer increase the fracture toughness of the CFRP as compared with CFRP laminates.	**CHARACTERIZATION OF MULTI-FUNCTIONAL COMPOSITES WITH PRINTED PRESSURE SENSORS** Dominik Krumm(Chemnitz University of Technology), Marko Illing(Chemnitz University of Technology), Stephan Odenwald(Chemnitz University of Technology) The objective of this study is to characterize the mechanical properties of multi-functional composites made of carbon fiber reinforced polymers and printed pressure sensors.
9:50	**MULTISCALE MODEL BASED ON A FINITE FRACTURE APPROACH FOR THE PREDICTION ON DAMAGE IN LAMINATE COMPOSITES** Nicolas Carrere(École Nationale Supérieure de Techniques Avancés, Bretagne), Nicolas Tual(Ecole Nationale Superieur des Ingenieur des Etudes et Techniques d'Armement), Malick Diakhaté(Universite de Bretagne Occidentale) TThe aim of this paper is to propose a model to describe the progressive damage to the failure in laminated composites. This model is based on a finite fracture mechanis approach.	**PERMEABILITY ANALYTICAL MODELING OF 3D INTERLOCK FABRICS** Nicolas Vernet(Ecole Polytechnique de Montreal), François Trochu(Ecole Polytechnique de Montreal) The aim of this work is to determine a model to predict the permeability of 3D interlock fabrics. Experimental permeabilities are compared to the calculated values.		**VERY HIGH CYCLE FATIGUE OF FIBRE-REINFORCED COMPOSITES: AN ALTERNATIVE EXPERIMENTAL APPROACH** Till Julian Adam(Technische Universitat Carolo-Wilhelmina Braunschweig), Peter Horst(Technische Universitat Carolo-Wilhelmina Braunschweig) The vhcf of frp has not been sufficiently investigated yet. Thus, a test rig circumventing the typical problems has been set up. The fatigue of cross ply laminates is analyzed up to 1E+8 cycles.	**IN SITU MONITORING OF NANOPARTICLE FILTRATION IN CARBON NANOMATERIAL/GLASS FIBER/ POLYESTER MULTISCALE COMPOSITES DURING VARTM** Joel renaud Ngouanom Gnidakouong, Young Bin Park, Myungsoo Kim, Hyung Wook Park, Ho soon jeong, Young bok Jung, Kyungsik han, Sung Kyu ahn (Ulsan National Institute of Science and Technology), Joung-man Park(Gyeongsang National University) In situ resistance monitoring as a non-destructive method during a Vacuum Assisted Resin transfer molding (VARTM) were used to evaluate the flow of nanofiller suspensions in the porous media.
10:10	**THIN PLY COMPOSITES: EXPERIMENTAL CHARACTERIZATION AND MODELING** Joël Cugnoni(École polytechnique fédérale de Lausanne), Robin Amacher(École polytechnique fédérale de Lausanne), John Botsis(Ecole Polytechnique Federal de Lausanne) In this work, the performance improvement brought by ultra-thin ply composites is demonstrated experimentally and explained using 3D meso-scale FE modeling of damage progression.	**A SIMULATION-BASED METHOD OF PERMEABILITY PREDICTION FOR RTM PROCESS SIMULATION** Christoph Hahn(Technische Universitat Munchen), Christophe Binetruy(Ecole Centrale de Nantes), Roland Hinterhoelzl(Technische Universitat Munchen) This paper presents an approach to predict permeability numerically for carbon fiber fabrics. The most important benefit is the speed-up compared to experimental testing.	**STIFFNESS PREDICTION IN GREEN COMPOSITES USING HOMOGENIZATION TECHNIQUES** Asghar Arab(Universitat des Saarlandes), Markus Stommel(Universitat des Saarlandes), Lennart Wallström(Lulea University of Technology), Janis Varna(Lulea University of Technology) Homogenization techniques has been used to predict the mechanical properties of the green composites considering the fiber length distribution in composite.	**ENHANCED FATIGUE TESTING OF COMPOSITES** Peter Bradby spiros Bailey(Instron), Christian Hoehl(Instron), Payam Jamshidi(University of Manchester), Steve Squires(Instron), Andrew J Smith(Instron) A novel control method for composites fatigue is presented. Adaptive frequency control is employed to prevent excessive specimen heating, offering improved repeatability and increased test throughput.	**PIEZORESISTANCE CHARACTERIZATION OF PVDF-MWNT NANOCOMPOSITES** Reza Rizvi(University of Toronto), Hani E Naguib(University of Toronto) This study investigates the effect of MWNT concentration on the electrical properties and piezoresistance of Polyvinylidene Flouride-MWNT (PVDF-MWNT) composites prepared by high shear melt mixing.
10:30	**AN INTEGRATED XFEM-CE APPROACH FOR MODELING MATRIX CRACKS AND DELAMINATION INTERACTIONS IN COMPOSITE LAMINATES WITH ANGLED PLIES** Xiushan Sun(National University of Singapore), Vincent Bc Tan(National University of Singapore), Tong earn Tay(National University of Singapore) This paper presents a novel approach integrating the extended finite element method (XFEM) and cohesive elements (CEs) for delamination crack interactions.	**A STUDY OF THE QUALITY OF COMPLEX PARTS MADE USING THE MOULDLESS VARTM METHOD** Chris Larose Polowick(Carleton University) This paper focuses on a method to characterize and mitigate voids and thickness variation found in three-dimensional components that have been manufactured using the VARTM method.	**NANOCRYTALLINE CELLULOSE-LIGNIN CARBON NANOFIBRES** Yingjie Li(University of British Columbia), Li-ting Lin(University of British Columbia), John F. Kadla(University of British Columbia), Frank Ko(University of British Columbia) NCC-lignin composite nanofibers have been prepared by emulsion-electrospinning and carbonization. With emulsion electrospinning, the hydrophilic NCC was encapsulated by the hydrophobic lignin phase.	**INFLUENCE OF GLASS TRANSITION TEMPERATURE OF THERMOPLASTIC AND THERMOSET LAMINATES ON THEIR FATIGUE BEHAVIOR** William Albouy(INSA Rouen), Benoit Vieille(INSA Rouen), Lakhdar Taleb(INSA Rouen) About the influence of glass transition temperature of woven-ply Epoxy- and PPS-based composites on their high-temperature fatigue behavior: angle-ply and quasi-isotropic laminates	**NANOINDENTATION RESPONSE OF PIEZOELECTRIC COMPOSITE MATERIALS** Guang Cheng(State University of New York at Stony Brook), T.a. Venkatesh(State University of New York at Stony Brook) Using finite element modeling, a comprehensive framework for characterizing the electromechanical properties of piezoelectric composite materials through the nanoindentation method is developed.
10:50	**BREAK**				

	Room 525	Room 520f	Room 520be		Room 516ab
7:30					
8:30	**PLENARY (Room 710) - Ludwik Leibler: " Vitrimers".** Chair: Tsu-Wei Chou				
	STRUCTURAL RESPONSE & DESIGN Chair: Guijun Xian		**LIFE CYCLE ANALYSIS & RELIABILITY** Chair: Christopher Hansen		**TESTING - POSTER** Chairs: Mehdi Hojjati, Jihua Chen
9:30	**UNEXPECTED TWISTING CURVATURE GENERATION OF BISTABLE CFRP LAMINATE DUE TO THE UNCERTAINTY OF LAY-UP SEQUENCE AND NEGATIVE INITIAL CURVATURE** Junghyun Ryu(Seoul National University), Jong-gu Lee(Seoul National University), Seung-won Kim(Seoul National University), Kyu-jin Cho(Seoul National University), Maenghyo Cho(Seoul National University) The reasons of the tilting behavior of bistable CFRP cross-ply laminate are presented. We modify the strain energy function by introducing the additional constraint, force and moment balance equation		**REDUCING USE OF STYRENE MONOMERS IN UNSATURATED POLYESTER RESINS** Christopher Hansen(University of Massachusetts at Lowell), Richard A Poillucci(University of Massachusetts at Lowell) Alternative vinyl- and allyl-based monomers are explored to replace styrene monomer in unsaturated polyester resins. A rapid microfluidic screening technique is used to speed monomer identification.	9:30	**COMPARISON OF CONSOLIDATED COMPOSITES USING MECHANICAL TESTING AND A MULTI-CRITERIA DECISION MAKING TECHNIQUE UNDER VARIABLE MATERIAL PROPERTIES** Jeremy Leung, Melissa Heinrick, Abbas Milani
				9:34	**SPIN TEST OF THE DISK MADE OF CARBON FIBER REINFORCED THREE-DIMENSIONAL COMPOSITES** Yuichi Nagura, Noboru Hiroshima, Hiroshi Hatta, Ken Goto, Yasuo Kogo
				9:38	**STIMULUS RESPONSE POLYMER AND MULTIFUNCTIONAL COMPOSITES: CHALLENGES AND PROSPECTS** Volodymyr Hutsaylyuk, Heorhiy Sulym, Iaroslav Pasternak, Igor Turchyn
				9:42	**DEGRADATION AND DEFORMATION OF CARBON PHENOLIC ABLATOR UNDER ELEVATED TEMPERATURE PROCESSES** Kohei Fukuda, Yuuki Kubota, Hiroshi Hatta, Yasuo Kogo, Kenichi Hirai, Walter Krenkel, Nico Langhof
9:50	**POST-BUCKLING OF DYNAMICALLY LOADED COMPOSITE PANELS USING A REDUCED ORDER MODEL** Eelco Jansen(Universitat Hannover), Tanvir Rahman(TNO DIANA BV), Alexander Meurer(Universitat Hannover), Raimund Rolfes(Universitat Hannover) A multi-mode reduced order approach for finite element analysis of buckling under dynamic loading is presented. The approach is applied to post-buckling of composite panels under compressive loading.		**QUANTIFICATION OF SOURCES OF VARIABILITY IN CRFP PLATES CURED IN AUTOCLAVE** Yves Angel Davila(Institut Clément Ader), Laurent Crouzeix(Institut Clément Ader), Bernard Douchin(Institut Clément Ader), Francis Collombet(Institut Clément Ader), Yves-henri Grunevald() A variability study on CFRP plates cured in autoclave in which the following sources are measured: ply thickness, ply orientation, etc.	9:46	**MECHANICAL BEHAVIOUR OF GLASS FIBRE-REINFORCED POLYMER THIN RODS** Daxu Zhang, Xiaoyan Wang, Wujun Chen, Fujun Peng, Jinghai Gong, Guozhi Qiu
				9:50	**STUDY OF ELECTROMAGNETIC SHIELD EFFECT OF THE METAL-PLATED CARBON FIBER COMPOSITE** Mee-hye Oh
				9:54	**BENDING STIFFNESS BEHAVIOR OF THICK-WALLED COMPOSITE TUBES** Mohamed El-geuchy, Suong Hoa, Farjad Shadmehri
				9:58	**ON THE ANALYSIS OF A CONTACT FRICTION COMPOSITE-TO-METAL JOINT** Andrei Costache, Konstantinos N. Anyfantis, Christian Berggreen
10:10	**A COMPARISON OF CURRENT DESIGN CONCEPTS OF FUSELAGE PANELS UNDER TYPICAL LOAD CONDITIONS** Xiao Cai(Concordia University), Franck Dervault(Borland Software Corporation), Suong Hoa(Concordia University), Ramin Sedaghati(Concordia University) This paper presents a side-by-side comparison of most design concepts employed in the practice of sizing fuselage panels by the aerospace industry with a main function of structural weight.		**SHADES OF GREEN: PRELIMINARY LCA OF BIOBASED POLYMER RESINS FOR COMPOSITE MATERIALS** Jonathon Chard(University of Surrey), Lauren Basson(University of Surrey), Gavin Creech(Scott Bader Company Ltd), David Jesson(University of Surrey), Paul A Smith(University of Surrey) Multistage LCA for batch produced resin systems, tested on a commercial Urethane Methacrylate and with a development "sustainable" version of the same resin system.	10:02	**ADHESIVE STRAIN MEASUREMENT IN PATCH REPAIRED CFRP LAMINATE USING 2D DIC** Mohammad Kashfuddoja, Ramji Manoharan
				10:06	**LUMINESCENT METHOD OF ASSESSING THE STRUCTURAL MODIFICATIONS OF POLYMER MATRICES** Svetlana Karitskaya
				10:10	**MICROSTRUCTURE AND MECHANICAL BEHAVIORS OF THICK-WALLED JOURNAL BEARING GFRP RINGS** Sergei Borisovich Sapozhnikov, Alexandr Viktorovich Bezmelnitsyn, Radii Sergeevich Zinoviev
				10:14	**SURFACE STRESS EFFECT IN THIN FILMS WITH NANOSCALE ROUGHNESS** Mikhail Grekov, Sergey Kostyrko
				10:18	**BLOCK COPOLYMERS ORGANIZATION AT INTERFACE** Diane Fischer, Sophie Bistac, Maurice Brogly
10:30	**EXTENDED FINITE ELEMENT METHOD MODELING OF CRACK PATHS IN PARTICLE REINFORCED COMPOSITES** Li MA, Zhi-Yong WANG, Lin-Zhi WU (Harbin Institute of Technology) An improved extended FEM which only the straightforward enrichment functions for material interfaces and crack surface are adopted to simulate the fracture behavior of particle reinforced composites.			10:22	**OUT-OF-PLANE TENSILE MODULUS OF UD-CFRP LAMINATE BY 3-POINT BENDING TEST** Eiichi Hara
10:50	**BREAK**				

	Room 515	Room 519a	Room 514	Room 710	Room 524c
10:50	BREAK				
	CNT NANOCOMPOSITES 2 Chairs: Brian Wardle, Daniel Theriault	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 6** Chairs: Max Shtein, Scott White	**SYMPOSIUM ON MARINE COMPOSITES 6** Chairs: Young W. Kwon, Mark Battley	**FRACTURE AND DAMAGE 6** Chairs: Reza Vaziri, Chandra Veer Singh	**TEXTILE COMPOSITES 2** Chairs: Prasad Potluri, Stepan V. Lomov
11:10	**CONDUCTIVITY ENHANCEMENT FOR CARBON NANOTUNES WITH SILVER DECORATION** Warintorn Thitsartarn(Institute of Materials Research and Engineering) Ag decorated TMWCNTs/Epoxy was presented as a new conductive nanocomposite with high electrical conductivity, as compared to epoxy resin, and retained mechanical properties of neat epoxy resin.	**CARBON NANOSTRUCTURES FOR FLEXIBLE AND HIGH EFFICIENCY ENERGY APPLICATION** Wonbong Choi(University of North Texas) This talk will focus on engineering of carbon nanomaterials, graphene and carbon nanotubes (CNTs), and their applications in Li-ion battery and flexible solar cells.	**EVALUATION OF PROGRESS OF PHYSICAL AGING ON VISCOELASTIC BEHAVIOR OF EPOXY RESIN** Masayuki Nakada(Kanazawa Institute of Technology), Kosuke Hosaki(Kanazawa Institute of Technology), Yasushi Miyano(Kanazawa Institute of Technology) The aging progressive rates which are the amount of horizontal and vertical translations of storage modulus of epoxy resin for various aging conditions can be used to estimate the aging process.	**THE WORLD WIDE FAILURE EXERCISE-STRENGTH PREDICTION IS NOT EASY - BUT WE ARE GETTING THERE** Michael John Hinton (National Composites Centre) Sam Kaddour (QinetiQ Ltd) The purpose of this lecture is to review the progress achieved through the World Wide Failure Exercises and to challenge the community to apply the principles to other critical areas in the domain.	**OPEN DATA FORMATS AND SCRIPTING IN INTEGRATED MESO-LEVEL TEXTILE COMPOSITE SIMULATIONS** Stepan V. Lomov(Katholieke Universiteit Leuven) Paper demonstrates possibilities, given by the open data exchange format and command line scripting for meso-level textile composite simulations (example of WiseTex).
11:30	**EFFECT OF CARBON NANOTUBE DEFORMATION ON ELECTRICAL CONDUCTIVITY OF POLYMER COMPOSITES** Shen Gong(York University), George Zhenghong Zhu(York University), Emile Haddad(MPB Communications Inc) This paper studies the electrical conductivity of carbon nanotube polymer nanocomposites by considering the tunneling effect of radical deformable carbon nanotubes.	**TAILORED ALIGNED-CARBON NANOTUBE NANOCOMPOSITES FOR ENERGY STORAGE** Noa Lachman(Massachusetts Institute of Technology), Brian Wardle(Massachusetts Institute of Technology) Recent advances in fabricating aligned CNT with ultrahigh volume fraction and controlling their surface by conformal coating create opportunities for improving the performance of supercapacitors.	**COMPRESSIVE BEHAVIOUR OF PVC FOAM IN ELEVATED TEMPERATURE USING DIGITAL IMAGE CORRELATION AND A MODIFIED ARCAN FIXTURE** Ole Thybo Thomsen(University of Southampton), Janice Marie Dulieu-barton(University of Southampton), Siavah T Taher(Aalborg University) The work focuses on experimental characterisation of PVC foams at elevated temperatures when subjected to compression. A modified Arcan fixture was used, and the deformations were measured using DIC.		**NCF/BMI COMPOSITE MATERIALS: EFFECT OF STITCHING THREADS** Anqi Dong(Beihang University), Xinqing Zhao(Beihang University), Li Zhang(Beihang University), Shan Zhu(Beihang University) Mechanical properties and compatibility with resin of stitching threads which used in NCF were investigated.Hygrothermal resistance of NCF composites was also investigated.
11:50	**HIGH OPTOELECTRONIC PERFORMANCE OF LAYER-BY-LAYER ASSEMBLED CARBON NANOTUBE THIN FILMS** Yong Tae Park(University of Minnesota - Twin Cities Campus), Jaime C Grunlan(Texas A&M University) Highly transparent thin film electrodes were assembled through the alternate exposure of flexible PET substrates to positively-charged and negatively-charged aqueous mixtures.	**MECHANICAL RELIABILITY OF INORGANIC THIN FILM PHOTOVOLTAICS INTEGRATED WITH COMPOSITE LAMINATES** Dimitrios Antartis(University of Illinois at Urbana-Champaign), Ioannis Chasiotis(University of Illinois at Urbana-Champaign) The residual stresses, their gradients and the mechanical strength of inorganic photovoltaic films were thoroughly quantified for the first time.	**THE INFLUENCE OF TEMPERATURE ON THE STABILITY OF POLYMER FOAM CORED SANDWICH STRUCTURES** Janice Marie Dulieu-barton(University of Southampton), Ole Thybo Thomsen(University of Southampton), Shufeng Zhang(University of Southampton) The paper describes an experimental investigation on the influence of temperature on the stability of sandwich structures under three and four point bend loading.	**MODELLING COMPRESSIVE DAMAGE IN CFRP: COMBINING FRICTION WITH DAMAGE** Renaud Gutkin(Swerea SICOMP) A traction separation law combining damage and friction is developed to capture the response of composites under compression. An application to simulate the crushing of a wedge specimen is presented.	**MODELLING OF 3D WOVEN COMPOSITES WITH REALISTIC UNIT CELL GEOMETRY** Steven Daniel Green(University of Bristol), Mikhail Matveev(University of Nottingham), Andrew C Long(University of Nottingham), Stephen Richard Hallett(University of Bristol) Both realistic (from simulation) and idealised unit cell geometries of a 3D woven composite are analysed using finite element analysis, with a voxel mesh and continuum damage mechanics model.
12:10	**ELECTRICAL CONDUCTIVITY OF HYBRID/PATTERNED NANOCOMPOSITES FILMS** Rouhollah Dermanaki Farahani(Ecole Polytechnique de Montreal), Daniel Therriault(Ecole Polytechnique de Montreal) With the aim at improving electrical conductivity of polymer nanocomposites at a given filler loading, a heterogeneous distribution of carbon nanotubes was achieved using two different approaches.	**THE EFFECTS OF STRUCTURAL INTEGRATION AND MECHANICAL DEFORMATION ON THE ELECTRO-MECHANICAL PERFORMANCE OF STRUCTURAL BATTERIES** Salah M Shalouf(Royal Melbourne Institute of Technology) This research seeks to investigate the effects of mechanical deformation on the electrical performance of structural composite batteries made from polymer batteries embedded in CFRP.	**HOT-WET ENVIRONMENTAL PROPERTIES OF Z-PINNED CARBON-EPOXY COMPOSITES** Adrian Mouritz(Royal Melbourne Institute of Technology) Effect of water absorption from hot-wet environment on the delamination properties, impact damage resistance and joint properties of z-pinned composites.	**STUDY OF NON-LINEAR TENSILE BEHAVIOUR OF DISCONTINUOUS CARBON-EPOXY PREPREG COMPOSITES** Gergely Czel(University of Bristol), Michael R Wisnom(University of Bristol) Present study aims at investigating the tensile behaviour of unidirectional carbon- epoxy composites made with cut and overlapped prepreg plies.	**CHARACTERIZATION AND MODELING OF DAMAGE AT THE MESOSCALE OF WOVEN POLYMER MATRIX COMPOSITES.** Christian Fagiano(ONERA), Martin Hirsekorn(ONERA), Gael Grail(ONERA), Vincent Chiaruttini(ONERA) A FE strategy is proposed to evaluate the effects of mesoscale transverse damage on the macroscopic mechanical properties of woven polymer matrix composites.
12:30	LUNCH				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
10:50	BREAK				
	MODELLING AND SIMULATION VI Chairs: Stephen Richard Hallett, Silvestre T. Pinho	**LCM 6 - PERMEABILITY BENCHMARK WORKSHOP** Chairs: Nicolas Vernet, Edu Ruiz	**NATURAL FIBER COMPOSITES 6** Chairs: Hiroyuki Hamada, Masahiro Arai	**FATIGUE OF COMPOSITES 2** Chairs: Marino Quaresimin, Masahiro Arai	**MULTI-FUNCTIONAL SMART COMPOSITES II** Chairs: Krishna Sri Challagulla, Hamid Akbarzadeh
11:10	**NUMERICALLY PREDICTED DAMAGE AND FAILURE ENVELOPES OF COMPOSITES FEATURING NON-LINEAR MATERIAL BEHAVIOR** Jakob Gager(Polymer Competence Center Leoben), Martin Meindlhumer(FACC AG), Martin Schwab(Polymer Competence Center Leoben), Heinz E Pettermann(Vienna University of Technology) Energy based stress/strain envelopes are computed to assess safe operation ranges of textile composites based on multiple non-linear FEM simulations accounting for damage and plasticity.	**WORKSHOP ON THE "2nd INTERNATIONAL PERMEABILITY BENCHMARK"**	**SURFACE ANALYSES OF BASALT FIBRES: TAILORING THE INTERPHASE OF GREEN FIBRE REINFORCED COMPOSITES** Theresa Foerster(Leibniz Institute of Polymer Research Dresden), Edith Maeder(Leibniz Institute of Polymer Research Dresden), David Jesson(University of Surrey), John F. Watts(University of Surrey) The composition of surface of unsized, silanized and temperature treated basalt fibres is studied by XPS. The high temperature behaviour of two unsized basalt fibres is shown.	**SYNCHROTRON COMPUTED TOMOGRAPHY OF FATIGUE MICROMECHANISMS IN CFRP** Serafina Consuelo Garcea(University of Southampton), Mark N Mavrogordato(University of Southampton), Anna E Scott(University of Southampton), Ian Sinclair(University of Southampton), Simon M Spearing(University of Southampton) Fatigue micromechanical behaviour in carbon/epoxy has been investigated using Computed Tomography. Damage detected was quantified and compared with quasi-static load.	**PREPARATION AND CHARACTERIZATION OF NANOCELLULOSE/PVA GREEN COMPOSITES** Hitoshi Takagi(University of Tokushima) We fabricated cellulose nanofiber-reinforced PVA green composites, and found that the vacuum stirrer defoaming process is effective to obtain the composites with better mechanical performance.
11:30	**MODEL FOR TIME-INDEPENDENT AND TIME-DEPENDENT DAMAGE EVOLUTION AND ITS INFLUENCE ON CREEP OF MULTIDIRECTIONAL POLYMER COMPOSITE LAMINATES** Amir Asadi(University of Manitoba), Raghavan Jayaraman(University of Manitoba) An analytical model was developed to predict simultaneous time-independent and time-dependent transverse cracking in multiple plies of multidirectional polymer composites and its influence on creep		**PREPARATION AND PROPERTIES OF PLANT FIBER MODIFIED PHENOLIC FOAM COMPOSITE MATERIALS** Zhong-jia Yang(Beihang University), Yizhuo Gu(Beihang University), Xuelin Tan(Beihang University), Min Li(Beihang University), Zuoguang Zhang(Beijing University of Aeronautics and Astronautics) Phenolic foam has excellent properties as exterior wall material, but low strength. Natural plant fibers are added before curing process, the mechanical property is reinforced by 30~50%.	**FATIGUE AND STATIC DAMAGE MODELLING OF CONTINUOUS GLASS FIBRE/EPOXY COMPOSITE** Rim Ben toumi(PSA Peugeot Citroen), Jacques Renard(), Pongsak Nimdum(Ecole Nationale Superieure des Mines de Paris), Martine Monin() Continuous fibrous composites are found to be increasingly used in structural automotive parts which are mostly subjected to cyclic loads.Hence, interest is focused on composites durability.	**MAGNETOELASTIC RESPONSES OF A BI-LAYERED COMPOSITE CYLINDER WITH AN EMBEDED TIME-HARMONIC EIGENSTRAIN** Hamid Akbarzadeh(University of New Brunswick), Armin Abedini(University of New Brunswick), Zengtao Chen(University of New Brunswick) The present paper obtains analytical solutions for time-harmonic magnetoelastic responses of an infinitely-long bi-layered composite cylinder with embedded polynomial eigenstrain.
11:50	**A SIMPLE PLASTICITY MODEL FOR PREDICTING TRANSVERSE COMPOSITE RESPONSE AND FAILURE** Khong wui Gan(University of Bristol), Michael R Wisnom(University of Bristol), Stephen Richard Hallett(University of Bristol), Giuliano Allegri(University of Bristol) A simple plasticity model is implemented in the explicit FE solver LS-Dyna for predicting failure in complex multi-axial load cases of composite materials.		**WETTABILITY EVALUATION OF FLAX AND PAPER FIBERS USING THE SESSILE DROP TECHNIQUE.** Gilbert Lebrun(University of Quebec at Trois-Rivieres) Using the sessile drop technique, the spread and penetration of epoxy resin inside compressed pellets of fibers were used to qualify the fibers pretreatment.	**INFLUENCE OF PLY WAVINESS ON RESIDUAL STRENGTH AND FATIGUE DEGRADATION OF COMPOSITE WIND TURBINE BLADES** Milos Draskovic(Universitat Stuttgart), Udayanga Indunil kumar Galappaththi(Glasgow Caledonian University), Anthony Pickett(Universitat Stuttgart), Marc Capellaro(Universitat Stuttgart), Peter Middendorf(Universitat Stuttgart) Evaluation of the effect of ply waviness on residual strength and fatigue life of composite wind turbine blades. Integration of manufacturing defects influence on the fatigue life.	**CARBON FIBRE SENSOR FOR CRACK MONITORING OF COMPOSITE MATERIALS** Tobias Müller(Universitat der Bundeswehr Munchen), Alexander Horoschenkoff(Hochschule Munchen), Helmut Rapp(Universitat der Bundeswehr Munchen) Electric isolated ex-PAN carbon fibre rovings were used as piezoresistive embedded sensors for crack monitoring of microcracks in continuous fibre reinforced plastics and composite pressure vessels.
12:10	**MODELING STRUCTURAL BEHAVIOUR OF PVC FOAM SANDWICH PANELS REINFORCED BY CFRP PINS** Zhongwei Guan(University of Liverpool), Jin Zhou(University of Liverpool), Wesley J Cantwell() This paper presents numerical modeling of the structural response of PVC foam sandwich panels reinforced by CFRP pins subjected to compression.			**THE EFFECT OF TEMPERATURE ON THE MIXED-MODE INTERLAMINAR TOUGHNESS AND FATIGUE DELAMINATION GROWTH OF FIBRE REINFORCED PLASTICS** Georgia Charalambous(University of Bristol), Giuliano Allegri(University of Bristol) This study addresses the characterisation of the temperature effect on the fracture toughness and fatigue delamination growth rate for an aerospace grade carbon fibre reinforced toughened epoxy.	**BINARY BRUSHES: A NOVEL APPROACH TOWARDS ENHANCED INTERFACIAL TUNABILITY IN MULTIFUNCTONAL POLYMER NANOCOMPOSITES** Bharath Natarajan(Rensselaer Polytechnic Institute), Ying Li(Rensselaer Polytechnic Institute), Tony Neely(University of South Carolina), Atri Rungta(University of South Carolina - Columbia), Brian C Benicewicz(University of South Carolina - Columbia), Linda [illegible] We demonstrate the effectiveness of the binary brush approach in tuning interfacial interactions for enhanced dispersions and mechanical properties, through a study of homopolymer nanocomposites
12:30	LUNCH				

	Room 525	Room 520f	Room 520be		Room 516ab
10:50	BREAK				
	STRUCTURAL OPTIMIZATION 1 Chair: Paul M. Weaver, Damiano Pasini	**MULTI-SCALE MODELING 1** Chairs: Gregory Odegard, Masato Nishi	**BIO-INSPIRED COMPOSITES** Chairs: François Barthelat, Christopher Hansen		**MECHANICAL PROPERTIES - POSTER** Chairs: Mehdi Hojjati, Jihua Chen
11:10	**EFFECTS OF VISCOELASTICITY ON THE DEPLOYMENT OF BISTABLE TAPE SPRINGS** Alex W Brinkmeyer(University of Bristol), Sergio Pellegrino(California Institute of Technology), Paul M Weaver(University of Bristol), Matthew Santer(Imperial College of Science) The deployment of composite bistable tubular springs is investigated at various stowage times and temperatures. Experiments are compared with predictions from an analytical viscoelastic model.	**PARAMETRIC STUDY OF SIMULATION PARAMETERS FOR MOLECULAR DYNAMICS MODELING OF REACTIVE CARBON GASES USING REAXFF** Benjamin D. Jensen(Michigan Technological University), Ananyo Bandyopadhyay(Michigan Technological University), Kristopher E. Wise(NASA), Gregory Odegard(Michigan Technological University) MD parameters are investigated for the Reax Force Field for reactive gases present in the formation of carbon nanocomposite constituents at various temperatures and for two Reax parameterizations	**DESIGN OF THE FIBER-WINDING LIGHTWEIGHT STRUCTURE INSPIRED BY BEETLE ELYTRA AND ITS MECHANICAL PROPERTIES** Ce Guo(Nanjing University of Aeronautics and Astronautics), Yi Zhou(Nanjing University of Aeronautics and Astronautics), Dong Li(Nanjing University of Aeronautics and Astronautics) Based on the microstructure of the cross-section of the beetle elytra, a bio-inspired lightweight structure was designed and made, and its mechanical properties were studied with FEM.	11:10	**4-POINT BENDING FATIGUE TESTING OF THIN CARBON-EPOXY LAMINATES** Catharine Marsden, Chun Li, Mark Biernacki, Scott Joseph Carnegie
				11:14	**STUDY ON COMPRESSIVE EXPERIMENT OF SINGLE CARBON FILAMENT** Tong Lili, Zhou Peiming
				11:18	**STIMULUS RESPONSE POLYMER AND MULTIFUNCTIONAL COMPOSITES: CHALLENGES AND PROSPECTS** Pavla Tesinova
				11:22	**INSULATING LAYERED COMPOSITE MATERIALS MANUFACTURING AND THERMAL DIFFUSIVITY MEASUREMENTS** Adam Dominiak, Roman Domarski
11:30	**OPTIMAL DESIGN OF A COMPOSITE STRUCTURE RELEVANT TO LAMINATE DESIGN GUIDELINES** Alexis Lasseigne(ONERA), François-xavier Irisarri(ONERA), Rodolphe Le riche(Ecole Nationale Superieure des Mines de St-Etienne) A multiobjective optimization method based on GA has been adapted to deal with stacking sequence tables to improve an existing composite structure relevant to usual laminate design guidelines.	**APPROACH FOR DRY TEXTILE COMPOSITE FORMING SIMULATION** Masato Nishi(JSOL Corporation), Tei Hirashima(JSOL Corporation) Response of dry textile is studied by meso-model. Then we propose macro-scale model that can reproduce in-plane properties and out-plane bending property in mesoscopic simulations.	**MULTIFUNCTIONAL COMPOSITE SANDWICH STRUCTURES UTILIZING EMBEDDED MICROVASCULAR NETWORKS** Christopher Hansen(University of Massachusetts at Lowell), Jordan Tye(University of Massachusetts at Lowell) Honeycomb sandwich composites with microvascular networks enable structural fluid transport and storage. Extruded fibers improve process reliability and recovery efficiencies near 100% are achieved.	11:26	**STRENGTH ESTIMATION FOR FORMED PARTS OF CARBON FIBER REINFORCED THERMOPLASTIC COMPOSITE BY ACCOUNTING FOR FORMING PROCESS EFFECTS** Takushi Miyake, Masako Seki
				11:30	**RULE OF MIXTURE FOR COMPOSITE THERMOELECTRICS** Yun Lu, Katsuhiro Sagara, Liang Hao, Hiroyuki Yashida, Zi Wu Ji, Fusheng Pan
				11:34	**OPTIMIZATION AND EXPERIMENT OF COMPOSITE SQUARE BEAM** Mingsen Yi
				11:38	**STATISTICAL ANALYSIS OF SINGLE PPTA FIBERS** Nathanael Alan Heckert, Jae hyun Kim, Gale A Holmes, Walter Mcdonough, Kirk Rice
11:50	**COMPARISON OF RESPONSE OF GROOVED COMPOSITES TO LOADING VIA SPHERICAL AND CYLINDRICAL INDENTERS** Holly K Jeffrey(Massachusetts Institute of Technology), Paul A Lagace(Massachusetts Institute of Technology) Experimental and finite element methods are used to examine the response of grooved composites to spherical and cylindrical indenters, using six different laminates.	**MESO-MECHANICAL INVESTIGATION OF WOVEN CARBON FIBER REINFORCED PLASTIC** Bertram Stier(Rheinisch Westfalische Technische Hochschule Aachen), Jaan Willem Simon(Rheinisch Westfalische Technische Hochschule Aachen), Stefanie Reese(Rheinisch Westfalische Technische Hochschule Aachen) In this work, numerical and experimental results of woven FRP plates at the meso-scale are compared. Numerically obtained strain fields and DIC measurements until crack initiation are investigated.	**BIOINSPIRED HIERARCHICAL FUNCTIONAL MATERIALS TEMPLATED FROM NATURAL STRUCTURES** Di Zhang, Wang Zhang, Jiajun Gu, Shenmin Zhu, Huilan Su, Qinglei Liu, Tongxiang Fan, Chuangliang Feng (Shanghai Jiao Tong University) A review of the development on using biomaterials with subtle hierarchical structures as biotemplates to fabricate biomorphic inorganic materials in Shanghai JiaoTong University.		
12:10		**MOLECULAR MODELING OF PHYSICAL AGING IN EPOXY POLYMERS** Ananyo Bandyopadhyay(Michigan Technological University), Gregory Odegard(Michigan Technological University) The objective of this study was to develop a molecular dynamics (MD) simulation method to predict the molecular structure of an epoxy material when subjected to various levels of physical aging.	**PUMPING POTENTIAL OF A LEFT-VENTRICAL-LIKE FLEXIBLE-MATRIX-COMPOSITE STRUCTURE** Hany A Ghoneim(Rochester Institute of Technology) The pumping potential of a left-ventrical heart-like composite structure is investigated both analytically and experimentally. Reasonably high pumping potential is realized.		
12:30	LUNCH				

	Room 515	Room 710	Room 514	Room 524ab	Room 524c
12:30	LUNCH				
13:30	PLENARY (Room 710) - Goichi Ben: "Fabrication and Evaluation of FRTP using in-situ polymerizable PA6 with AvRTM". Chair: Takahira Aoki				
	EXPERIMENTAL TECHNIQUES Chairs: John Botsis, Joël Cugnoni	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 7** Chairs: Minoru Taya, Henry Sodano	**SYMPOSIUM ON MARINE COMPOSITES 7** Chairs: Fu-pen Chiang, Ole Thybo Thomsen	**FRACTURE AND DAMAGE 7** Chairs: Chandra Veer Singh, Samit Roy	**TEXTILE COMPOSITES 3** Chairs: Anthony M Waas, Kunigal N. Shivakumar
14:30	**SPRING-IN CHARACTERISTICS OF THERMOPLASTIC COMPOSITES WITH GLASS FIBER FABRIC REINFORCEMENT** Jasmin Brühmann(Universitat Siegen), Bernd Engel(Universitat Siegen) The conducted studies analyze the friction and spring-in behavior of glass fiber reinforced polyamide-66 to derive suggestions for tool design and process criteria.	**FROM SMART SENSING TO MULTIFUNCTIONAL MATERIALS: ARE WE READY FOR THE CHALLENGES?** Fu-kuo Chang (Stanford University) Multifunctional materials capable of sensing their own state & knowing their residual capabilities in real time offer tremendous new abilities/opportunities for the design & usage of the materials.	**NONLINEAR BUCKLING OF SYNTACTIC FOAMS WITH IMPERFECT INTERFACE** Adel Shams(Polytechnic Institute of New York University), Matteo Aureli(Polytechnic Institute of New York University), Maurizio Porfiri(Polytechnic Institute of New York University) Buckling of a spherical shell embedded in elastic medium with imperfect interface is studied to investigate failure of syntactic foams	**EFFECT OF SUBSTRATE SURFACE MORPHOLOGY ON FATIGUE BEHAVIOUR OFADHESIVELY BONDED CARBON FIBRE REINFORCED PEEK COMPOSITES** Michelle Salvia(Ecole Centrale de Lyon), Réda el hak Ourahmoune(Ecole Centrale de Lyon), Nadir Mesrati(Ecole Nationale Polytechnique), Thomas Mathia(Ecole Centrale de Lyon) The effect of surface morphology generated by sandblasting process on the long term behaviour of adhesively bonded PEEK composite single shear lap-joint specimen under cyclic loading was studied	**EVALUATING DEFORMABILITY OF NON-CRIMP FABRIC AND MECHANICAL PERFORMANCE OF NON-CRIMP FABRIC COMPOSITES** Long Li(Beijing University of Aeronautics and Astronautics), Yan Zhao(Beihang University), Lijun Zhang(Beihang University), Wei Li(Hafei Aviation Industry Co. Ltd) Non-crimp fabric(NCF) has huge potential to replace traditional reinforcements for its combination good stability, outstanding drapability and prominent mechanical performance.
14:50	**COMPARISON OF METHODS TO CHARACTERIZE DAMAGE ONSET IN SHORT GLASS FIBER FILLED POLYPROPYLENE** Anna Maria Hartl(Johannes Kepler University Linz), Winoj Naveen Balasooriya(Johannes Kepler University Linz), Martin Reiter(Johannes Kepler University Linz), Markus Schossig(Hochschule Anhalt (FH), Hochschule fur angewandte Wissenschaften), Michael Jerabek(Borealis [illegible]) Investigation of micro-mechanisms governing damage evolution in short glass fiber reinforced polypropylene by means of acoustic emission, volume strain and two-cycle tensile tests and SEM analysis.		**PURE MOMENT APPROACH TO DETERMINE MIXED-MODE FRACTURE TOUGHNESS OF SANDWICH FACE/CORE INTERFACES** Christian Berggreen(Technical University of Denmark), George A Kardomateas(Georgia Institute of Technology), Leif A Carlsson(Florida Atlantic University) Closed form algebraic expressions for the energy release rate and the mode-mixity are obtained for a debonded sandwich. Tests are conducted with a new servo-hydraulically driven loading system.	**MIXED-MODE TRANSLAMINAR FRACTURE: EXPERIMENTAL RESULTS AND NUMERICAL MODELLING** Matthew John Laffan(Imperial College of Science), Silvestre T Pinho(Imperial College of Science), Paul Robinson(Imperial College of Science) Experimental results from a series of mixed-mode translaminar fracture tests will be presented. The experiments will be simulated using commercially available modelling tools and a new damage model.	**MESO-SCALE ANALSYIS OF 2D GLASS WOVEN PREFOM UNDER COMPACTION** Prasad Potluri(University of Manchester), Zeshan Yousaf(University of Manchester), Fabien Leonard(University of Manchester), Philip Withers(University of Manchester) This paper presents an experimental technique involving micro CT for measuring the meso-scale geometry of single and multi-layer preforms under compression loading.
15:10	**ANALYSIS OF FLEXIBLE CLAMPING IN TENSILE TESTS OF MULTIDIRECTIONAL LAMINATES** Faustino Mujika(Universidad del Pais Vasco), Neftali Carbajal(Universidad del Pais Vasco), Gustavo Vargas Silva(Universidad del Pais Vasco) The tensile test of a multidirectional laminate is analysed. It is proposed an experimental method for determining bending and twisting compliances at the clamped ends of the specimen.	**BIO-INSPIRED NEUROMORPHIC NETWORK BASED ON CARBON NANOTUBE/POLYMER COMPOSITES** K. Kim, A. Tudor, C-L. Chen, B. Cho, A. M. Shen, D. Lee, and Y. Chen (University of California) A device, synapstor, based on carbon nanotube/polymer composite to mimic a biological synapse is developed, and a synapstor-integrated neuromorphic circuit is fabricated to emulate a neuron network.	**G-CONTROL FATIGUE TESTING OF DEBONDED SANDWICH COMPOSITES** Marcello Manca(Technical University of Denmark), Christian Berggreen(Technical University of Denmark), Leif A Carlsson(Florida Atlantic University) This work is aimed at fatigue characterization of sandwich composites using the MMB test method and the G-control technique, which allows real-time control of the energy release rate.	**MULTI-SCALE ANALYSIS OF EFFECTS OF CONSTITUENT PROPERTIES ON OPEN-HOLE TENSION PERFORMANCE OF COMPOSITE LAMINATES** Xing Li, Zhidong Guan, Bin Xue, Lu Liu, Wei He, Junwu Mu (Beijing University of Aeronautics and Astronautics) A combination of experiments and multi-scale numerical simulations were used to investigate the effect of constituent properties on open-hole tension performance of CFRP.	**3D WOVEN UNIFORM DENSITY DRY PREFORMS FOR THE AEROSPACE INDUSTRY** Nicolas Juillard (JB Martin), Jonathan Lévesque, Olivier G. Vermeersch, Pascal Lamoureux-tremblay, Catherine Leroux (Group CTT), Daniel Puche, Odréanne Laverdière, Janic Duplessis (CE?GEP de Saint-Hyacinthe) New developments for 3D woven uniform density preforms for the aerospace industry, a solution to increase productivity and mechanicals properties for carbon fiber reinforced composites.
15:30	**STRAIN RATE EFFECT ON SINGLE PPTA FIBER TENSILE BEHAVIOURS** Jae hyun Kim, Nathanael Alan Heckert, Stefan D. Leigh, Walter Mcdonough, Kirk Rice, Gale A Holmes (National Institute of Standards and Technology(NIST)) PPTA fibers are tested under slow loading conditions despite of their ballistic application. This study focuses on measuring fiber properties at comparable loading condition with ballistic event.	**CARBON NANOTUBES FOR IN SITU THERMOMECHANICAL AND THERMOCHEMICAL SENSING IN COMPOSITES** Kalon L Lasater(University of Delaware), Gaurav Pandey(University of Delaware), Erik T Thostenson(University of Delaware) In this research, we evaluate nanocomposite thermoresistive behavior where nanotubes effectively act as a network of sensors detecting thermal transitions in situ.	**MANUFACTURING AND IMPACT BEHAVIOR OF SANDWICH COMPOSITES WITH EMBEDDED GRAPHENE PLATELETS** Alfred Loos(Michigan State University), Mahmood Haq(Michigan State University), Rehan Umer(Khalifa University of Science Technology and Research), Lawrence T Drzal(Michigan State University) Sandwich composites constructed from glass fabric face sheets coated with graphene nanoplatelets and PVC foam core were manufactured by VARTM. The resulting structures were subjected to impact loads.	**NUMERICAL AND EXPERIMENTAL ANALYSES OF MULTIPLE DELAMINATIONS IN CURVED COMPOSITE LAMINATES** Andrea Baldi(Polytechnic Institute of Milan), Alessandro Airoldi(Polytechnic Institute of Milan), Paolo Belotti(Polytechnic Institute of Milan), Paolo Bettini(Polytechnic Institute of Milan), Giuseppe Sala(Polytechnic Institute of Milan) Experimental and numerical investigations of the response of curved composite laminates in the presence of multiple delaminations nucleated and propagated in different modes and regimes are presented	**EVALUATION OF THE IMPREGNATION CHARACTERISTICS OF THE CARBON FIBER REINFORCED COMPOSITES USING DISSOLVED POLYPROPYLENE** Song hee Han(Chonbuk National University), Hyun ju Oh(Chonbuk National University), Seong su Kim(Chonbuk National University) In this work, the novel solution impregnation method introduced solvent quenching was proposed to increase impregnation between the carbon fabric and PP.
15:50	**OPTIMIZED EXPERIMENTAL CHARACTERISATION OF PVC FOAM USING DIC TEST AND THE VIRTUAL FIELDS METHOD** Peng Wang(Aalborg University), Fabrice Pierron(University of Southampton), Ole Thybo Thomsen(University of Southampton), Marco Rossi(), Lava Pascal(Katholieke Universiteit Leuven) This paper proposes an efficient experimental methodology to identify all the material stiffness parameters of PVC foams in one single test using Digital Image Correlation and Virtual Field Method.	**CONDUCTIVE POLYANILINE NANOCOMPOSITES: ELECTROCHROMIC BEHAVIOR, ELECTROCHEMICAL ENERGY STORAGE AND GIANT MAGNETORESISTANCE SENSOR** John zhanhu Guo(Lamar University), Huige Wei(Lamar University), Hongbo Gu(Lamar University), Jiahua Zhu(Lamar University), Suying Wei(Lamar University) the conductive PANI polymer nanocomposites were prepared for the applications of electrochromic devices, electrochemical energy storage and giant magnetoresistance sensors.		**EVALUATION OF THE APPLICABILITY OF THE FIRST PSEUDO-GRAIN FAILURE MODEL FOR SHORT GLASS FIBER REINFORCED POLYPROPYLENE MATERIALS** Martin Reiter(Johannes Kepler University Linz), Michael Jerabek(Borealis Polyolefine GmbH), Simon Gastl(Borealis Polyolefine GmbH), Anna Maria Hartl(Johannes Kepler University Linz), Zoltan Major(Johannes Kepler University Linz), Reinhold W. Lang(Johannes [illegible]) The deformation and damage behavior of short glass fiber reinforced Polypropylene was predicted by use of mean-field homogenization in combination with the first pseudo-grain failure model.	**PARTICLE-BASED MODELLING OF THE GEOMETRY AND MECHANICAL BEHAVIOUR OF TEXTILE REINFORCMENTS** Reza Samadi(University of Ottawa), Francois Robitaille(University of Ottawa) A particle-based modelling method enabling the accurate modelling of the geometry and constitutive behaviour of textile assemblies was presented. Simulation results were validated experimentally.
16:10				**MIXED MODE COHESIVE LAW FOR FIBRE/MATRIX INTERFACE- A COUPLED EXPERIMENTAL AND NUMERICAL STUDY** Karolina Martyniuk(Technical University of Denmark), Bent F Sørensen(Technical University of Denmark), Qingda Yang(University of Miami), Wei Liu(University of Miami) The fibre/matrix interface cohesive law are studieded by a coupled experimental and numerical approach. A single fibre specimen is tested in SEM and A-FEM simulations are carried out.	**REALISTIC FEA MODELING OF 3D WOVEN COMPOSITES ON MESOSCALE** Andrew Drach(University of New Hampshire), Borys Drach(University of New Hampshire), Igor Tsukrov(University of New Hampshire), Harun Bayraktar(Albany Engineered Composites), Jon Goering(Albany Engineered Composites) In this paper we present a procedure to develop realistic FEA models of 3D woven composites based on the as-woven geometry obtained by the textile modeling software
16:30	BREAK				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
12:30	LUNCH				
13:30	PLENARY (Room 710) - Goichi Ben: "Fabrication and Evaluation of FRTP using in-situ polymerizable PA6 with AvRTM". Chair: Takahira Aoki				
	MODELLING AND SIMULATION VII Chairs: Carole Nadot-Martin, Tong Earn Tay	**LCM 7 - CHARACTERIZATION** Chair: Philippe Causse	**NATURAL FIBER COMPOSITES 7** Chairs: Debes Bhattacharyya, Ton Peijs	**FATIGUE OF COMPOSITES 3** Chairs: Masamichi Kawai, Simon M. Spearing	**MULTI-FUNCTIONAL SMART COMPOSITES III** Chairs: Victor Mark Birman, Darren John Hartl
14:30	**NUMERICAL VALIDATION OF HOMOGENIZATION MODELS FOR THE CASE OF ELLIPSOIDAL PARTICLES REINFORCED COMPOSITES** Elias Ghossein(Ecole Polytechnique de Montreal), Martin Lévesque(Ecole Polytechnique de Montreal) The purpose of this paper is to validate the performance of well-known analytical homogenization models for the case of composites reinforced by ellipsoidal (i.e. 3D) particles.	**CHEMICAL SHRINKAGE AND THERMOMECHANICAL CHARACTERIZATION OF DIFFERENT RESIN SYSTEMS AND PREPREGS DURING CURE BY A NOVEL IN SITU MEASUREMENT METHOD** Catherine Billotte(Ecole Polytechnique de Montreal), Edu Ruiz(Ecole Polytechnique), Clémentine Fellah(Ecole Polytechnique de Montreal) This study presents a novel in-situ technique allowing simultaneous characterization of resin cure as well as dimensional and rheological change during polymerization for thermosets and prepregs.	**MECHANICAL PROPERTY OF PAPER REINFORCED THERMOSETTING RESIN COMPOSITE** Takanori Kitamura(Daiwa Itagami Co. Ltd.), Kanta Ito(Daiwa Itagami Co. Ltd.), Suguru Teramura(Daiwa Itagami Co. Ltd.), Ryo Marui(Marui Textile Machinery Co.Ltd.), Zhiyuan Zhang(Kyoto Institute of Technology), Yuqiu Yang(Donghua University), Hiroyuki Hamada(Kyoto Institute of Technology) In this study, two kinds of unsaturated polyester resin were used to improve properties of reborn paperboard. The mechanical property and fracture behavior were analyzed and studied.	**DAMAGE PHENOMENA OF FIBRE REINFORCED COMPOSITES UNDER VHCF-LOADING** Ilja Koch, Maik Gude, Werner A. Hufenbach, Roman Koschichow (Technische Universitat Dresden), Karl Schulte, Julia Knoll (Technische Universitat Hamburg-Harburg) Within the paper the development of test principles for the characterisation of the VHCF phenomena and of damage models for NCF-CFRP as a basis for novel fatigue life evaluation methods is described.	**ADAPTATION OF DEVELOPING TENDON-TO-BONE INSERTION SITE TO OPTIMIZE STRESS ENVIRONMENT** Yanxin Liu(Washington University in St. Louis), Annie Gitomer Schwartz(Washington University in St. Louis), Victor Mark Birman(Missouri University of Science and Technology), Stavros Thomopoulos(Washington University in St. Louis), Guy M Genin(Washington University in St. Louis) Low stresses during development are compensated by tissue-scale and cell-scale stress concentrations yielding the stress environment conducive for the development of mineral at the postnatal enthesis.
14:50	**MODELING AND PROGRESSIVE DAMAGE ANALYSIS OF FRP LAMINATES WITH PERIDYNAMIC THEORY** Yile Hu(Shanghai Jiao Tong University), Yin Yu(Shanghai Jiao Tong University), Hai Wang(Shanghai Jiao Tong University) A new 3D peridynamic model for composite laminates was proposed and used to analyze the progressive damages in notched laminates. Its predictions agree well with result in literatures and experiments.	**EFFECT OF NANOGRAPHITE ON THERMAL PROPERTIES OF LIQUID MOLDED POLYAMIDE-6 LAMINATES** Peter W. Barfknecht(University of Alabama - Birmingham), Selvum Brian Pillay(University of Alabama - Birmingham), Uday K Vaidya(University of Alabama - Birmingham) Nanographite platelets to be used as an additive for liquid molded thermoplastic laminates are evaluated for their effect on anionic polyamide-6 thermal properties.	**UTILIZATION OF A THREE-STEP THERMO-MECHANICAL TREATMENT TO MODIFY WOOD PROPERTIES** Rébla Gonçalves Vasconcelos(Universidade de Brasilia), Claudio Henrique Del menezzi(Universidade de Brasilia) A three-step thermo-mechanical treatment was quite effective in improving all mechanical and surface properties, as well as equilibrium moisture content of wood.	**A NEW INTEGRATED ANISOMORPHIC CFL DIAGRAM APPROACH TO OFF-AXIS FATIGUE LIFE PREDICTION OF CFRP LAMINATES AT ANY TEMPERATURES IN ANY FIBER-ORIENTATIONS** Masamichi Kawai(Tsukuba University) A fatigue model is formulated that can efficiently predict the fatigue life of CFRP laminates under off-axis fatigue loading in any fiber orientation with any stress ratio at any temperature.	**EFFECTS OF POROSITY SHAPE ON THE ELECTROMECHANICAL RESPONSE OF 3-3 PIEZOELECTRIC FOAMS** Krishna S Challagulla(Laurentian University), Benjamin V Nguyen(Laurentian University) The effects of porosity geometry on the effective electromechanical response and figures of merit of 3-3 piezoelectric foams is studied.
15:10	**PREDICTION OF COMPRESSION AFTER IMPACT STRENGTH BASED ON INSTABILITY OF DELAMINATION** Makoto Ichiki(Sophia University), Hiroshi Suemasu(Sophia University), Yuichiro Aoki(Japan Aerospace Exploration Agency) Compression strength reduction of CFRP laminates with double spiral damage is studied numerically considering instability of the damage. The failure process is simulated by using interface element.	**RTM OPTIMAL INJECTION VELOCITY DETERMINATION BY CAPILLARY RISE MEASUREMENTS USING INFRARED THERMOGRAPHY** Christophe Ravey(Ecole Polytechnique de Montreal), Edu Ruiz(Ecole Polytechnique), François Trochu(Ecole Polytechnique de Montreal) The goal of this investigation is to develop a new experimental technique, with Infrared thermography, in order to determine the optimal injection velocity for carbon fibers fabrics in RTM processing	**FABRICATION AND MECHANICAL PROPERTIES OF UNIDIRECTIONAL COMPOSITE OF SILK FIBER/PLA BY COMPRESSION MOLDING** Anin Memon(Kyoto Institute of Technology), Asami Nakai(Gifu University) The unidirectional composites of silk/PLA were fabricated using compression molding. The reinforcement fibers were paralleled with matrix resin fiber and were used as intermediate materials.	**MECHANICAL COUPLING BETWEEN METAL LINER AND COMPOSITE STRUCTURE IN TYPE III TANKS DURING HIGH PRESSURE FATIGUE LOADING.** Dominique M Perreux(Universite de Franche-Comte) We present an original analysis of the life prediction in fatigue loading of type III tanks. This type of tank is made of a metallic liner and a composite structure for load bearing.	**EFFECT OF FOAM SHAPE AND PIEZOELECTRIC MATERIAL PROPERTIES ON THE ELECTROMECHANICAL RESPONSE OF 3-3 PIEZOELECTRIC FOAMS** Krishna S Challagulla(Laurentian University), Jaspreet Singh(Laurentian University), T.a. Venkatesh(State University of New York at Stony Brook) The effect of foam shape and piezoelectric material properties (PZT, $BaTiO_3$, barium sodium niobate, relaxor ferroelectric) on the electromechanical response of 3-3 piezoelectric foams is studied
15:30	**DISPLACEMENT BASED FINITE STRIP ANALYSIS OF A CRACKED LAMINATE WITH APPROPRIATE BOUNDARY CONDTIONS FORMULATION** Farrukh Hafeez(The Petroleum Institute), Shuguang Li(University of Nottingham), Fahad Almaskari() The finite strip method is applied to the generalized plane strain problem of cracked laminate. ODE for the problem are solved directly by using appropriate boundary conditions.	**NUMERIC MODELING OF THE FIBROUS MATERIAL WEAVING PROCESS FOR COMPOSITE MATERIAL** Charlotte Florimond(INSA), Emmanuelle Vidal-sallé(Institut National des Sciences Appliquees de Lyon), Philippe Boisse(Institut National des Sciences Appliquees de Lyon), Jérôme Vilfayeau(ENSAIT) Implicit simulation of the fibrous material weaving process to obtain residual stresses. The behavior of the yarn is defined by a hypoelastic law in a user material subroutine in ABAQUS/Standard.	**HIGH PERFORMANCE SELF-REINFORCED POLYLACTIC ACID BIOCOMPOSITES WITH DEGRADATION SENSING** Fang Mai(Queen Mary and Westfield College, University of London), Emiliano Bilotti(Queen Mary and Westfield College, University of London), Ton Peijs(Queen Mary and Westfield College, University of London) A new family of self-reinforced polymer composites based on the biopolymer polylactic acid (PLA) is presented. The biodegradation can be monitored via the introduction of carbon nanotubes (CNTs).	**AN INVESTIGATION INTO THE DAMAGE DEVELOPMENT AND RESIDUAL STRENGTHS OF OPEN-HOLE SPECIMENS IN FATIGUE** Oliver James Nixon-pearson(University of Bristol), Stephen Richard Hallett(University of Bristol) An experimental program was carried out in order to understand the sequence of damage development throughout the life of open-hole composite laminates in fatigue. A residual strength study ensued.	**THE BEHAVIOUR OF MAGNETO-RHEOLOGICAL ELASTOMERS UNDER EQUI-BIAXIAL TENSION** Philip Harrison(University of Glasgow), Gerlind Schubert(University of Glasgow), Zaoyang Guo(Chongqing University) Equi-biaxial tension tests have been performed on isotropic and anisotropic magneto-rheological elastomers (MREs), a smart material whose mechanical properties can be instantaneously changed.
15:50	**VISCOELASTIC SHEAR LAG ANALYSIS OF THE DISCONTINOUS FIBER COMPOSITE** R. byron Pipes(Purdue University), Nicholas Alan Smith(Purdue University) Viscoelastic shear lag analysis to provide the foundation for short fiber viscoelastic micromechanical model to be used in the prediction of time dependent properties of short fiber composites.	**MODELLING DUAL-SCALE FLOW-DEFORMATION PROCESSES IN COMPOSITES MANUFACTURING** Mohammad Sadegh Rouhi(Chalmers University of Technology), Maciej Wysocki(Swerea SICOMP), Ragnar Larsson(Chalmers University of Technology) The idea is to present a generic algorithm to model dual-scale flow-deformation processes in manufacturing of advanced composites using poromechanics	**THERMAL BEHAVIOR OF SUGARCANE BAGASSE/PP COMPOSITES USING LIGNIN AS COMPATIBILIZER AGENT** Patrícia Câmara Miléo(Universidade de Sao Paulo) The aim of this work was to investigate the thermal properties of polypropylene composites reinforced with cellulose, obtained from sugarcane bagasse, using lignin as a compatibilizer	**DURABILITY OF CARBON FIBER REINFORCED COMPOSITE LAMINATES FOR LARGE PRECISE SPACE STRUCTURE UNDER CYCLIC THERMAL LOADING** Satoshi Kobayashi(Tokyo Metropolitan University), Masahiro Tomite(Tokyo Metropolitan University), Minoru Iwata(Kyushu Institute of Technology), Num Huu Tran(Japan Aerospace Exploration Agency), Ken Goto(Japan Aerospace Exploration Agency) Thermal cycle tests were conducted on CFRP laminates to discuss durability under space environment. Transverse cracking due to cyclic thermal stress initiated and accumulated during tests.	**SHAPE MEMORY ALLOY LAMINATE FOR DESIGN OF SELF-FOLDING RECONFIGURABLE STRUCTURES** Edwin Alexander Peraza-hernandez(Texas A&M University), Darren John Hartl(Texas A&M University), Dimitris C Lagoudas(Texas A&M University) We examine a self-folding material system that consists of an active laminate including two outer layers of thermally-actuated shape memory alloy (SMA) separated by a compliant passive layer.
16:10	**INITIATION AND PROPAGATION OF FIBER FAILURE IN COMPOSITE LAMINATES** Endel Iarve(University of Dayton), David H Mollenhauer(Air Force Research Laboratory), Timothy D Breitzman(Air Force Research Laboratory), Kevin Hoos(University of Dayton), Michael Swindeman(University of Dayton) A progressive fiber failure modeling with statistical scaling of the initiation stress has been developed and demonstrated in laminated composites	**CARBON FIBER'S SURFACE CHEMISTRY AND SELF-ASSEMBLED INTERPHASE FORMATION IN FIBER REINFORCED POLYMER COMPOSITES** Felix N Nguyen(Toray Composites (America)), Kenichi Yoshioka(Toray Industries Inc.), Al Haro(Toray Composites America Inc.), Daigo Kobayashi(Toray Industries Inc.), Yoshifumi Nakayama(Toray Industries Inc.), Tomoko Ichikawa(Toray Industries Inc.), Eric Aston(University of Utah) Carbon fiber's surface chemistry, a robust interphase formation by a self-assembled process of a nanomaterial and effects of the reinforced interphase on the composite's properties are discussed.		**COMPRESSION AFTER IMPACT AND FRACTURE TOUGHNESS OF CARBON FIBER/EPOXY COMPOSITES MODIFIED WITH CARBON NANOTUBES** Marcel Siegfried(Katholieke Universiteit Leuven), Carmen Tola(), Stepan V. Lomov(Katholieke Universiteit Leuven), Ignaas Verpoest(Katholieke Universiteit Leuven), Larissa Gorbatikh(Katholieke Universiteit Leuven) The study investigates the effect of carbon nanotubes on the delaminated area after impact and the residual compression strength of woven carbon fiber/epoxy composites.	
16:30	BREAK				

	Room 525	Room 520f	Room 520be	Room 516ab
12:30	LUNCH			
13:30	**PLENARY (Room 710) - Goichi Ben: "Fabrication and Evaluation of FRTP using in-situ polymerizable PA6 with AvRTM".** Chair: Takahira Aoki			
	STRUCTURAL OPTIMIZATION 2 Chair: Paul M. Weaver, Damiano Pasini	**MULTI-SCALE MODELING 2** Chairs: Gregory Odegard, Masato Nishi		**MODELING I - POSTER** Chair: Alireza Forghani
14:30	**OPTIMIZED FIBER STEERING AND LAYER STACKING FOR ELASTICALLY TAILORED, DAMAGE TOLERANT LAMINATES** Wenli Liu(University of Bath), Richard Butler(University of Bath), Andrew Thomas Rhead(University of Bath) This paper presents a combined optimization strategy for minimum mass panels satisfying buckling and damage tolerance using blended layer stacking of tow steered layers and straight fiber layers.	**NUMERICAL MODELLING OF THE WEAVING PROCESS FOR TEXTILE COMPOSITE** Jérôme Vilfayeau(ENSAIT), David Crepin, Damien Soulat, François Boussu (Ecole Nationale Superieure des Arts et Industries Textiles), Philippe Boisse(Institut National des Sciences Appliquees de Lyon) Study's aim is to have a good prediction of the geometry and the mechanical properties of the 3D woven unit cell.		14:30 **A NEW DYNAMIC REANALYSIS METHOD FOR THE COMPOSITE STRUCTURES** Xu Zhong Hai
14:50	**THE DESIGN OF A PRE-WARPED BUS DOOR FOR LOW COST COMPOSITE MANUFACTURING** Zhi-cheng Yu(Composites Innovation Centre) A pre-warped bus entrance door was designed to overcome the large thermal deformation. The new door demonstrates significant less thermal deflection and is 40lbs lighter than the door replaced.	**A NOVEL APPROACH TO MODELLING OF FIBER-REINFORCED COMPOSITES WITH CARBON NANOTUBES** Valentin S. Romanov(Katholieke Universiteit Leuven), Stepan V. Lomov(Katholieke Universiteit Leuven), Larissa Gorbatikh(Katholieke Universiteit Leuven), Ignaas Verpoest(Katholieke Universiteit Leuven) The effect of CNTs on the onset of transverse cracks in unidirectional composites was analyzed through a novel Finite Element approach that is able to model fibers and CNTs in a single simulation.		14:34 **ON THE NUMERICAL MODELLING OF THE BEHAVIOUR OF MECHANICALLY JOINTED TIMBER BASED COMPOSITE CONNECTIONS** Hacene Ait-aider, Marc Oudjene, El mahdi Meghlat 14:38 **ELASTIC ANALYSIS OF CIRCULAR SANDWICH PLATES WITH FGM FACE-SHEETS** Roberta Sburlati, Seyed Rasoul Atashipour 14:42 **FROM MICROSTRUCTURE CHARACTERIZATION TO MULTI-SCALE MODELLING OF INJECTED CARBON FIBRE REINFORCED PEEK** Jeremy Crevel, Florentin Berthet, Marie-laetitia Pastor, Frederic Lachaud 14:46 **AN AUTOMATED UNIT-CELL MODELLING TOOL UNITCELLS ON ABAQUS PLATFORM DRAWING FUNCTIONALITIES FROM MULTIPLE EXTERNAL CODES** Tian-hong Yu, Qing Panhuguang Li 14:50 **THEORETICAL AND NUMERICAL ANALYSIS OF STRESS DISTRIBUTION IN CFRP ROD BOND ANCHORAGE** Pan Zhang, Peng Feng 14:54 **VARIABLE STIFFNESS FLEXIBLE MATRIX LAMINATES WITH PRESCRIBED FINITE ELASTIC DEFORMATION** Carlos Santos Sousa, Pedro P. Camanho, Afzal Suleman, Francisco Manuel Pires 14:58 **LINKING PROCESS MODELLING WITH STRUCTURAL ANALYSIS OF COMPOSITE LAMINATED PLATES USING LAYERWISE THEORY** Hamidreza Bakhtiarizadeh, Abdul rahim Ahamed Arafath, Reza Vaziri 15:02 **Co-TYPE EFFICIENT HIGHER-ORDER PLATE THEORY FOR THE THERMO-MECHANICAL ANALYSIS OF LAMINATED COMPOSITE PLATES** Jangwoo Han, Jun-sik Kim, Maenghyo Cho 15:06 **QUANTIFYING THE SHEAR COUPLING EFFECT IN FOUR-POINT BENDING TESTS OF ANGLE PLY LAMINATES** Diane Wowk, Catharine Marsden, David Thibaudeau 15:10 **NUMERICAL SIMULATION OF COMPOSITE STRUCTURE REPAIRED BY EXTERNAL BONDED PATCHES UNDER TENSILE LOADING USING COHESIVE ELEMENTS** Lingling Peng, Xiaojing Gong, Zheng Li, Laurent Guillaumat 15:14 **BUCKLING AND POST-BUCKLING BEHAVIOUR OF TOP-HAT CROSS-SECTION COMPOSITE BEAMS WITH VARIOUS SEQUENCES OF PLIES** Hubert Debski 15:18 **REALIZING DOMAIN SUPERPOSITION MODEL IN NASTRAN FOR PREDICTING THE MECHANICAL PROPERTIES OF TEXTILE COMPOSITE** Xiuhua Chen, Yan Deng, Ming Li, Hai Wang 15:22 **A NEW 3D FINITE ELEMENT MODEL FOR THE MECHANICAL ANALYSIS OF RANDOM FIBER COMPOSITE** Zixing Lu, Zeshuai Yuan, Qiang Liu
15:10	**OPTIMIZATION OF VARIABLE ANGLE TOW PLATES WITH ONE FREE EDGE USING LAMINATION PARAMETERS** Zhangming Wu(University of Bristol), Gangadharan Raju(University of Bristol), Paul M Weaver(University of Bristol) This paper presents a buckling optimization strategy for the design of variable angle tow composite plate with one free edge using the lamination parameters.	**MULTISCALE ANALYSIS FOR PREDICTION OF STRENGTH IN TEXTILES UNDER COMBINED THERMOMECHANICAL LOADING** Wesley Ross Mclendon(Texas A&M University), John D Whitcomb(Texas A&M University) Progressive failure analysis is performed at the fiber-matrix and textile scales to predict the effect that strength uncertainty and thermal residual stresses have on damage development.		
15:30	**ACCOUNTING FOR MANUFACTURABILITY CONSTRAINTS IN THE OPTIMISATION OF COMPOSITE STRUCTURES** Vinay Madhavan(Cenaero), Philippe Martiny(Cenaero) This paper discusses the implementation of manufacturability constraints in the design optimisation of composite structures. The results were validated against an academic, and an industrial case.	**MOLECULAR DYNAMICS AND THE CORRESPONDING RHEOLOGICAL RESPONSE OF POLYMER NANOCOMPOSITES** Dong gi Seong(Korea Institute of Materials Science) Dynamic behavior of molecule and the characteristic rheological behavior from complex interactions in nanocomposite were predicted by a newly proposed molecular model and Brownian dynamics simulation.		
15:50	**STACKING SEQUENCE TABLES FOR LAMINATE BLENDING OPTIMIZATION** François-xavier Irisarri(ONERA), Alexis Lasseigne(ONERA), François-henri Leroy(ONERA) This paper introduces stacking sequence tables for the optimal design of laminated composite structures with ply drops. Design guidelines are enforced to ensure manufacturability of the solutions.	**NUMERICAL DESIGN OF COMPOSITE MATERIALS THROUGH MULTI-SCALE COMPUTER SIMULATION** John Leach(Battelle Memorial Institute), James Mackiewicz() This paper covers a 3 year US Office of Naval Research effort to develop a multi-scale method for composite armor analysis and design.		
16:10		**ESTIMATION OF RESIN FLOW FOR FRP BASE ON MPS METHOD** Shota Nodomi(Osaka University), Tetsusei Kurashiki(Osaka University), Ziming Guo(Osaka University), Gaku Yoshikawa(Osaka University), Fumikazu Miyasaka(Osaka University) In this study, the resin flow simulation has been developed based on MPS (Moving Particle Semi-implicit) method which is one of the particle methods.		
16:30	BREAK			

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
16:30	BREAK				
	EFFECT OF RESIDUAL STRESSES FROM MANUFACTURING ON PROPERTIES Chairs: Samer Tawfik, John J. Wang	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 8** Chairs: Fu-Kuo Chang, Nikolaus Correll	**SYMPOSIUM ON MARINE COMPOSITES 8** Chair: Veronica Eliasson	**FRACTURE AND DAMAGE 8** Chairs: Chandra Veer Singh, Samit Roy	**TEXTILE COMPOSITES 4** Chairs: Francois Robitaille, Kunigal N. Shivakumar
16:50	**DETERMINISTIC DESIGN AND MANUFACTURING OF CARBON NANOTUBE STAPLE YARNS** Sameh H. Tawfick(Massachusetts Institute of Technology), Abhinav Rao(University of Michigan - Ann Arbor), A. john Hart(University of Michigan - Ann Arbor) We present a new method to fabricate continuous high-strength staple yarns from long carbon nanotubes, by rolling and twisting of aligned CNT microstructures.	**USE OF CARBON FIBER SENSORS TO DETERMINE THE RESIN FLOW** Mohsen Bakhshi(Hochschule Munchen), Alexander Horoschenkoff(Hochschule Munchen) Two parallel carbon fibers as electrodes and the resin with lithium ions as electrolyte behave like a low capacitor. This capacitive sensor can be used to measure the resin flow in closed moulds.	**EFFECTS OF NANOCLAYS AND WOOD FLOUR ON THE PERFORMANCE OF POLYURETHANE FOAMS** Mahesh Hosur(Tuskegee University), Gregory Strawder(Tuskegee University), Shaik Jeelani(Tuskegee University) This study deals with improving the performance of closed cell foam cores. We have used nanoclay and wood flour as fillers and shown significant improvement in the properties of foam.	**THE EFFECT OF CYCLIC SOLUTION TEMPERATURE ON FLEXURAL PROPERTY OF UNSATURATED POLYESTER RESIN UNDER LIQUID AND VAPOR PHASE** Pradchar Pradyawong(Tokyo Institute of Technology), Masatoshi Kubouchi(Tokyo Institute of Technology), Saiko Aoki(Tokyo Institute of Technology) The results showed that the effect of cyclic solution temperature can be more accelerate mechanical failure of UP. This fact suggests the possibility of tank top failure.	**BRAIDING TAKE-UP SPEED OPTIMIZATION - CASE STUDIES** Johan Hendrik Van ravenhorst(University of Twente), Bert Rietman(University of Twente), Remko Akkerman(University of Twente) Circular braiding currently lacks automatic generation of optimum CNC code. A geometry-based procedure for braid angle optimization was designed and implemented for arbitrary mandrels.
17:10	**INFLUENCE OF TRIMMING PROCESS ON THE SURFACE QUALITY AND THE MECHANICAL BEHAVIOR OF CFRP STRUCTURES: STATIC AND FATIGUE TESTS** Haddad Madjid(Institut Clément Ader), Habiba Bougherara(Ryerson University), Redouane Zitoune(Institut Clément Ader), Florent Eyma(Institut Clément Ader), Bruno Castanié(Institut Clément Ader) First the influence of machining process and composite material nature on the machining defects are investigated. Then the impact of these damages on the mechanical behavior is detailed.	**MODELING AND SIMULATION OF SLOTTED WAVEGUIDE ANTENNA STIFFENED STRUCTURES** Woon kyung Kim, Robert A Canfield(Virginia Polytechnic Institute and State University (Virginia Tech)), William G Baron, James M Tuss, Jason E Miller (Air Force Research Laboratory) This paper is concerned with modeling and simulation of Slotted Waveguide Antenna Structures with the aim to improve the structural strength and stiffness of an integrated aircraft wing or fuselage.	**THERMAL AND VISCOELASTIC PROPERTIES OF SC15 EPOXY RESIN COMPOSITES MODIFIED WITH MONTMORILLONITE NANOCLAY EXPOSED TO UV RADIATION** Alfred Tcherbi-narteh(Tuskegee University) Effects of UV radiation on Thermal and Viscoelastic properties of unmodified and modified SC 15 with different amount of Montmorillonite nanoclay epoxy resin system was studied.	**A MULTI-SCALE VISCOELASTIC COHESIVE LAYER MODEL FOR PREDICTING DELAMINATION IN HIGH TEMPERATURE POLYMER MATRIX COMPOSITES** Samit Roy(University of Alabama - Tuscaloosa) A novel numerical-experimental methodology is outlined to determine cohesive stress and damage parameters for isothermally aged polymer matrix composites using a viscoelastic cohesive layer model.	**DAMAGE CHARACTERIZATION OF TRIAXIAL BRAIDED COMPOSITES UNDER TENSION USING FULL-FIELD STRAIN MEASUREMENT** Tobias Wehrkamp-richter(Technische Universitat Munchen), Monika Humbs(Technische Universitat Munchen), David Schultheiss(Technische Universitat Munchen), Roland Hinterhoelzl(Technische Universitat Munchen) An experimental study was conducted to characterize the damage behavior of 2D triaxial braided carbon/epoxy composites and investigate the effects of the textile architecture on the strain field.
17:30	**MICROMECHANICAL INVESTIGATION OF RESIDUAL STRESSES AND STRENGTH OF CROSS-PLY LAMINATES** Fatih Ertugrul Oz(Bogazici University), Nuri Bulent Ersoy(Bogazici University) Elastic moduli prediction, residual stress investigation and progressive failure analysis are carried out for a cross-ply AS4/8552 by finite elements micromechanical analysis with a square-packed RVE.	**DIELECTROPHORETICALLY STRUCTURED PIEZOELECTRIC COMPOSITES** Hamideh Khanbareh(Delft University of Technology), Pim Groen(Delft University of Technology), Sybrand Van der zwaag(Delft University of Technology) Significant improvement in piezoelectric properties of lead-titanate (PT)-polymer composites is achieved by dielectrophoretic alignment of the ceramic particles inside the polymer matrix.	**COMPATIBILITY AND FLAMMABILITY STUDY OF UNSATURATED POLYESTER /FUNCTIONALISED PHENOLIC RESIN BLEND MATRICES FOR GLASS REINFORCED COMPOSITES** Latha Krishnan(University of Bolton), Baljinder Kandola(University of Bolton) The UP/allyl-functinalised PH co-blended resins of different ratios exhibits good compatibility. Their flammability decreased with increasing phenolic content without affecting mechanical properties.	**MODELLING CRACK PROPAGATION IN PARTICLE-REINFORCED COMPOSITES USING THE ELEMENT-FREE GALERKIN METHOD** Nelson Madalai Muthu(Indian Institute of Technology, Bombay), Brian George Falzon(Queen's University Belfast), Surjya Kumar Maiti(Indian Institute of Technology, Bombay), Shahin Khoddam(Monash University) A novel way of modelling and predicting the crack propagation path within the matrix of particle-reinforced composites is presented. Phenomena such as crack tip shielding due to fibers are shown.	**NOTCHED RESPONSE OF NON-CRIMP FABRIC THIN-PLY LAMINATES** Albertino Arteiro(Universidade do Porto), Giuseppe Catalanotti(Universidade do Porto), José Xavier(Universidade de Tras-os-Montes e Alto Douro), Pedro P. Camanho(Universidade do Porto) The mechanical response of non-crimp fabric thin-ply laminates is studied. The size effect and notch sensitivity were similar to those in UD laminates, but the response to bearing loads was improved.
17:50	**TENSILE, COMPRESSIVE AND SHEAR RESIDUAL STRENGTHS OF COMPOSITE STRUCTURES SUBJECTED TO BALLISTIC IMPACT WITH DIFFERENT VELOCITIES** John J Wang(Australian Government Defence Science and Technology Organisation) Very limited research has been reported in measuring residual strengths of composite structures subject to ballistic damage. This paper summarises research carried out at DSTO / CRC-ACS in this area.	**FUNCTIONALIZED GRAPHENE-BATIO3/FERROELECTRIC POLYMER NANOCOMPOSITES WITH EXCELLENT DIELECTRIC PROPERTIES** Zhi-min Dang(University of Science and Technology Beijing), Dongrui Wang(University of Science and Technology Beijing) The functionalized graphene nanosheets(fRGO)-BT/PVDF nanocomposites were fabricated,which exhibit a typical percolation transition, a relatively low loss and show a temperature independent behavior.		**RESIDUAL COMPRESSIVE STRENGTH ASSESSMENT OF IMPACTED LAMINATES BASED ON C-SCAN DATA** Yu Yang(University of Nottingham), Xiasheng Sun(China Aviation Industry Corp), Shuguang Li(University of Nottingham) A method of assessing residual compressive strength of impacted laminates is presented, which is based on C-scan data, and sufficiently accurate and convenient for practical use.	**ANALYSIS AND MODELING OF 3D INTERLOCK FABRIC COMPACTION BEHAVIOR** Nicolas Vernet(Ecole Polytechnique de Montreal), François Trochu(Ecole Polytechnique de Montreal) The goals of this investigation is to study the influence of weaving on the compaction behaviors of 3D interlock fabrics in order to create a compaction model.
18:10	**SOLVOTHERMAL METHOD FOR RECYCLING HYBRID COMPOSITE MATERIALS** Armando Tibigin Quitain(Kumamoto University), Katsuji Shibata(Hitachi Chemical Co. Ltd.), Mitsuru Sasaki(Kumamoto University), Motonobu Goto(Nagoya University) Solvothermal method using benzyl alcohol for recycling hybrid composite materials is investigated. Degradation behavior is elucidated by analyzing decomposition rate and products, and by SEM analyses.			**EVALUATION OF LOADING RATE DEPENDENCE ON FRACTURE BEHAVIOR OF CFRP LAMINATE WITH HIGH SPEED IMAGING** Hideaki Kusano(Shimadzu Corporation), Yoshiyasu Hirano(Japan Aerospace Exploration Agency), Akinori Yoshimura(Japan Aerospace Exploration Agency), Yuichiro Aoki(Japan Aerospace Exploration Agency), Yutaka Iwahori(Japan Aerospace Exploration Agency) We had a purpose of finding the difference of the fracture on difference of the layer by the high speed imaging. The images were analyzed by Digital Image Correlation.	**MODELING TEXTILE REINFORCED CEMENTITIOUS COMPOSITES AND EFFECT OF ELEVATED TEMPERATURES** Johan Blom(Vrije Universiteit Brussel) A textile reinforced cementitious composites beam under tension, compression and bending will be modeled using an analytical model and FEM software, including the effect of elevated temperature.
18:30	End				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
16:30	BREAK				
	MODELLING AND SIMULATION VIII Chair: Tong Earn Tay	**OUT OF AUTOCLAVE MANUFACTURING** Chairs: Steve Nutt, Goran Fernlund	**NATURAL FIBER COMPOSITES 8** Chairs: Debes Bhattacharyya, Ton Peijs	**FATIGUE OF COMPOSITES 4** Chairs: Masamichi Kawai, Simon M. Spearing	**MULTI-FUNCTIONAL SMART COMPOSITES IV** Chairs: Krishna Sri Challagulla, Tobias Müller
16:50	**PREDICTION OF THE HOLE-SIZE EFFECT IN THE OFF AXIS TENSILE SPECIMEN USING AN INTRINSIC FLAW** Johnathan Goodsell(Purdue University) Prediction of the hole-size effect in a composite 10 degree off-axis tensile specimen has been accomplished by means of a computationally-efficient intrinsic flaw distribution model.	**INFLUENCE OF AIR RELEASE AGENT ADDITIVE ON VACUUM BAG CURABLE PREPREG** Baoyan Zhang(China Aviation Industry Corp) The main physical and mechanical properties of an air release additive incorporated T700/VB-90 prepreg were evaluated. The quality and properties of the composite was improved.	**HIERARCHICAL REGENERATED CELLULOSE FIBRE REINFORCED POLYHYDROXYBUTARATE** Alexander Bismarck(Imperial College of Science), Siti rosminah Shamsuddin(Imperial College of Science), Koon-yang Lee(Imperial College of Science) Green hierarchical composites were manufactured by integrating UD regenerated cellulose fibres into PHB containing 2.5wt% NFC. Mechanical characterisation was done to study effect of NFC in the matrix	**INTERLAMINAR FATIGUE CRACK GROWTH IN CARBON FIBER REINFORCED COMPOSITES** Steffen Stelzer(Montanuniversitat Leoben), Rhys Jones(Monash University), Andreas J. Brunner(Empa, Swiss Federal Laboratories for Materials Science & Technology) Recent developments in mode I and mode II interlaminar fatigue measurements and data analysis for carbon fiber reinforced composites are presented.	**ANALYTICAL AND NUMERICAL MODELING FOR 3D SMART ORTHOTROPIC GRID-REINFORCED COMPOSITE STRUCTURES** Edris Hassan(Dalhousie University) Two micromechanical models for 3D smart composites with embedded periodic grid of generally orthotropic reinforcements/actuators are developed and applied to cubic grid-reinforced composite structures
17:10	**A FLOATING NODE METHOD FOR MODELLING MULTIPLE DISCONTINUITIES WITHIN AN ELEMENT** Silvestre T Pinho(Imperial College of Science), Bo Yang Chen(Imperial College of Science), Pedro M Baiz(Imperial College of Science), Nelson V De carvalho(National Institute of Aerospace), Tay T Earn(National University of Singapore) We propose a new numerical method for modelling multiple cracks within one element. We use extra nodes to represent extra material points but do not require integrating only part of an element.	**INVESTIGATION OF THE PROPERTIES OF CARBON FIBER / EPOXY COMPOSITE LAMINATES FABRICATED WITH CO-RFI PROCESS** Xuqiang Ma(Beihang University), Yizhuo Gu(Beihang University), Min Li(Beihang University), Yanxia Li(Beijing University of Aeronautics and Astronautics), Zuoguang Zhang(Beijing University of Aeronautics and Astronautics) Properties of co-RFI laminates with different process procedures were investigated. The effects of factors above on laminate quality and mechanisms were discussed by mechanical test and SEM photos.	**MOISTURE ABSORPTION OF GLUTEN POLYMERS AND FLAX/GLUTEN COMPOSITES** Nhan Vo hong(Katholieke Universiteit Leuven), Aart Willem Van vuure(Katholieke Universiteit Leuven), Peter Van puyvelde(Katholieke Universiteit Leuven), Ignaas Verpoest(Katholieke Universiteit Leuven) The aim of this research is to study the moisture absorption behavior of gluten polymers and flax/gluten composites. Different levels of moisture absorption lead to change mechanical performance.	**PREDICTION OF FATIGUE DAMAGE EVOLUTION IN MULTIDIRECTIONAL LAMINATES** Marino Quaresimin(University of Padua), Paolo Andrea Carraro(University of Padua) A prediction model for the crack density evolution in a MD laminate under fatigue is presented. Crack onset is assumed to be controlled by the matrix-dominated fat. behavior of the single UD lamina	**SHAPE MEMORY POLYPER BASED NANOCOMPOSITE ACTUATORS** Qing-qing Ni(Shinshu University) The shape memory polymer based nanocomposites as actuator materials were developed and they have shown a good mechanical properties and electroactive actuation.
17:30	**FLOATING NODE METHOD AND VIRTUAL CRACK CLOSURE TECHNIQUE FOR MODELING MATRIX CRACKING-DELAMINATION MIGRATION** Nelson V De carvalho(National Institute of Aerospace), Bo Yang Chen(Imperial College of Science), Silvestre T Pinho(Imperial College of Science), Pedro M Baiz(Imperial College of Science), James Gordon Ratcliffe(National Institute of Aerospace), Tay T Earn(National University of Singapore) Virtual Crack Closure Technique and Floating Node Method are combined to model multiple crack growth and interaction, without re-meshing, and applied to predict matrix cracking-delamination migration.	**VACUUM BAG ONLY MANUFACTURING OF HONEYCOMB SANDWICH PANELS** James Kratz(McGill University), Pascal Hubert(McGill University) A simple analytical model to predict disbonds and delaminations during oven cure is validated with embedded miniature pressure sensors in an effort to produce consistent, predictable honeycomb panels.	**THE EFFECT OF FIBER MICROSTRUCTURE AND FIBER-MATRIX INTERFACIAL ADHESION ON MECHANICAL PROPERTIES OF COIR FIBRE COMPOSITES** Le Quan Ngoc Tran(Katholieke Universiteit Leuven), Carlos Anibal Fuentes(Katholieke Universiteit Leuven), Christine Dupont-gillain(Universite Catholique de Louvain), Aart Willem Van vuure(Katholieke Universiteit Leuven), Ignaas Verpoest(Katholieke Universiteit Leuven) The aim of this paper is to investigate the influence of fiber microstructure, fiber properties and fiber-matrix interfacial adhesion on the final properties of coir fiber composites.	**INFINITE LIFE OF CFRP EVALUATED NONDESTRUCTIVELY WITH X-RAY-REFRACTION TOPOGRAPHY** Volker Trappe(BAM Federal Institute for Materials Research and Testing), Hans Peter Ortwein(BAM-Federal Institute for Materials Research & Testing), Stefan Hickmann(BAM-Federal Institute for Materials Research & Testing) CFRP are assumed to have an infinite life at the nowadays design strain-level for airliners. This was investigated by fatigue tests up to 10^8 load cycles and X-ray-refraction NDT measurements.	**ASYMPTOTIC HOMOGENIZATION MODELING OF MAGNETO-ELECTRIC SMART** Alexander L. Kalamkarov(Dalhousie University) A comprehensive micromechanical model for the analysis of piezo-magneto-thermo-elastic smart composites with orthotropic constituents is developed on the basis of the asymptotic homogenization method.
17:50	**ANALYSIS OF CRACK MIGRATION IN LAMINATED COMPOSITES USING CONVENTIONAL AND MESH-INDEPENDENT COHESIVE ZONE MODELS** Maria Francesca Pernice(University of Bristol), Luiz Kawashita(Cardiff University), Stephen Richard Hallett(University of Bristol) Cohesive interface elements and a novel mesh-independent cohesive zone model are used to investigate the crack migration phenomenon in laminated composites for aerospace applications.	**EFFECT OF LAYUP AND PLY MORPHOLOGY ON VOID FORMATION IN OUT-OF-AUTOCLAVE PREPREGS** Timotei Centea(McGill University), Mathieu Preau(McGill University), Pascal Hubert(McGill University) Defect formation in out-of-autoclave processing is studied by evaluating the impact of ply morphology and layup on void shape, size and location in parts cured under ideal and deficient conditions.		**DEVELOPMENT OF CYCLIC DAMAGE IN CARBON EPOXY COMPOSITES UNDER VARIABLE LOADING CONDITIONS** Alan Plumtree(University of Waterloo), Jan Dahl(University of Waterloo) Constant and variable amplitude loading on the damage accumulation in [±45]2S angle-ply and [45]8 off-axis carbon-epoxy laminates has been investigated by monitoring the progressive strain changes	**ELECTRICAL BEHAVIOR OF A CFRP UNIDIRECTIONAL LAMINATE UNDER TEMPERATURE VARIATION** Kosuke Takahashi(Tokyo Institute of Technology), Takahiro Fujimura(Tokyo Institute of Technology), Kazuaki Inaba(Tokyo Institute of Technology), Kikuo Kishimoto(Tokyo Institute of Technology) Electrical resistance of CFRP unidirectional laminate was measured in heated condition, and it was evaluated in terms of temperature coefficient of resistivity and thermal expansion.
18:10	**AN ANALYTICAL MODEL FOR THE MECHANICAL RESPONSE OF DISCONTINUOUS COMPOSITES** Soraia Pimenta(Imperial College of Science), Paul Robinson(Imperial College of Science) An analytical model, based on a fracture-mechanics consistent shear-lag theory, is developed to investigate the potential of aligned discontinuous composites to present a pseudo-ductile response.	**MESO-SCALE MULTIPHYSIC MODELLING OF THE WET FILAMENT WINDING PROCESS** Hugo Faria (INEGI - Institute of Mechanical Engineering and Industrial Management), Francisco Manuel Pires (University of Porto), António Torres Marques (University of Porto) The wet filament winding process was modelled in detail. The several physical phenomena interacting at the layer/laminate level were described and a meso-scale overall original model was established.		**FATIGUE DAMAGE CHARACTERIZATION IN SHORT GLASS FIBER REINFORCED POLYAMIDE-66** Muhamad fatikul Arif(Arts et Metiers Paris Tech), Nicolas Saintier(Ecole Nationale Superieure d'Arts et Metiers de Paris), Fodil Meraghni(Ecole Nationale Superieure d'Arts et Metiers de Paris), Yves Chemisky(Arts et Metiers ParisTech), Joseph Fitoussi(Ecole Nationale Superieure d'Arts et [illegible] Fatigue of short glass fiber reinforced polyamide 66 composite (PA66-GF30) is investigated by in-situ temperature field monitoring together with 3D damage evaluation by X-Ray tomography	
18:30	End				

	Room 525	Room 520f	Room 520be	Room 516ab
16:30	BREAK			
	STRUCTURAL HEALTH MONITORING Chairs: Pierre Mertiny, Andrew Johnston	**MULTI-SCALE MODELING 3** Chair: Martin Lévesque		**MODELING II - POSTER** Chair: Alireza Forghani
16:50	**DETECTION OF DEFECTS IN COMPOSITE STRUCTURES WITH 3D LASER VIBROMETER** Patrick Peres(ASTRIUM Space Transportation), David Barnoncel(ASTRIUM Space Transportation), Wieslaw Jerzy Staszewski(Technical University of Cracow) This paper presents the study performed with a 3D Laser vibrometer acquiring Lamb wave to detect a wide range of defects by scanning the composite skin of a cryogenic tank.	**FREE EDGE ANALYSIS OF CFRP LAMINATES BASED ON A HOMOGENIZATION THEORY FOR TIME-DEPENDENT COMPOSITES** Keita Goto(Tsukuba University), Tetsuya Matsuda(Tsukuba University) In this study, microscopic stress and strain distributions around free edges of a CFRP laminate are analyzed three-dimensionally based on a time-dependent homogenization theory.		16:50 **ANALYSIS OF THE CRITICAL MOMENT TRIGGERING OFF SNAP-THROUGH OF BISTABLE COMPOSITE WITH INTIALTIAL CURVATURE** Jong-gu Lee, Junghyun Ryu, Seung-won Kim, Kyu-jin Cho, Maenghyo Cho
				16:54 **ADHESION EVALUATION IN CARBON FIBER AND CONCRETE MATRIX COMPOSITES** Gerson Marinucci, Reinaldo Leonel Caratin
				16:58 **MULTISCALE DAMAGE MODELING FOR HIGHLY-FILLED PARTICULATE COMPOSITES: PARTICLE SIZE EFFECT AND COUPLING WITH FINITE STRAINS** Marion Trombini, Carole Nadot-martin, Damien Halm, Gérald Contesse, Alain Fanget
				17:02 **TRANSVERSE MECHANICS OF UNIDIRECTIONAL TEXTILE FIBROUS MATERIALS** William Caster, Christiane Wagner-kocher, Stéphane Fontaine, Artan Sinoimeri, Guillaume Perie
17:10	**IMPACT LOCALIZATION IN ANISOTROPIC COMPOSITE PLATES INTRUMENTED WITH A NETWORK OF PIEZOELECTRIC SENSORS** Andre luiz De aguiar Ribeiro(Universidade Estadual de Campinas), Carlos Alberto Cimini Jr(Universidade Federal de Minas Gerais), Niederauer Mastelari(Universidade Estadual de Campinas) This paper proposes a methodology to evaluate impact localization in composite plates instrumented with piezoelectric sensors. Preliminary trials presented encouraging results.			17:06 **ENHANCED FILAMENT WINDING SIMULATION FOR IMPROVED STRUCTURAL ANALYSIS OF COMPOSITE PRESSURE VESSELS** Jörg Bernhard Multhoff
				17:10 **MICRO-MACRO APPROACH FOR PREDICTING LOCALIZED STRESS DISTRIBUTION IN COMPOSITES** Saurabh Gupta, Ganesh Soni, Ramesh Kumar Singh
				17:14 **STATISTICAL ANALYSIS AND MECHANICAL BEHAVIOR FOR POLYPROPYLENE COMPOSITES REINFORCED WITH BENZOYLATED SUGARCANE FIBERS** Rosineide Miranda Leão
				17:18 **LONG TERM DURABILITY OF UNIDIRECTIONAL CFRP USING TOUGHENED MATRIX RESIN** Shunnosuke Ohta, Masayuki Nakada, Yasushi Miyano, Takayuki Matsumoto
17:30	**RELEVANCE OF ENVIRONMENTAL INFLUENCES FOR LAMB WAVE BASED SHM WITH PIEZOELECTRIC ELEMENTS** Konstantin Jonas Schubert(Faserinstitut Bremen e.V.), Oliver Focke(Faserinstitut Bremen e.V.), Axel Siegfried Herrmann(Universitat Bremen) This paper discusses environmental influences on Lamb Waves in FRP and their compensation for the health monitoring of said structures			17:22 **PREDICTION OF OPEN HOLE COMPRESSIVE FAILURE FOR QUASI-ISOTROPIC CFRP LAMINATES BY MMF/ATM METHOD** Tatsuya Hioki, Masayuki Nakada, Yasushi Miyano, Hisaya Katoh
				17:26 **NUMERICAL STUDY OF COMPACTION INFLUENCE ON SPRING-IN OF THIN COMPOSITE COMPONENTS MANUFACTURED BY VACUUM BAG PROCESS** Costanzo Bellini, Luca Sorrentino
				17:30 **USE SANDWICH COMPOSITES TO MAKE PASSENGER CAR COMPONENTS FOR RAIL TRAIN APPLICATION** Wenguang Ma
				17:34 **ANALYSIS OF BI-STABILITY AND RESIDUAL STRESS RELAXATION IN HYBRID UNSYMMETRIC LAMINATES** Fuhong Dai
17:50	**STRUCTURAL HEALTH MONITORING IN COMPOSITE STRUCTURES USING EMBEDDED WIRE SENSORS** Pierre Mertiny(University of Alberta), Martin Ocker(University of Alberta), Christian Hansen(Universitat Hannover), Cagri Ayranci(University of Alberta) The present contribution reviews and reports on low-cost structural health monitoring systems for fiber-reinforced polymer composite components based on embedded metallic wires/filaments.			17:38 **MODELLING OF THE THERMO-MECHANICAL PROPERTIES OF WOVEN COMPOSITES DURING THE CURE** Loleï Khoun, Pascal Hubert, Krishna S Challagulla
18:10				
18:30	End			

	Room 515	Room 519a	Room 710	Room 524ab	Room 524c
7:30					
8:30	**PLENARY (Room 710) - Anthony Wass: "Virtual Testing of Composites: Opportunities and Challenges".** Chair: Gregory Odegard				
	CARBON MATRIX & BRAIDED COMPOSITES Chairs: Zhengwei Zhou, Guodong Fang	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 9** Chair: Nicolas Kotov	**APPLICATIONS 1** Chairs: Isabelle Paris, Simon Joncas	**FRACTURE AND DAMAGE 9** Chairs: Goich Ben, Chandra Veer Singh	**TEXTILE COMPOSITES 5** Chairs: Alistair McIlhagger, Brian George Falzon
9:30	**STRENGTH ANALYSIS OF 3D AXIAL BRAIDED COMPOSITES** Guodong Fang(Harbin Institute of Technology) The biaxial compressive and tensile strengths of axial braided composites are studied. A damage model of the composites is utilized to calculate the failure stress.	**MANUFACTURING OF PREPREG WITH MICROCAPSULES FOR SELF HEALING COMPOSITES** Sang yup Kim(University of Illinois at Urbana-Champaign), Nancy R Sottos(University of Illinois at Urbana-Champaign), Scott R White(University of Illinois at Urbana-Champaign) Self healing prepreg consists of E-glass fiber and diglycidyle Ether of bisphenol F resin together with polymeric microcapsules containing a core of the solvent ethyl phenylacetate was developed.	**APPLICATIONS OF COMPOSITE TECHNOLOGIES TO AEROSPACE SYSTEMS IN KARI** Seung Jo Kim (Korea Aerospace Research Institute) Composite technologies like CFRP (Carbon Fiber Reinforced Plastics) have provided a lot of solutions for aerospace systems of KARI seeking light weight and extreme temperature and load endurance.	**THERMOGRAPHIC EVALUATION OF CFRP SPECIMENS DRILLED WITH CONVENTIONAL AND ABRASIVE WATER JET TECHNIQUES** Muhammad Saleem(Ryerson University), Lotfi Toubal(University of Quebec at Trois Rivieres), Redouane Zitoune(Institut Clément Ader), Habiba Bougherara(Ryerson University) The difference in the mechanical behavior of the specimens during fatigue testing is mainly attributed to the machining process.This was confirmed by SEM and surface roughness tests.	**PREDICTING THE CONSTITUTIVE BEHAVIOR OF BIAXIAL BRAIDED COMPOSITES USING BEAM UNIT CELLS** Joerg Cichosz(Technische Universitat Munchen), Johannes Bueckle(Technische Universitat Munchen), Roland Hinterhoelzl(Technische Universitat Munchen), Markus Wolfahrt(Polymer Competence Center Leoben) Finite element unit cells with beam elements representing the yarns are used to predict the linear and nonlinear constitutive response of biaxial braided composites.
9:50	**THROUGH-THICKNESS COMPRESSION BEHAVIOR OF A 2,5D CARBON/CARBON COMPOSITE** Marie Poitrimolt(Institut Clément Ader), Mohammed Cheikh(Universite de Toulouse-le-Mirail (Toulouse II)), Gérard Bernhart(Institut Clément Ader) We investigate here the through-thickness mechanical behavior of a carbon/carbon composite by monotonic and cyclic compression tests in order to characterize the elastic and damageable domains.	**MULTILAYER COMPOSITES WITH SELF-HEALING CAPABILITY BASED ON AN EMAA IONOMER** Antonio Mattia Grande, Luca Castelnovo, Luca Di landro Giuseppe Sala (Polytechnic Institute of Milan), Cinzia Giacomuzzo, Alessandro Francesconi (University of Padua) In this research, the SH behavior of different multilayer composites, based on an ionomer with different backing materials was investigated under ballistic impact conditions.		**BENDING STIFFNESS OF LAMINATES WITH INTRALAMINAR CRACKS IN SURFACE LAYERS AND INTERFACE DELAMINATIONS** Janis Varna(Lulea University of Technology), Andrejs Pupurs(Lulea University of Technology), Liva Pupure(Lulea University of Technology) Theoretical approach to bending stiffness determination of laminates with intralaminar cracks and interlayer delaminations is presented and validated in experiments.	**BEARING BEHAVIOR OF 3D WOVEN COMPOSITES** Michael P Mcclain(Albany Engineered Composites), Nikolay Timoshchuk(Albany Engineered Composites), Jon Goering(Albany Engineered Composites), Chris Redman() Investigated the bearing and pull through response, as function of tow size and preform architecture, of 3D woven composites molded using the Resin Transfer Molding (RTM) process.
10:10	**EFFECTS OF CURE PRESSURE ON VOID CONTENT AND ULTRASONIC ATTENUATION COEFFICIENT OF CARBON FIBRE REINFORCED COMPOSITE** Yalin Yu(Beihang University) A method is established through controlling cure pressure. Exponentially decreasing relationships are obtained between the void content, cure pressure and ultrasonic attenuation coefficient.	**SELF-HEALING OF A FIBRE REINFORCED POLYMER COMPOSITE MATERIAL USING METAL TRIFLATES AS CATALYTIC CURING AGENTS** Tim S Coope(University of Bristol), Ian P Bond(University of Bristol), Richard S Trask(University of Bristol), Duncan F Wass(University of Bristol) A novel self-healing (SH) high performance FRP composite material is investigated using a novel Lewis acid-catalysed SH system and a bio-inspired vascular architecture to restore fracture toughness.	**APPLICATION OF X-WEB TECHNOLOGIES FOR IMPROVED SHEAR TRANSFER IN WIND TURBINE BLADES UPWARDS OF 100 METERS** Ryan Michael Barnhart(Wetzel Engineering Inc.), Kyle Wetzel(Wetzel Engineering Inc.) An alternative shear web design is presented here, capable of both reducing sandwich core and resin uptake weight, and increasing structural efficiency in utility scale wind turbine blades.	**SYNERGISTIC DAMAGE MECHANICS MODELING OF FAILURE IN MULTIDIRECTIONAL COMPOSITE LAMINATES** Chandra veer Singh(University of Toronto) We describe a new approach for predicting progressive damage and failure in multidirectional composites. Its implementation into ABAQUS and practical examples will be presented in the conference.	**MULTI-FUNCTIONAL CARBON FIBER FLAT TAPE FOR COMPOSITES** Vivek Koncherry(University of Manchester), Prasad Potluri(University of Manchester), Anura Fernando(University of Manchester) This paper presents manufacturing systems for producing metalized carbon fibre tows, which can be used in the DCFP process for manufacturing automotive composites.
10:30	**THERMAL ANALYSIS AND MICROSTRUCTURE OF FURFURAL ACETONE RESIN-DERIVED CARBON** Zhengwei Zhou(Shanghai University), Aijun Li(Shanghai University), Ruicheng Bai(Shanghai University), Jinliang Sun(Shanghai University), Musu Ren(Shanghai University), Hong Li(Shanghai University) TGA was applied to study the heat resistance of furfural-acetone resin. XRD was used to investigate the evolution of structure after carbonization. SEM was utilized to observe the fracture morphology.	**AUTONOMOUS RESTORATION OF ELECTRICAL INTERFACES** Nancy R Sottos(University of Illinois at Urbana-Champaign) This abstract presents an approach to restore conductance in composite electrodes via the use of microencapsulated nanoparticles that form a conductive network when released.	**DELAMINATION ARREST FASTENERS IN AIRCRAFT COMPOSITE STRUCTURES** Kuen-yuan Lin(University of Washington), Luke I Richard(University of Washington), Wenjing Liu(University of Washington) This paper investigates the effectiveness of fasteners as delamination arrest feature. Fracture analyses were performed to determine delamination growth in the presence of the fasteners.	**DEPENDENCE OF INTERFACE PLY ORIENTATION ON DELAMINATION GROWTH DIRECTIONALITY AND MIGRATION** Carla Canturri(Imperial College of Science), Emile Smith Greenhalgh(Imperial College of Science), Silvestre T Pinho(Imperial College of Science) Experimental evidence shows that delamination propagates preferentially in the direction of one ply at the interface. If directionality cannot be met, migration to neighbouring ply interfaces ensues.	**STUDY OF BRAID TOPOLOGY AND EFFECT OF BRAID PATTERN ON COMPOSITE PROPERTIES** Sabahat Nawaz(University of Manchester), Prasad Potluri(University of Manchester), Sree shankhachur Roy(University of Manchester), Mayank Gautam(University of Manchester) Braid topology is the pattern of the interlacement of yarns in braided structures. . The proposed methods are to generate braid patterns with the removal of any bobbins from the braiding machine.
10:50	**BREAK**				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
7:30					
8:30	**PLENARY (Room 710) - Anthony Wass: "Virtual Testing of Composites: Opportunities and Challenges".** Chair: Gregory Odegard				
	MODELLING AND SIMULATION IX Chairs: R. Byron Pipes, Thomas Gereke	**PROCESSING I** Chairs: Ralf Schledjewski, Tohru Morii	**AUTOMATED COMPOSITES MANUFACTURING I** Chairs: Stephen W. Tsai, Ewald Fauster	**FATIGUE OF COMPOSITES 5** Chairs: Karl Schulte, Volker Trappe	**HEALTH MONITORING 1** Chair: Dineshkumar Harursampath
9:30	**A MIXED MODE COHESIVE LAW INCLUDING INTERFACE DILATATION UNDER NEAR MODE II FRACTURE** Bent F Sørensen(Technical University of Denmark), Stergios Goutianos(Technical University of Denmark) Under Mode II, a fracture process zone can induce a displacement normal to the cracking plane. A potential function based mixed mode cohesive law is developed and implemented in a FE program.	**DEVELOPMENT OF FIBER TOW SPREADING SYSTEM AND ITS APPLICATION FOR THIN FIBER REINFORCED MATERIALS** Tohru Morii(Shonan Institute of Technology), Masaaki Shimaba(Shonan Institute of Technology), Masahiro Mogi(ITO Yacht Sails LTD) This study proposed the newly developed fiber tow spreading system and discussed the effect of spread fiber on mechanical properties of thin fiber reinforced material.	**FORM-FLEXIBLE HANDLING TECHNOLOGY FOR AUTOMATED PREFORMING** Christian Löchte, Holger Kunz, Raphael Schnurr, Franz Dietrich, Annika Raatz, Klaus Dilger, Klaus Dröder (Technische Universitat Carolo-Wilhelmina Braunschweig) This paper introduces a novel form-flexible gripping and handling technology which is designed to empower today's RTM production processes to fabricate preforms in an automated way.	**INFLENCE OF NOTCH GEOMETRY ON BENDING FATIGUE BEHAVIOR OF TWILL E-GLASS/EPOXY COMPOSITE** Giovanni Belingardi(Polytechnic Institute of Turin), Alem Tekalign Beyene(Polytechnic Institute of Turin), Ermias Gebrekidan Koricho(Polytechnic Institute of Turin) The effect of notch geometry on bending fatigue behavior of E-glass/epoxy composite with different type of notches geometry considered for the study.	**DELAMINATION DETECTION OF ROTORCRAFT FLEX BEAM USING FRACTAL DIMENSIONS** Keshava Kumar s(Indian Institute of Science), Ranjan Ganguli(Indian Institute of Science), Dineshkumar Harursampath(Indian Institute of Science) The present article addresses the issue of partial delamination in rotorcraft flexbeams, and applicability of fractal dimensions for edge delaminations is evaluated.
9:50	**UNCERTAINTIES IN THE PREDICTION OF CFRP LAMINATE PROPERTIES IN THE CONTEXT OF A RELIABILITY BASED DESIGN APPROACH** Conny Schillo(Technische Universitat Hamburg-Harburg), Dieter Krause(Technische Universitat Hamburg-Harburg) Uncertainties related to the prediction of laminate properties originating from different scales are quantified and the effect on a reliability statement is illustrated through a simple beam problem	**LASER WELDING MODELLING FOR THERMOPLASTIC COMPOSITE AND DEVELOPMENT OF AN ADAPTED MATERIAL CHARACTERIZATION METHOD** Mylene Deleglise(Ecole des Mines de Douai), Benoit Cosson(Ecole des Mines de Douai) An original method to model the laser welding process for thermoplastic composites materials is propos, based on ray tracing method using a numerical representation of the microstructure variability	**FORM-FLEXIBLE HEATING DEVICES FOR INTEGRATION IN A PREFORM GRIPPER** Holger Kunz, Christian Löchte, Fabian Fischer, Klaus Dröder, Klaus Dilger (Technische Universitat Carolo-Wilhelmina Braunschweig) Different heating technologies for the integration into a form-flexible handling and draping device for preform manufacturing are presented and discussed.	**PREDICTING FATIGUE DAMAGE DEVELOPMENT FOR BRAIDED CARBON FIBER POLYMER MATRIX COMPOSITES** John Montesano(Ryerson University), Zouheir Fawaz(Ryerson University), Martin Lévesque(Ecole Polytechnique de Montreal), Cheung J Poon(Ryerson University) A prediction model is presented which simulates fatigue damage development in braided PMCs. The model is implemented into a commercial finite element package.	**STRUCTURAL HEALTH MONITORING (SHM) OF COMPOSITE AEROSPACE STRUCTURES USING LAMB WAVES** Shashank Pant(Carleton University), Jeremy Laliberte(Carleton University), Marcias Martinez(Delft University of Technology) Full derivation of Lamb wave equations for monoclinic composite laminates based on linear 3-D elasticity and partial wave techniques is presented.
10:10	**PROBABILISTIC MODELLING OF THE PROCESS INDUCED VARIATIONS IN PULTRUSION** Ismet Baran(Technical University of Denmark), Jesper Henri Hattel(Technical University of Denmark), Cem C Tutum(Technical University of Denmark) This paper investigates the effects of uncertainties in the pultrusion process parameters (a total of 29) on the process induced residual stresses and distortions.	**NUMERICAL AND EXPERIMENTAL INVESTIGATIONS OF CONTINUOUS FIBRE REINFORCEMENTS AND THERMOPLASTIC RESIN (CFRTP) FORMING** Peng Wang(Ecole Nationale Superieure des Arts et Industries Textiles), Nahiene Hamila(Institut National des Sciences Appliquees de Lyon), Philippe Boisse(Institut National des Sciences Appliquees de Lyon) To improve the understanding of CFRTP forming, the numerical and experimental studies are presented. Thermoforming simulation is validated, which can predict the feasibility condition of process.	**LOW-ENERGY ELECTRON BEAM CURED THERMOSET TAPE PLACEMENT** Dilmurat Abliz(Technische Universitat Clausthal), Yugang Duan(Xian Jiaotong University), Xinming Zhao(Xian Jiaotong University), Xiaolong Liu(Xi'an Jiaotong University), Dichen Li(Xi'an Jiaotong University) An new out-of-autoclave fabrication process for thermoset composites-integrating automated fiber placement process with a low-energy electron beam (150 KeV) layer-wise curing unit was explored.	**EXPERIMENTAL ASPECTS AND MULTISCALE NUMERICAL DESCRIPTION OF THE FATIGUE BEHAVIOR OF FIBER REINFORCED POLYMERS** Daniel Krause(Deutsches Zentrum fuer Luft- und Raumfahrt e.V. (DLR)), Gordon Just(Deutsches Zentrum fuer Luft- und Raumfahrt e.V. (DLR)), Janko Kreikemeier(Deutsches Zentrum fuer Luft- und Raumfahrt e.V. (DLR)) An efficient micromechanical fatigue modeling framework is introduced. Results show characteristic damage behavior to be consistent with experimental observations from the literature.	**THERMAL AND ULTRASONICS DAMAGE MONITORING AND CHARACTERIZATION IN WOVEN COMPOSITES** Jean-michel Roche(ONERA) The present paper highlights the contribution of passive infrared thermography and guided waves for in situ damage detection, monitoring and characterization in woven composites during tensile tests.
10:30		**SOLID MECHANICS-BASED SIMULATION OF COMPOSITE FORMING WITH STRESS RELAXATION IN THE DRY FABRIC REINFORCEMENT AND RESIN CURING** Mojtaba Komeili(University of British Columbia), Abbas Milani(University of British Columbia) A simplified modeling framework is shown to study the effect of cure progression and/or stress relaxation of dry woven fabric reinforcements during composite forming simulations.		**FATIGUE BEHAVIOURS OF ±45°GLASSFIBRE DOMINATED COMPOSITES IN WIND TURBINE BLADES** Kuangyi Zhang(University of Manchester) The biaxial fatigue properties of ±45° glassfibre-based composites ([±45]4s, [±45/0]2s, [±45/90/0]2s layup structures) are focused,which used for wind turbine blade skin materials.	
10:50	**BREAK**				

	Room 525	Room 520f	Room 520be	Room 516ab
7:30				
8:30	**PLENARY (Room 710) - Anthony Wass: "Virtual Testing of Composites: Opportunities and Challenges".** Chair: Gregory Odegard			
	IMPACT & DYNAMIC RESPONSES 1 Chair: Serge Abrate	**BISTABLE LAMINATES** Chairs: Mike Hyer, Marie-Laure Dano	**MODELLING OF PLATES & SHELLS 1** Chairs: Georges Verchery, Farid Taheri	**PROCESSING - POSTER** Chairs: Veronique Michaud, Marie-Claude Belanger
9:30	**A MECHANICAL MODEL FOR LAMINATED SHELLS WITH COHESIVE INTERFACES LOADED DYNAMICALLY: VERIFICATION AND APPLICATIONS** Francesca Campi(University of Genoa), Roberta Massabo(University of Genoa) The accuracy and some applications of a mechanical model formulated to study delamination damage evolution in laminated shells with cohesive interfaces loaded dynamically will be presented.	**TIME AND TEMPERATURE DEPENDENCE ON THE SNAP-THROUGH BEHAVIOUR OF ADAPTIVE BISTABLE COMPOSITES** Christian Kirvel(Technische Universitat Dresden), Maik Gude(Technische Universitat Dresden), Werner A. Hufenbach(Technische Universitat Dresden) This study addresses the influence of temperature and continuous switching operation for a longer duration on the performance of active bistable laminates in different experimental setups	**FEA BASED INITIAL DESIGN OF A COMPOSITE WIND TURBINE BLADE** Owaisur rahman Shah(École Nationale Supérieure de Techniques Avancés, Bretagne) This study is creates a series of calculations for the initial design of a wind turbine blade, based on its length (i.e. intended power output) and the incident wind speed	9:30 **FABRICATION AND MECHANICAL PROPERTIES OF SELF-REINFORCED POLYESTER DOUBLE COVERED UNCOMMINGLED YARN COMPOSITES** Chang-mou Wu
				9:34 **DSC INVESTIGATION OF THE INFLUENCE OF CARBON CONTENT ON PEEK CRYSTALLISATION** Olivier De almeida, Emeline Bessard, Gérard Bernhart
				9:38 **STIMULUS RESPONSE POLYMER AND MULTIFUNCTIONAL COMPOSITES: CHALLENGES AND PROSPECTS** Fabien Cara
				9:42 **TOWARDS COST-EFFECTIVE TEXTILE CHARACTERISATION: KEY PARAMETERS IN MATERIAL CHARACTERISATION** Andrew Walbranen), Hannes Körber
9:50	**IRREVERSIBLY ABSORBED ENERGY AND DAMAGE IN GFRP LAMINATES IMPACTED AT LOW-VELOCITY** Giuseppe Villani(University of Naple), Claudio Leone(University of Naples Federico II), Valentina Lopresto(University of Naples Federico II), Antonio Langella(University of Naples Federico II), Giancarlo Caprino(University of Naples Federico II) Impact tests were carried out on basalt fibre reinforced plastic laminates at the aim to investigate the ply by ply delamination and the absorbed energy.	**A DESIGN STRATEGY FOR BI-STABLE UNSYMMETRIC COMPOSITE LAMINATES INDUCED BY VIBRATION** Atsuhiko Senba(Nagoya University), Tadashige Ikeda(Nagoya University) The dynamics of a linear system that approximately express the vibration of the first mode of the unsymmetric laminate with additional mass is investigated.	**IMPROVEMENT OF LIMIT-BASED APPROACH TO STRESS ANALYSIS FOR ORTHOTROPIC COMPOSITE CYLINDERS (0/90) SUBJECTED TO PURE BENDING** Canhui Zhang(Xiamen University), Suong Hoa(Concordia University), Pei Liu(Xiamen University) The limit-based approach is improved, where we take the derivatives for both sides of the identically satisfied equations to obtain their replacing equations.	9:46 **AUTOCLAVE FORMATION TECHNOLOGY FOR CFRTP BRAIDED T-SHAPED PIPE** Toshikazu Uchida, Koichi Bun, Akio Ohtani, Asami Nakai
				9:50 **RELATIONSHIPS BETWEEN DEGREE OF SKILL, DIMENSION STABILITY AND MECHANICAL PROPERTIES OF COMPOSITE STRUCTURE IN HAND LAY-UP METHOD** T. Kikuchi, H. Hamada, A. Nakai, A. Ohtani, A. Goto, Y. Takai, T. Koshino, A.i Endo, C. Narita, A. Fudauchi
				9:54 **PROCESS ANALYSIS OF HAND LAY UP METHOD BY VARIOUS EXPERIENCE PERSONS** T. Kikuchi, H. Hamada, A. Nakai, A. Ohtani, A. Goto, Y. Takai, A. Endo, T. Koshino, C. Narita, A. Fudauchi
				9:58 **CURING KINETIC AND PROPERTIES OF MEHHPA /HYDANTOIN EPOXY RESIN SYSTEM** Ling Li
10:10	**NONLINEAR RESPONSE OF SHELLS TO BLAST AND IMPACT** Serge Abrate(Southern Illinois University at Carbondale) This paper considers the dynamics of composite shells with large deformations and initial imperfections. The problem is formulated in curvilinear coordinates to examine various geometries.	**MORPHING OF BISTABLE COMPOSITE LAMINATES** Samer Tawfik(Georgia Institute of Technology), Erian Armanios(University of Texas at Arlington), Stefan Dancila(University of Texas at Arlington) The current research provides an efficient method to design a morphing panel by bonding MFC actuators to the surfaces of a bistable panel.	**POSTBUCKLING ANALYSIS OF A COMPOSITE CYLINDRICAL PANEL WITH FRAMES AND OMEGA STRINGERS** José Reinoso(Universitat Hannover), Antonio Blazquez(Universidad de Sevilla), Federico París(Universidad de Sevilla) This research deals with the experimental and the numerical analysis, using FEM, of a composite stiffened panel under compression load.	10:02 **CURE KINETIC OF ADHESIVE FOR RAPID REPAIR BY NON-ISOTHERMAL METHOD** Ying Chun Li, Mengyuan Wang
				10:06 **A STUDY OF QUADRIAXIAL AND TRIAXIAL COMPOSITE TUBES DEVELOPED BY BRAID-WINDING** Sree shankhachur Roy, Prasad Potluri, Constantinos Soutis
				10:10 **SMALL LEAKAGE BIG PROBLEM - AUTOMATED LEAKAGE DETECTION OF VACUUM SETUPS IN CFRP PRODUCTION** Jens Boelke
				10:14 **SECONDARY FORMING OF HYBRID REINFORCEMENTS METAL MATRIX COMPOSITE** Hyun ho Kim, Chung-gil Kang
				10:18 **POROSITY ELIMINATION RELATED FROM THE VOLATILES FROM THE POLYMERIZATION IN RTM PROCESSING** Cédric Pupin
10:30	**EXPERIMENTAL STUDY OF OBLIQUE IMPACTS ON HELICOPTER BLADES – FORCE GAUGING BY DIGITAL IMAGE CORRELATION** Jean-charles Passieux(Institut Clément Ader), Pablo Navarro(Institut Clément Ader), Julien Aubry(Institut Clément Ader), Steven Marguet(Institut Clément Ader), Jean-françois Ferrero(Institut Clément Ader), Jean-noel Périé(Institut Clément Ader) Oblique impacts on helicopter blades are studied. A new motion analysis technique is proposed for tracking the impactor. The force values provided by this measuring technique are then analysed.	**AUTHORITY OPTIMISATION FOR RESONANT MORPHING CONTROL OF BI-STABLE WING-SHAPED COMPOSITES** Andres Felipe Arrieta diaz(Swiss Federal Institute of Technology, Zurich), Onur Bilgen(Old Dominion University), Michael I Friswell(Swansea University), Paolo Ermanni(Swiss Federal Institute of Technology, Zurich) The position optimization of piezoelectric actuators for maximising the authority to trigger controlled snap-through with a dynamic morphing technique on wing-shaped bi-stable composites is presented.	**THE NETTING ANALYSIS AS A LIMIT CASE OF THE LAMINATED STRUCTURE THEORY** Georges Verchery(Pluralis) The netting analysis is consistently derived as a limit case of the laminate theory. For many configurations, close-form solutions are obtained, useful for design and sensitivity analysis.	10:22 **THE COMPRESSION RESIN TRANSFER MOULDING PROCESS FOR EFFICIENT COMPOSITE MANUFACTURE** Kunal Masania, Clemens Dransfeld, benjamin bachmann
				10:26 **THREE-DIMENSIONAL ULTRASONIC CUTTING OF RTM PREFORMS – A PART OF A HIGH VOLUME PRODUCTION SYSTEM** Andreas Björnsson, Kerstin Johansen, Dan Eric Alexandersson
				10:30 **INFLUENCE OF THE IMPREGNATION RATE AND COMPRESSION MOLDING CONDITIONS** Kenichi Hasegawa, Masachika Yamane Suzuki, Jun Takahashi, Isamu Ohsawa
				10:34 **TIMESAVING QUALITY ASSURANCE FOR THE AUTOMATED PREFORMING PROCESS IN THE AUTOMOBILE SERIAL PRODUCTION OF CARBON COMPOSITES** Daniel Brabandt, Gisela Lanza, Patrick Bingemann
				10:38 **UV CURABLE COATING FOR FLAME-RETARDANT TEXTILE FINISHING** Nantana Jiratumnukul, Watcharinporn Promsook
				10:42 **SOLVENT-CAST DIRECT-WRITE MICROFABRICATION OF THERMOPLASTIC-BASED NANOCOMPOSITE STRUCTURES** Shuang-zhuang Guo, Marie-claude Heuzey, Daniel Therriault
				10:46 **THE EFFECT OF THERMAL RESISTANCE ON THE CURING PROCESS OF A COMPOSITE PART** Zhongmin Xue, Ltd, Qizhong Huang, Mingfa Ren, Hu Zhaohui, Gao Hongcheng
10:50	**BREAK**			

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
10:50	BREAK				
	PHYSICAL PROPERTIES Chairs: Zhengwei Zhou, Guodong Fang	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 10** Chair: Ioannis Chasiotis	**APPLICATIONS 2** Chairs: Isabelle Paris, Simon Joncas	**FRACTURE AND DAMAGE 10** Chairs: Constantinos Soutis, Carl Quinn Rousseau	**INTERLAMINAR REINFORCEMENTS I** Chairs: Kunigal N. Shivakumar, Felix N. Nguyen
11:10	**THERMO-MECHANICAL INVESTIGATION OF ELECTROFORMED NICKEL-CARBON FIBERS COMPOSITES** Sabah S Abdulnoor(University of Technology) A slab of plain nickel is produced by electrochemical forming process, similarly a nickel-matrix is built around a predesigned formation of paralleled long carbon fibers.	**THERMAL-MECHANICAL BEHAVIOR OF ACTIVELY COOLED VASCULARIZED COMPOSITES** Anthony M Coppola(University of Illinois at Urbana-Champaign), Nancy R Sottos(University of Illinois at Urbana-Champaign), Scott R White(University of Illinois at Urbana-Champaign) In this study we examine the ability of active cooling through vascular channels embedded in a fiber-reinforced composite to preserve mechanical properties in a hot environment.	**PROPERTIES OF PHENYLETHYNYL IMIDE COMPOSITES FABRICATED VIA VARTM** Roberto J. Cano(NASA), Sayata Ghose(The Boeing Company) The NASA LaRC HT-VARTM process was successfully used to fabricate quasi-isotropic composite panels from three PETI resin systems, LARC™ PETI-330, LARC™ PETI-8 and LARC™ PETI-9.	**MODELLING OF FLEXURAL BEHAVIOUR OF FUNCTIONALLY GRADED COATINGS** Maria Kashtalyan(University of Aberdeen), Maryam Heidari(University of Aberdeen), Igor Guz(University of Aberdeen) This paper presents a 3-D elasticity analysis of stress and displacements fields in coated plates subjected to transverse loading with coating properties graded in thickness direction.	**DELAMINATION PERFORMANCE OF TUFTED CARBON/EPOXY COMPOSITES MADE BY AUTOMATED DRY FIBRE PLACEMENT** Diego Marcelo Lombetti(Cranfield University), Giuseppe Dell'anno(Cranfield University), Ivana Katherine Partridge(University of Bristol), Alex Skordos(Cranfield University) This paper focuses on the experimental determination of the mode I and mixed I/II mode delamination resistance of DCB specimens prepared by automated dry fibre placement and tufted with aramid thread.
11:30	**FIBER ORIENTATION ASSESSMENT IN CARBON FIBER REINFORCED COMPOSITES USING INFRARED THERMOGRAPHY** Henrique Coelho Fernandes(Laval University), Xavier Maldague(Laval University) In this work we apply Infrared Thermography to assess fiber orientation. More specifically a "laser spot" technique is used to assess fiber orientation on the surface of a carbon/PEEK plate.	**ACTIVELY COOLED BATTERY PACKAGING USING VASCULAR COMPOSITES** Stephen John Pety(University of Illinois at Urbana-Champaign), Nancy R Sottos(University of Illinois at Urbana-Champaign), Scott R White(University of Illinois at Urbana-Champaign) Microvascular composite panels are fabricated for the cooling of batteries. Cooling experiments using an infrared (IR) camera are compared to computational fluid dynamics (CFD) simulations.	**FEASIBILITY STUDY ON A LARGE CHOPPER DISC FOR A TOF-SPECTROMETER** Valeria Antonelli(Technische Universitat Munchen), Wiebke Lohstroh(Technische Universitat Munchen), Horst Baier(Technische Universitat Munchen) The present paper describes the results of a parameter study necessary to design the most efficient TOF-Spectrometer to be accommodated in the new European Spallation Neutron Source.	**EXPERIMENTAL AND NUMERICAL INVESTIGATIONS ON FRICTION EFFECTS IN 4ENF FRACTURE TESTS** John Botsis(Ecole Polytechnique Federal de Lausanne) Support friction in Mode II fracture of carbon/epoxy is studied experimentally and numerically. Embedded sensors are employed to obtain stains and used to quantify friction effects on fracture.	**INTERLAMINAR REINFORCEMENT BY ALIGNED CARBON NANOTUBES IN CARBON FIBER REINFORCED POLYMER COMPOSITES** Felix N Nguyen(Toray Composites (America)), Kenichi Yoshioka(Toray Industries Inc.), Al Haro(Toray Composites America Inc.), Noriyuki Hirano(Toray Industries Inc.), Swezin Than tun(Toray Composites (America)), Raquel Ovalle robles(University of Texas at Dallas) Aligned CNTs parallel to the fiber's direction as an interlaminar reinforcement of a carbon fiber reinforced polymer composite is discussed in terms of the tube's characteristics and alignment.
11:50	**TEXTURE SHARP TRANSITION MECHANISM OF PYROCARBON BASED ON MONTE CARLO** Qingbo Huang(Shanghai University), Ruicheng Bai(Shanghai University), Aijun Li(Shanghai University), Hong Li(Shanghai University), Musu Ren(Shanghai University), Jinliang Sun(Shanghai University) The paper presents a kinetic model for pyrolytic carbon (pyrocarbon) deposition and its texture formation. Numerical calculations are carried out by Monte Carlo.	**A MULTIFUNCTIONAL MICROPOROUS POLYMER NANOCOMPOSITE WITH GRAPHENE NANOPLATELETS** Diandra Rollins(Michigan State University), Lawrence T Drzal(Michigan State University) A multifunctional nanofiller, in this case graphene, is embedded into the structure of a polymer foam to change its electrical and thermal properties while maintaining its mechanical performance.	**THE RESEARCH PROGRESS FOR THE STRUCTURAL AND FUNCTIONAL MATERIAL OF FOAMED METAL IN THE PREPARATION AND APPLICATION** Keju Ji(Nanjing University of Aeronautics and Astronautics) The foamed metal is a porous structure with an interconnected 3-D metallic scaffold. It was applied as the foamed-metal reinforced rubbing material, heat transfer and conductive shielding material.	**AN IMAGE BASED APPROACH TO MODELLING PLASTIC BONDED EXPLOSIVES (PBX) ON THE MICRO SCALE** Hari Arora(Imperial College of Science), Maria Charalambides(Imperial College of Science), Edmund Tarleton(University of Oxford), David M Williamson(University of Cambridge), Claire L Leppard() Finite element models have been made based on scanning electron microscope (SEM) images of a binary composite microstructure to predict fracture paths and global response under loading.	**COMPATIBILITY ASSESSMENT BETWEEN INTERLEAVING NANOFIBERS AND COMPOSITE LAMINATES** Kunigal N Shivakumar(North Carolina A&T State University), Sandi G Miller(NASA), Raghu Panduranga(North Carolina Agricultural and Technical State University), Matthew M Sharpe(North Carolina Agricultural and Technical State University) Test methods are presented to identify polymer nanofibers that bonds well with base laminate resin to improve interlaminar fracture toughness with loss of in-plane properties.
12:10	**NUMBERICAL AND EXPERIMENTAL ANALYSIS FOR MODE I FRACTURE OF TI/APC-2 HYBRID COMPOSITE LAMINATES** Lei Pan(Nanjing University of Aeronautics and Astronautics) The influence of surface treatment of titanium alloys fracture behavior analysis of Ti/APC-2 was evaluated by the combination of a experimental method of DCB and the finite element method .	**TWO-PHASE PORO-VASCULAR LAMINATES WITH STRUCTURE-PLUS-SURFACE ROUGHNESS CONTROL** James P. Thomas, Marriner Merrill, Andrew T. Smith, David Kessler, Michael Baur, Siddiq Qidwai, Alberto Pique (Naval Research Laboratory), Christopher Kindle (Science Applications International, Inc.) Poro-vascular composites are laminates with liquid-filled internal channels connected to surface pores for roughness control. Fabrication results and multifunctional characterization are reported.	**DEVELOPMENT OF CARBON FIBRE REINFORCED EPOXY COMPOSITES WITH CONTROLLABLE STIFFNESS** Henry Maples(Imperial College of Science), Charnwit Tridech(Imperial College of Science), Alexander Bismarck(Imperial College of Science), Paul Robinson(Imperial College of Science) High performance carbon fibre reinforced epoxy composites with controllable stiffness have been manufactured and tested. The stiffness is controlled by altering the temperature of the composites.	**MATERIAL CHARACTERIZATION WITH REPRESENTATIVE VOLUME SIMULATIONS OF WOVEN POLYMER MATRIX COMPOSITES** Shawn A English(Sandia National Labs), Timothy Briggs(Sandia National Labs) A distribution of constitutive responses is obtained using material and geometric uncertainties with representative volume elements (RVE) of the woven polymer matrix composite meso-structure.	**MECHANICAL PROPERTIES OF WOVEN FIBERGLASS COMPOSITE LAMINATE INTERLEAVENED WITH GLASS NANOFIBERS** Ajit D. Kelkar(North Carolina A&T State University), Ram Mohan(North Carolina A&T State University), Dattaji Shinde(North Carolina A&T State University), Evan Kimbro(North Carolina A&T State University) Paper focuses on the fabrication; characterization and behavior of fiberglass laminates interleaved with glass TEOS electrospun nanofibers and evaluates potential of such interlaminar reinforcements.
12:30	LUNCH				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
10:50	BREAK				
	MICROMECHANICAL MODELING SYMPOSIUM I Chair: Igor Tsukrov	**PROCESSING II** Chairs:Alfred Loos, Paolo Ermanni	**AUTOMATED COMPOSITES MANUFACTURING II** Chairs: Ralf Schledjewski, Akira Kuraishi	**FATIGUE OF COMPOSITES 6** Chairs: Karl Schulte, Giuliano Allegri	**HEALTH MONITORING 2** Chairs: Peter Wilson, Ahmed Malsouhi
11:10	**DESIGN OF THE THERMAL TRANSPORT IN FIBER REINFORSED COMPOSITES** Vinit Deshpande(Karlsruhe Insitiute of Technology), Romana Piat(Karlsruhe Institute of Technology), Yuriy Sinchuk(Karlsruhe Institute of Technology), Galyna Stasiuk(Karlsruhe Insitiute of Technology), Puneet Mahajan(Indian Institute of Technology, Delhi) The studies on optimal orientations of fiber in C/C composite on macro- and microlevels are provided. Microstructure characterization, FE- and micromechanical modeling are provided.	**INFLUENCE OF MATERIAL FLOW IN COMPRESSION MOLDING ON MECHANICAL PROPERTIES OF DISCONTINUOUS CF/PP** Nozomi Mitsui(The University of Tokyo), Kazuro Kageyama(Tokyo University), Jun Takahashi(The University of Tokyo), Kiyoshi Uzawa(Kanazawa Institute of Technology), Isamu Osawa(Tokyo University) In this study, the mechanical expanding rate in compression molding was varied to investigate the influence of material flow during molding on flexural properties of molded materials.	**MODELLING THE EFFECT OF GAPS AND OVERLAPS IN AUTOMATED FIBRE PLACEMENT (AFP) MANUFACTURED LAMINATES** Xiangqian Li(University of Bristol), Stephen Richard Hallett(University of Bristol), Michael R Wisnom(University of Bristol) The AFP process can introduce gaps and overlaps between tapes, which reduces strength. Finite element models were created to simulate the effect of defects from the manufacturing process.	**EFFECT OF FLEXIBLE INTERPHASE ON DYNAMIC CHARACTERISTICS OF CFRP** Tatsuya Fukuda(Gifu University), Akio Ohtani(Gifu University), Asami Nakai(Gifu University) Flexible interphase was applied to carbon fiber reinforced plastic. Fracture mechanism of flexible treated specimens was examined by observing progress of micro fractures under fatigue loading.	**PROCESS OPTIMISATION FOR MILLING CARBON/EPOXY COMPOSITE MATERIAL USING RESPONSE SURFACE METHODOLOGY AND VIBRATION ANALYSIS** Hicham Chibane(Ecole Nationale d'Ingenieurs du Val de Loire), Roger Serra(Ecole Nationale d'Ingenieurs du Val de Loire), Antoine Morandeau(Universite Francois Rabelais de Tours), René Leroy(Universite Francois Rabelais de Tours) The objective of this study is to find the cutting conditions using design of experiments and vibration criterion in order to avoid the delamination defects in down milling process of CFRP material.
11:30	**HOMOGENIZATION OF ELASTIC PROPERTIES OF SHORT FIBER REINFORCED COMPOSITES BASED ON MICRO COMPUTER TOMOGRAPHY DATA** Viktor Müller, Barthel Brylka, Thomas Böhlke(Karlsruhe Institute of Technology), Felix Dillenberger, Robert Glöckner(Fraunhofer Institute for Structural Durability and System Reliability LBF), Stefan Kolling (Technische Hochschule Mittelhessen) A micromechanical approach to model short fiber reinforced composites is presented. The model uses microstructure data from micro ct measurements. Numerical results are compared with experiments.	**STUDY ON APPLICATION OF ABRASIVE WATER JET CUTTING TO THICK CFRP PLATE** Hirohito Hira(Daido University) Application of abrasive water jet cutting to CFRP plates were examined to compare with fiber laser cutting. And then tilt effect on cut quality was studied.	**IMPACT OF LAYUP RATE ON QUALITY OF FIBER STEERING/CUT-RESTART IN AUTOMATED FIBER PLACEMENT PROCESS** Jihua Chen(National Research Council Canada), Teresa Chen-keat(), Mehdi Hojjati(Concordia University), Alexander J Vallee(), Marc-andre Octeau(Natural Resources Canada), Ali Yousefpour(National Research Council Canada) In this study, both simulation and experiment were conducted to investigate impact of layup rate on quality of fiber steering and fiber cut-restart in automated fiber placement process.	**CUMULATIVE FATIGUE DAMAGE PREDICTION OF COMPOSITE STRUCTURES** Chris Cater(Michigan State University), Xinran Xiao(Michigan State University) This paper investigates the use of Miner's rule and a novel Degraded Strength Based Model for cumulative damage in a Progressive Fatigue Damage Model.	**CURE MONITORING OF AN AUTOCLAVE MANUFACTURED INDUSTRIAL PART: ADDED VALUE OF COMPLEMENTARY INSTRUMENTATION** Francis Collombet(Institut Clément Ader), Geert Luyckx(Ghent University), Camille Sonnenfeld(Vrije Universiteit Brussel), Yves-henri Grunevald(), Yves Angel Davila(Institut Clément Ader), Mauricio Torres(Instituto Politecnico Nacional), Xavier Jacob(), Kuo-ting Wu(National Research Council Canada), Samuel Rodriguez(Universite A multi-instrumentation set up is proposed for monitoring a composite structure during its curing phase to show the complementarity of different embedded devices
11:50	**MODELLING EDGE EFFECTS ON COMPRESSIVE STRENGTH OF FIBRE COMPOSITES** Michael Sutcliffe(University of Cambridge) Finite element analysis is used to explore free edge and size effects for compressive failure of fibre composites containing idealised and random variations of fibre waviness.	**INFLUENCE OF MILL GEOMETRY ON CUTTING FORCE AND SURFACE MORPHOLOGY OF MULTIDIRECTIONAL CFRP** Yan Chen(Nanjing University of Aeronautics and Astronautics), Yucan Fu(Nanjing University of Aeronautics and Astronautics), Honghua Su(Nanjing University of Aeronautics and Astronautics), Shengchao Han(Nanjing University of Aeronautics and Astronautics) Down milling processes of CFRP with varied mills are investigated. The objectives are to find relationships among the mill geometry, cutting force and surface morphology of the milled workpieces.	**MODELLING SLIT TAPE DEPOSITION DURING AUTOMATED FIBRE PLACEMENT** Fabrice Helenon(National Composites Centre), Dirk Lukaszewicz(BMW Group), Dmitry Ivanov(University of Bristol), Kevin Potter(University of Bristol) FE analyses are performed to model the behaviour of several tows lay down simultaneously. Final prepreg thickness and width are predicted. Models include lateral interactions between adjacent tows.	**UNDERWATER ACCELERATED AGING OF ELASTOMERIC COMPOSITE MATERIALS** Audrey Favre(Ecole Polytechnique de Montreal), Edith roland Fotsing(Ecole Polytechnique de Montreal), Edu Ruiz(Ecole Polytechnique), Martin Lévesque(Ecole Polytechnique de Montreal), Clémentine Fellah(Ecole Polytechnique de Montreal) The main purpose of this study was to understand the influence of accelerated underwater ageing on the mechanical properties of three elastomeric composites.	**STRUCTURAL GLASS FIBRES FOR OPTICAL DAMAGE, CURE AND MOISTURE INGRESS SENSING IN ADVANCE REINFORCED POLYMER COMPOSITES** Peter Wilson(University of Sheffield), Simon Antony Hayes(University of Sheffield), Russell Hand(University of Sheffield) Using structural glass fibres to optically sense damage using an intensity based system and, to sense cure and moisture ingress using fibre evanescent wave spectroscopy with the same fibre in a ARPC.
12:10	**HOMOGENIZATION AND SENSITIVITY ANALYSIS FOR THERMOELASTIC OPTIMAL DESIGN OF METAL-CERAMIC COMPOSITES** Yuriy Sinchuk(Karlsruhe Institute of Technology), Romana Piat(Karlsruhe Institute of Technology) This study presents a modeling and optimization of the composites with plastic metal and brittle ceramic phases. Optimization is provided for lamellae orientation.	**ULTRASONIC WELDING OF THERMOPLASTIC COMPOSITE. MODELING THE HEATING PHENOMENA** Steven Le corre(Universite de Nantes), Arthur Levy(McGill University), Irene Fernandez villegas(Delft University of Technology) Ultrasonic welding allows to locally dissipate heat at an assembly interface. This paper aims at modeling and simulating the key physical phenomena during the heating phase.	**DESIGN, DIMENSIONING AND AUTOMATED MANUFACTURING OF PROFILED COMPOSITE DRIVESHAFTS** Florian Lenz(Technische Universitat Dresden) At the TU Dresden, a novel profiled driveshaft was developed along with a continous manufacturing process. Results of extensive numerical and experimental investigations will be presented.		**PROCESS MONITORING OF FRP LAMINATES BY EMBEDDED FIBER OPTIC SENSORS** Tatsuro Kosaka(Kochi University of Technology), Akihiro Matsumoto(Kochi University of Technology), Takuya Kajikawa(Kochi University of Technology), Masayo Koike(Kochi University of Technology), Kazuhiro Kusukawa(Kochi University of Technology) Strain, degree of cure and existence of voids could be successfully monitored by our developed a process monitoring system during molding of FRP laminates.
12:30	LUNCH				

	Room 525	Room 520f	Room 520be		Room 516ab
10:50	BREAK				
	IMPACT & DYNAMIC RESPONSES 2 Chair: Serge Abrate	**INTERFACE 1** Chairs: Anthony R. Bunsell, Iosif Daniel Rosca	**MODELLING OF PLATES & SHELLS 2** Chairs: Georges Verchery, Farid Taheri		**JOINING - POSTER** Chairs: Chun Li, Arthur Levy
11:10	**OFFSET FAILURE IN FILLED HOLE COMPRESSION TESTS** Bruno Castanié(Institut Clément Ader) A failure mode may occur in compression tests : the off-set failure. In the litterature, this mode was attributed to bearing loads but a different failure scenario was identified in this study.	**STUDY ON INTERFACE COMPATIBILITY OF CARBON FIBER/EPOXY RESIN COMPOSITE BY SINGLE FIBER FRAGMENTATION TEST** Guo Congcong(Beihang University), Zhan Maosheng(Beihang University), Zhi Yang(Xian Aircraft Industry Corporation) The single fiber fragmentation test was performed to evaluate interfacial compatibility of carbon fiber/epoxy resin composite. Besides, surface characterization by SEM and XPS was undertaken.	**FINITE ELEMENT MODELING OF THE CRUSHING BEHAVIOR OF GRAPHITE/EPOXY MEMBERS** Deepak Siromani(Drexel University), Tein-min Tan(Drexel University), Jonathan Awerbuch(Drexel University) This paper discusses the finite element modeling and simulations performed to capture the crushing behavior of graphite/epoxy members subjected to quasi-static axial compression.	11:10 11:14 11:18 11:22 11:26 11:30 11:34 11:38 11:42 11:46 11:50 11:54	**NOVEL INDUCTION HEATING TECHNIQUE FOR JOINING OF CARBON FIBRE COMPOSITES** Chris M Worrall **IMPROVEMENT METHOD OF THE ADHESIVE BONDING BETWEEN THE PEI AND CFRP FOR THE ULTRACENTRIFUGE ROTOR** Soon Ho Yoon **STIMULUS RESPONSE POLYMER AND MULTIFUNCTIONAL COMPOSITES: CHALLENGES AND PROSPECTS** Christophe Bois, Julie Lecomte, Erwann Le goff, Jean-christophe Wahl, Hervé Wargnier **ADHESION AND DEGRADATION OF WELL-DESIGNED TITANIUM-PEEK INTERFACES WITHIN TITANIUM-CF/PEEK LAMINATES** Karola Schulze **ADHESIVE BONDING LAP SHEAR STRENGTH IMPROVEMENT OF CFR(PEEK) LAMINATES BY SURFACE MORPHOLOGY MODIFICATIONS** Réda el hak Ourahmoune, Michelle Salvia, Nadir Mesrati, Thomas Mathia **FRACTURE ANALYSIS OF NEEDLE PUNCHED NONWOVEN COMPOSITE WITH OPEN HOLE** Zhiyuan Zhang, Gustav Martin Wizemann, Yuqiu Yang, Hiroyuki Hamada **THE EPOXY BEHAVIOR OF CFRP ACCORDING TO CLEARANCE AND PRESSURE IN COMPRESSION MOLDING FOR U-CHANNEL** Hyun ho Kim, Minsik Lee, Chung-gil Kang **FAILURE MECHANISM OF A SINGLE-LAP HYBRID JOINT OF COMPOSITE LAMINATE SCREWED AND BONDED TO A STEEL PLATE** Songwei Wang, Xiaoquan Cheng, Zhonghai Li, Jiayi Qi, Qunfeng Cheng **NUMERICAL STUDY ON ULTRASONIC WELDING JOINT FOR CFRTP** Kazuya Suzuki, Isamu Ohsawa, Jun Takahashi, Kiyoshi Uzawa **JOINT EFFICIENCY OF MULTI-POINT SPOT ULTRASONIC WELDING FOR CFRTP** Tomoko Tomioka, Kiyoshi Uzawa, Hideaki Murayama, Isamu Ohsawa, Jun Takahashi **INTERFACE MICROSTRUCTURE OF A DOUBLE-POURED AL/AL-5CU BIMETALLIC COMPOSITE** Guo Wu, Marina Galano, Keyna O'reilly **JOINT STRENGTH OF CO-CURED COMPOSITE STRUCTURES USING Z-PINNING PATCH** I. Choi, J. Jeong, S. Cheong
11:30	**EDGE IMPACT DAMAGE SCENARIO ON STIFFENED COMPOSITE STRUCTURE** Ostre Benjamin(Institut Superieur de l'aeronautique et de lEspace ISAE) It is very important to study more precisely the edge impact and to define the damage scenario in order to identify the parameters that affect the residual strength after impact.	**INTERLAMINR FRACTURE TOUGHNESS OF NACRE: A HIGH PERFORMANCE BILOGICAL COMPOSITE** Ahmad Khayer dastjerdi(McGill University), Reza Rabiei(McGill University), Francois Barthelat(McGill University) In this work we have measured the interlaminar toughness of nacre, a high performance natural composite which can serve as model for bio-inspiration.	**INFLUENCE OF IMPERFECTIONS ON AXIAL BUCKLING LOAD OF COMPOSITE CYLINDRICAL SHELLS** Jendi Itjieh Kepple, B. gangadhara Prusty, Garth Morgan Kendall Pearce, Donald Wainwright Kelly (University of New South Wales), Rodney Thomson, Richard Degenhardt (Deutsches Zentrum fuer Luft und Raumfahrt e.V. (DLR)) The sensitivity of the axial buckling load to initial imperfections of composite monocoque cylinders is measured for robust optimisation and application to launch vehicle structures.		
11:50	**HIGH VELOCITY IMPACT RESPONSE OF E-GLASS/EPOXY COMPOSITES MODIFIED WITH NH2-MWCNT** Muhammad M Rahman(Tuskegee University), Mahesh Hosur(Tuskegee University), Shaik Zainuddin(Tuskegee University), Shaik Jeelani(Tuskegee University) Ballistic performance of E-glass/epoxy samples can be enhanced by adding a very small percentage of amino-functionalized MWCNTs using small loading.	**STRUCTURATION OF ADHESION PROMOTERS AT INTERFACES: A MOLECULAR LEVEL INVESTIGATION** Maurice Brogly(Universite de Haute-Alsace) On the basis of surface advanced techniques, this work focuses on the mechanisms of structuration at interface of adhesion promoters used to reinforce the interface in composite materials.	**SPACE VARIABLES SEPARATION AND PGD MODEL REDUCTION METHOD TO SOLVE ELASTICITY PROBLEMS ON LAMINATED PLATES AND SHELLS** Brice Bognet, Adrien Leygue, Francisco Chinesta The idea here is to solve 3D problems on laminated plates and shells with a PGD based model reduction technique in order to be able to solve it with reasonable computational resources.		
12:10	**IMPROVING BLAST RESISTANCE OF HIGHWAY BRIDGES BY USING FRP** Yuxin Pan(Sichuan University), Moe m s Cheung(Sichuan University) The paper studied the structural responses of a RC highway bridge subjected to blast loads. By incorporating the CFRP material, the vulnerable locations of bridges can be protected.	**STUDY OF INTERPHASE IN EXFOLIATED GRAPHITE NANOPLATELETS/POLYAMDIE12 NANOCOMPOSITES** Mehdi Karevan(Georgia Institute of Technology), Kyriaki Kalaitzidou(Georgia Institute of Technology) This study represents an integrated methodology to assess nano-reinforcement/polymer interfacial interactions and to determine the interphase properties in melt-mixed polymer nano-composites.	**SEMI-ANALYTICAL POST-BUCKLING AND ULTIMATE STRENGTH ANALYSIS OF COMPOSITE PLATES** Qiao jie Yang(University of Oslo), Brian Hayman(University of Oslo) The ultimate strength analysis of simply supported, square plates subjected to uniaxial in-plane compressive load using large deflection theory and first order shear deformation theory.		
12:30	LUNCH				

	Room 515	Room 710	Room 514	Room 524ab	Room 524c
12:30	LUNCH				
	MECHANICAL BEHAVIOR Chairs: Samer Tawfik, John J. Wang	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 11** Chairs: Nancy R. Sottos, James P. Thomas	**APPLICATIONS 3** Chairs: Sayata Ghose, Francis Martin	**FRACTURE AND DAMAGE 11** Chairs: Constantinos Soutis, Carl Quinn Rousseau	**INTERLAMINAR REINFORCEMENTS II** Chair: Kunigal N. Shivakumar
13:30	**INVESTIGATION ABOUT FRACTURE MODE AND STRENGTH IN CURVED SECTION OF CARBON FIBER REINFORCED POLYPROPYLENE** Yi Wan(The University of Tokyo), Takeshi Goto(The University of Tokyo), Tsuyoshi Matsuo(The University of Tokyo), Jun Takahashi(The University of Tokyo), Isamu Ohsawa(The University of Tokyo) Tensile test and finite-element analysis of L-shaped CF/PP specimens had been conducted. The relationship between fracture modes, strength types and the curvature in curved section are evaluated.	**MULTIFUNCTIONAL COMPOSITE MATERIALS FOR BIO-INSPIRED SYSTEMS ALLOWING AUTONOMIC RESPONSE** B. Les Lee (US Air Force Office of Scientific Research) The most revolutionary vision for developing a new generation of multifunctional structures appears to be autonomic systems that can sense, diagnose and respond to external stimuli.	**MOVING TO COMPOSITE FUSELAGE DESIGN** Francisco Kioshi Arakaki(EMBRAER S.A.) This paper outlines the conception of the composite stiffened panel designed to shear and bending loading under post buckling behaviour.	**AN EXPERIMENTAL AND NUMERICAL STUDY OF THE EFFECT OF SOME MANUFACTURING DEFECTS** Tonny Nyman(Saab AB), Alann Andre(), Malin Akermo(Royal Institute of Technology), Sören Nilsson(Swerea SICOMP), Monica Norrby(Royal Institute of Technology) An experimental and numerical study of effects of defects in a pin-loaded composite joint has been conducted. An excellent correlation between analyses and experiments were obtained.	**EFFECT OF NAPS WITH ANISOTROPIC ORIENTATION BETWEEN LAYERS ON MECHANICAL PROPERTIES OF WOVEN COMPOSITES** Jun Hirai(Tsudakoma Corporation), Akio Ohtani(Gifu University), Asami Nakai(Gifu University), Hiroyuki Hamada(Kyoto Institute of Technology) Effects of anisotropic naps of carbon woven fabrics on basic mechanical properties and interlaminar properties of composite laminates were investigated.
13:50	**ELASTIC MODULUS ESTIMATION OF CHOPPED CARBON FIBER TAPE REINFORCED THERMOPLASTICS USING THE MONTE CARLO SIMULATION** Yu Sato(The University of Tokyo), Jun Takahashi(The University of Tokyo), Tsuyoshi Matsuo(The University of Tokyo), Isamu Ohsawa(The University of Tokyo), Kohei Kiriyama(), Satoshi Nagoh(Toyobo Co., Ltd.) IN this study, we evaluated the elastic modulus of CTT using Monte Carlo method by focusing on the random arrangement of the chopped UD tapes.		**INNOVATIVE INTEGRAL COMPOSITE AIRCRAFT STRUCTURES** Kristian Zimmermann(EADS Innovation Works), Tamas Levente Havar(EADS Innovation Works) This paper focuses on innovative primary composite aircraft structures. Integral designs for composite flap load introduction ribs and landing gear fittings is shown.	**THE EFFECT OF RUBBER THICKNESS AND LOAD RATE ON THE INTERFACIAL FRACTURE ENERGY IN STEEL/RUBBER/COMPOSITE HYBRID STRUCTURES** Essi Sarlin(Tampere University of Technology), Jyrki Vuorinen(Tampere University of Technology), Minnamari Vippola(Tampere University of Technology), Toivo Lepistö(Tampere University of Technology) According to this study, increasing load rate and decreasing rubber thickness increases the interfacial fracture energy between glass fibre reinforced epoxy composite and EPDM based rubber.	**FABRICATION OF SELF-AMELIORATING MICROPHASES BETWEEN COMPOSITE PLIES BY INKJET PRINTING** Yi Zhang(University of Sheffield) Inkjet printing technique was used to deposit self-ameliorating agents between composite plies with the aim of gaining self-repairing functional composite.
14:10	**CONTROLLED IMPACT TESTING OF CARBON FIBRE COMPOSITES WITH AND WITHOUT CARBON NANOTUBES AND/OR SMA WIRES** Katerina Sofocleous(University of Cyprus), Vassilis Drakonakis(University of Cyprus), Stephen L Ogin(University of Surrey), Haris Doumanidis(University of Cyprus) Woven carbon fabric with and without CNTs and or SMA wires, have been impacted. Specimens with CNTs and SMA wires show the highest energy absorption compared to other kind of specimens.	**ENERGY HARVESTING AND SHOCK MITIGATION IN COMPOSITE STRUCTURES** Chris Lynch(University of California, Los Angeles) Energy harvesting from impact is used to modify material for shock mitigation. The primary energy harvesting material is a F to AF phase transforming material, 95/5 PZT.	**A NOVEL CONCEPT FOR CONFORMAL LOAD-BEARING ANTENNA STRUCTURES USING DISSIMILAR COMPOSITES** Jasim Ahamed(Royal Melbourne Institute of Technology), Chun H Wang(RMIT University) A comparative investigation of a number of alternative structural concepts to maximize the strength of Conformal Load-Bearing Antenna Structure was conducted.	**EXPERIMENTAL ANALYSIS OF DAMAGE IN FABRIC-REINFORCED COMPOSITES SUBJECTED TO LOW-VELOCITY IMPACTS** Vadim V. Silberschmidt(Loughborough University) The paper investigates the dynamic behaviour of woven fabric composites under low-velocity impacts generated by pendulum-type hammers.X-ray Micro CT is used to analyse the damage in the materials.	**INTERLAMINAR CHARACTERISTICS OF CFRP WITH THERMOPLASTIC PARTICLES** Takayuki Uno(Gifu University), Akio Ohtani(Gifu University), Asami Nakai(Gifu University), Teiji Ito(Daicel-Evonik Ltd.), Eiji Takenaka(Daicel-Evonik Ltd.), Mitsuteru Mutsuda(Daicel-Evonik Ltd.) In this study, effects of the size, shape, and amount of thermoplastic particles on interlaminar characteristics of woven laminated composites were investigated by using DCB and ENF tests.
14:30	**EFFECT OF FIBER LENGTH, TYPE, AND VOLUME FRACTION ON FLEXURAL STRENGTH OF DISCONTINUOUS CARBON/CARBON COMPOSITES** Daniel Heim, Alexander Matschinski, Thomas Kandler, Swen Zaremba, Klaus Drechsler (Technische Universitat Munchen), Christian Klotz (SGL CARBON GmbH) The effect of fiber length, fiber type, and fiber volume fraction on flexural strength was studied. A maximum flexural strength of 94 ± 23 MPa was achieved for a short fiber C/C in graphitized state.	**AUTONOMIC BIOMOLECULAR MATERIAL SYSTEMS AS MULTIFUNCTIONAL COMPOSITES** Donald Joseph Leo Our group has recently initiated a program to understand how we can utilize biomolecules to create a new class of autonomic biomolecular material that exhibits multifunctional behavior.	**EFFECT OF MICROSPHERE CONTENT ON FIRE PERFORMANCE AND THERMOMECHANICAL PROPERTIES PHENOLIC RESOLE SYNTACTIC FOAM COMPOSITES** Mounia Bouslah(Ecole Centrale de Lyon), Michelle Salvia(Ecole Centrale de Lyon), Isabelle Descheres(Institut Textile et Chimique de Lyon), Bruno Berthel(Ecole Centrale de Lyon), Stephane Benayoun(Ecole Centrale de Lyon) This paper presents the material characterization details of different systems of phenolic syntactic foams, all fabricated with glass microspheres as reinforcement but differing in their quantity.	**TENSILE PROPERTIES OF CARBON AND GLASS T-JOINTS AS A STRUCTURAL ELEMENT OF WIND TURBINE BLADE** Amirhossein Hajdaei(University of Manchester Institute of Science and Technology), Paul Jonathan Hogg(Royal Holloway and Bedford New College), Constantinos Soutis(University of Manchester) Different toughening methods used to improve the interlaminar fracture properties of T-joint as a representative of wind turbine blade's Spar.	**PLASMA TREATED CARBON NANOTUBE COATINGS ON THE FRACTURE TOUGHNESS OF GLASS PREPREGS.** John Williams(University of Bristol), Sameer Rahatekar(University of Bristol) Plasma treated carbon nanotubes have been coated on to a pre-preg system at different concentrations to improve the mode 1 & 2 fracture toughness.
14:50	BREAK				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
12:30	LUNCH				
	MICROMECHANICAL MODELING SYMPOSIUM II Chair: Alexander L. Kalamkarov, Borys Drach	**PROCESSING III** Chairs: Abbas Milani, Christophe Mobuchon	**AUTOMATED COMPOSITES MANUFACTURING III** Chairs: Nobuya Kamamura, Ralf Schledjewski	**COMPOSITE STRUCTURES 1** Chairs: Antonio Ferreira, Farid Taheri	**DETECTION & DAMAGE 1** Chairs: Richard Butler, John Botsis
13:30	**HOMOGENIZATION MODELS FOR POLYMER-CLAY NANOCOMPOSITES: ONE AND TWO-STEP APPRAOCHES** Maryam Pahlavanpour(Ecole Polytechnique), Pascal Hubert(McGill University), Martin Lévesque(Ecole Polytechnique de Montreal) To find the best analytical model to predict the mechanical properties of polymer-clay nanocomposites, the performance of different analytical models were compared against numerical simulations.	**UNDERSTANDING THE LAMINATION PROCESS TO IMPROVE COMPOSITE MANUFACTURING** Michael Philip Elkington(University of Bristol), Carwyn Ward(University of Bristol), Anna Chatzimichali(University of Bristol), Leo Dominic Bloom(University of Bristol), Kevin Potter(University of Bristol) The hand layup manufacturing process is analysed in detail to understand exactly how prepreg sheets are manipulated by laminators during layup.	**STUDY ON PRESSURE CONTROL OF AUTOMATED FIBER PLACEMENT PROCESS** Junfei Li(Nanjing University of Aeronautics and Astronautics), Chao Song(Nanjing University of Aeronautics and Astronautics), Xianfeng Wang(Nanjing University of Aeronautics and Astronautics), Jun Xiao(Nanjing University of Aeronautics and Astronautics) Discussed is Automated Fiber Placement (AFP) pressure control problem: a) Roller deformation; b) Relationship between average pressure and the force; c) Pressure maintenance problem and its solutions.	**PROGRESSIVE FAILURE ANALYSIS OF COMPOSITE LAMINATES INCLUDING STRAIN RATE EFFECT** Jingfen Chen(University of New South Wales), Evgeny V Morozov(University of New South Wales), Krishnakumar Shankar(Australian Defence Force Academy) An elastoplastic damage model including strain rate effect is proposed for progressive failure analysis of composite laminates. Strain-driven implicit integration algorithm for the model is derived.	**DIGITAL IMAGE CORRELATION APPLIED TO THERMAL EXPANSION OF COMPOSITES** Camille Flament(Ecole Centrale de Lyon), Michelle Salvia(Ecole Centrale de Lyon), Bruno Berthel(Ecole Centrale de Lyon), Gerard Crosland() Digital image correlation is an optic experimental technique to measure displacements and strains. It provides full-field data. Here, it is used to analyze local thermal behaviour of composites.
13:50	**SIMULATION OF FABRIC DEFORMATION UNDER MOLDING PROCESS** Lejian Huang(Kansas State University), Youqi Wang(Kansas State University), Yuyang Miao(Kansas State University), Chian-fong Yen(), Harun Bayraktar(Albany Engineered Composites), Jon Goering(Albany Engineered Composites) The fabric molding processes are simulated. A numerical procedure to determine the realistic fiber-level deformed 3-D fabric micro-geometry is developed.	**ON PREPREG PROPERTIES AND MANUFACTURABILITY** Leo Dominic Bloom(University of Bristol), Carwyn Ward(University of Bristol), Anna Chatzimichali(University of Bristol), Kevin Potter(University of Bristol), Michael Philip Elkington(University of Bristol) This work examines the role of material selection on the hand layup process. It attempts to identify the key material properties contributing to the ease/difficulty of manufacturing complex parts.	**ROBOTIC DRY FIBRE PLACEMENT OF 3D PREFORMS** Alvaro Silva-caballero(University of Manchester), Prasad Potluri(University of Manchester), Dhavalsinh Jetavat(University of Manchester), William Richard Kennon(University of Manchester) Development of a fabrication process to manufacture near net shape 3D reinforcements from dry fibres with variable thickness using ply-drops and variable fibre orientation between two adjacent layers.	**MODELING OF MULTIPLE DELAMINATIONS IN SHELLS USING XFEM** Jim Brouzoulis(Chalmers University of Technology), Martin Fagerström(Chalmers University of Technology) A computationally efficient shell element which can account for multiple delaminations is presented. The shell kinematics is enriched based on XFEM and the element is validated against tests.	**IOSIPESCU TEST TO CHARACTERIZE MODE II DELAMINATION RESISTANCE OF FIBRE-REINFORCED POLYMERS** Ben Jar(University of Alberta), Scott Mckinney(University of Alberta) This paper presents a study that uses Iosipescu loading to determine interlaminar fracture toughness of fibre-reinforced polymers in shear mode.
14:10	**A VIRTUAL TEST-BED FOR THE PREDICTION OF HOLISTIC ELASTIC PROPERTIES OF UNIDIRECTIONAL COMPOSITES** Ambrose Ighofovwe Akpoyomare(University of Greenwich), Michael Ihemelandu Okereke(University of Greenwich) A virtual testing scheme suitable for performing high-fidelity computational experiments on composites is proposed. It is a micromechanical modelling approach implemented via Finite Element Analysis.	**CO2-LASER-ASSISTED PRODUCTION OF HYBRID FIBER-REINFORCED THERMOPLASTIC COMPOSITES** Christian Brecher(Fraunhofer Institute for Production Technology), Michael Emonts(Fraunhofer Institute for Production Technology), Joffrey Stimpfl(Fraunhofer Institute for Production Technology) Fraunhofer IPT is currently developing and investigating CO2-laser-assisted tape winding of combined glass and carbon fiber-reinforced PP and PPS using for example thermoplastic liners.	**THERMOPLASTIC COMPOSITES: IN-SITU CONSOLIDATION OR IN-SITU WELDING?** Dhiren K. Modi(University of Limerick), Anthony John Comer(University of Limerick), Michael Mccarthy(University of Limerick) This review paper highlights the effect of heat source on ATP process physics. This understanding will allow one to select the most suitable process or to suitably modify the process and materials.	**MECHANICAL PROPERTIES OF COMPOSITE SANDWICH STRUCTURES WITH CORE OR FACE SHEET MODIFICATIONS** Edith roland Fotsing(Ecole Polytechnique de Montreal), Matthieu Sola(Ecole Polytechnique de Montreal), Edu Ruiz(Ecole Polytechnique), Annie Ross(Ecole Polytechnique de Montreal) Noticeable impact is observed if the amount of core discontinuities is significant or if the modified area of the face sheet is located directly under the loading force.	**IDENTIFICATION OF FAILURE MECHANISMS IN THERMOPLASTIC COMPOSITES BY ACOUSTIC EMISSION MEASUREMENTS** Markus Günter ronny Sause(University of Augsburg), Joachim Scharringhausen(), Siegfried Horn(Universitat Augsburg) The present study uses acoustic emission measurements on thermoplastic composites to demonstrate a validated method able to identify particular failure mechanisms by pattern recognition techniques.
14:30	**NUMERICAL SIMULATION OF DYNAMIC YARN PULL-OUT PROCESS** Habiburrahman Ahmadi(Kansas State University), Youqi Wang(Kansas State University), Yuyang Miao(Kansas State University), Xiaojiang Jack Xin(Kansas State University), Chian fong Yen(US Army Research Laboratory) This paper presents a numerical study of dynamic yarn pullout behavior of Kevlar KM2 fabric in a fiber-level yarn structure.	**THE IMPACT OF PROCESS PARAMETERS ON THE RESIDUAL STRESSES AND DISTORTIONS IN PULTRUSION** Ismet Baran(Technical University of Denmark), Jesper Henri Hattel(Technical University of Denmark), Cem C Tutum(Technical University of Denmark) In the present work, the effects of the heater configuration and pulling speed on the process induced residual stresses and distortions of a pultruded glass/epoxy flat plate have been investigated.	**IMPROVING ACCURACY IN ROBOTIZED FIBER PLACEMENT** Maylis Uhart(Ecole Supirieure des Technologies Industrielles Avances), Olivier Patrouix(Ecole Superieure des Technologies Industrielles Avancees), Yannick Aoustin(Universite de Nantes), Joseph Canou(Ecole Superieure des Technologies Industrielles Avancees) This paper presents the use of force/torque hybrid control to improve the accuracy of the robotic fiber placement cell developed by Coriolis Composites within the industrial project IMPALA.		
14:50	BREAK				

	Room 525	Room 520f	Room 520be		Room 516ab
12:30	LUNCH				
	IMPACT & DYNAMIC RESPONSES 3 Chairs: Francis Collombet, Michael Sutcliffe	**INTERFACE 2** Chairs: Anthony R. Bunsell, Iosif Daniel Rosca	**COMPOSITES IN TURBINES, PIPES & VESSELS 1** Chairs: Pierre Mertiny, Simon Joncas		**HEALTH MONITORING, MULTIFUNCTIONAL AND NDE - POSTER** Chair: Ahmed Maslouhi
13:30	**BALLISTIC IMPACT OF THERMOPLASTIC COMPOSITES REINFORCED WITH CARBON FIBERS** Hideaki Kasano(Takushoku University), Mohd azwan shahady Adzmi(Takushoku University) The paper presents the experimental and numerical study of ballistic impact response of continuous and discontinuous carbon fiber reinforced polycarbonate composites.	**FIBER-MATRIX INTERFACE REINFORCEMENT USING ATOMIC LAYER DEPOSITION** Sari Katz(Soreq NRC), Yacov Carmiel(Bar-Ilan University), Irina Gouzman(Soreq NRC), Chaim Sukenik(), Daniel wagner(), Eitan Grossman(Soreq NRC) Atomic layer deposition (ALD) was investigated as a possible way to enhance the chemical bonding between the UHMWPE fibers and epoxy matrix without undermining the fiber tensile strength.	**STRUCTURAL DESIGN AND VALIDATION OF A 10 KW WIND TURBINE BLADE** Louis-charles Forcier(École de technologie supérieure - Université du Québec), Jonathon Sumner(Dawson College), Tommy Gagnon(École de technologie supérieure - Université du Québec), Jean-François Charron(), Simon Joncas(École de technologie supérieure - Université du Québec) Structural design and validation of a wind turbine blade was made. The optimization capabilities of a finite element software was used and validation tests have shown good aggreement with the models.	13:30	**IMPROVING ROBOTIZED NON DESTRUCTIVE TESTING FOR LARGE PARTS WITH LOCAL SURFACE APPROXIMATION AND FORCE CONTROL SCHEME** Olivier Patrouix, Sébastien Bottecchia, Joseph Canou
				13:34	**NON-DESTRUCTIVE INSPECTION OF CFRPS USING INDUCTION HEATING THERMOGRAPHY** Yuuki Shiiya, Masashi Ishikawa, Yasuo Kogo, Hiroshi Hatta, Yoshio Habuka
				13:38	**INSPECTION EFFECTIVENESS OF ULTRASONIC TEST FOR SEVERAL DEGRADED FRP TANKS IN RBI** Masahiro Kusano, Tetsuya Sakai, Saiko Aoki, Masatoshi Kubouchi
				13:42	**COMPARISON OF THREE NDT TECHNIQUES FOR THE INSPECTION OF AERONAUTIC COMPOSITE STRUCTURES** Robin Dube, Laurent Scheed, Jacques Lewandowski, Laura Mouret, Marc P. Georges
13:50	**CRITERIA FOR SKIN RUPTURE AND CORE SHEAR CRACKING DURING IMPACT ON SANDWICH PANELS** Robin Olsson(Swerea SICOMP), Tim Berend Block(Faserinstitut Bremen e.V.) Criteria for skin rupture and core shear cracking in sandwich panel impact are derived and compared with tests on panels with various thicknesses of carbon/epoxy NCF skins and Rohacell foam cores.	**DURABILITY AND INTERPHASES IN ADHESIVELY BONDED EPOXY-POLYESTER INTERFACES** Mikko Samuli Kanerva(Aalto University), Essi Sarlin(Tampere University of Technology), Kosti Rämö(Tampere University of Technology), Olli Saarela(Aalto University) In this study, the durability of composite/composite joints is investigated. We concentrate on bond interfaces and interphases in multi-polymer systems with considerations on surface pre-treatments.	**CARBON FIBRE REINFORCED PVDF PIPE** Siti rosminah Shamsuddin(Imperial College of Science), John Hodgkinson(Imperial College of Science), Leif Erik Asp(Swerea SICOMP), Runar Langstrom(Swerea SICOMP), Alexander Bismarck(Imperial College of Science) Carbon fibre reinforced PVDF was manufactured using a laboratory composite line. The composite tapes were then used to fabricate reinforced thermoplastic pipes and characterised.	13:46	**FULL FIELD STRAIN CHARACTERISTICS OF COMPOSITE LAMINATE WITH IMPACT DAMAGE UNDER IN-PLANE LOAD** Yu Zhefeng, Ba Taxi, Hai Wang
				13:50	**REDUCTION OF PHASE NOISE TO ENHANCE DETECTABLE DEPTH OF DEFECTS IN CFRPS USING PULSE PHASE THERMOGRAPHY** Masashi Ishikawa, Hiroshi Hatta, Yoshio Habuka, Shin Utsunomiya
				13:54	**INFLUENCE OF STRESS FIELD AT OVERLAP EDGE OF CFRP SINGLE-LAP JOINT ON FIBER OPTIC DISTRIBUTED SENSING USING EMBEDDED FBG** Daichi Wada, Ning Xiaoguang, Hideaki Murayama
				13:58	**PREPARATION AND CHARACTERIZATION OF OPTICAL FIBERS EMBEDDED SMART GEOCOMPOSITE** Seung woo Han, Yeong og Choi
14:10	**MULTILAYER BALLISTIC SYSTEMS BASED ON DRY FABRICS** Francisca Martínez hergueta(IMDEA Materials), Carlos Daniel González(IMDEA Materials), Javier Llorca(IMDEA Materials), Tamara Blanco varela(), Jose J Martínez() Ballistic performance of barriers based on hybrid combinations of felts and dry woven fabrics and comparison with conventional ballistic protection systems.	**INFLUENCE OF POWDER COATING PRE-CURING TIME ON INTERFACE COATING/EPOXY MATRIX COMPOSITE** Aurore Lafabrier(Universite de Toulon et du Var), Ahmad Fahs(Universite de Toulon et du Var), Emmanuel Aragon(Universite de Toulon et du Var), Jean-francois Chailan(Universite de Toulon et du Var) The objective is to study the interface between powder coatings and composite; to understand the adhesion mechanisms and the effect of curing time on interface characteristics has been studed	**SIMULATIVE DESIGN OF OVERBRAIDED PRESSURE VESSEL FOR HYDROGEN STORAGE** Michael Lengersdorf(Rheinisch Westfalische Technische Hochschule Aachen), Thomas Gries(Rheinisch Westfalische Technische Hochschule Aachen), Jörg Bernhard Multhoff(ISATEC GmbH), Markus Linke(Fachhochschule Hamburg) Hydrogen is considered to be an alternative fuel for future automotive generations. This paper will examine the braiding process as alternative to filament winding for composite pressure vessels.	14:02	**TOWARDS STRAIN-BASED STRUCTURAL HEALTH MONITORING OF A COMPOSITE AIRFOIL UNDER UNCERTAINTY** Hessamodin Teimouri, Abbas Milani, Rudolf Seethaler, Ali Abedian, Amir Heidarzadeh, Behnam Teimouri
				14:06	**IMPACT OF MWCNT ON ELECTRICAL CONDUCTIVITY OF CARBON FIBER MULTISCALE COMPOSITES** Maxime Arguin, Daniel Therriault, Frederic Sirois
14:30	**HYPERVELOCITY IMPACT OF SPACE DEBRIS ON MULTIPLE COMPOSITE BUMPERS: EXPERIMENTS & SIMULATIONS USING LS-DYNA** Abrar-ul-haq khan Baluch(Korea Advanced Institute of Science & Technology), Yurim Park(Korea Advanced Institute of Science & Technology), Chun Gon Kim(Korea Advanced Institute of Science & Technology), Yunho Kim(Korea Advanced Institute of Science & Technology) Composite double bumpers are used in normal and oblique configurations for the spacecraft structural application. LSDYNA SPH-module used to validate	**PRE-TREATMENT OF CFRP FOR ADHESIVE BONDING USING LOW-PRESSURE BLASTING** Stefan Kreling(Technische Universitat Carolo-Wilhelmina Braunschweig), Fabian Fischer(Technische Universitat Carolo-Wilhelmina Braunschweig), Klaus Dilger(Technische Universitat Carolo-Wilhelmina Braunschweig) Low-pressure blasting as a technology to pre-treat CFRP for adhesive bonding is shown. Results of mechanical and analytical experiments performed on aerospace and automotive materials are presented.	**A NOVEL INJECTION PROCESS FOR LONG FIBER COMPOSITES USING ROTATION** Andreas Altmann(Technische Universitat Munchen), Swen Zaremba(Technische Universitat Munchen), Roland Hinterhoelzl(Technische Universitat Munchen), Klaus Drechsler(Technische Universitat Munchen) A novel process to manufacture composite structures via rotational forces will be shown. In contrast to familiar techniques composite parts can be produced with non-symmetrical rotations.		
14:50	BREAK				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
14:50	**BREAK**				
	NANOCOMPOSITES I Chairs: A. John Hart, Yadienka Martinez Rubi	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 12** Chairs: B. Les Lee, Don Leo	**APPLICATIONS 4** Chairs: Sayata Ghose, Francis Martin	**FRACTURE AND DAMAGE 12** Chairs: Gabriel Laplante, Shuguang Li	**PREFORMS 1** Chair: Jeff Wood
15:10	**ENHANCED MECHANICAL AND ELECTRICAL PROPERTIES OF IN-SITU CROSS-LINKED BUCKYPAPER** Jianwei Zhang(National University of Defense Technology), Dazhi Jiang(National University of Defense Technology), Hua-xin Peng(University of Bristol) An in-situ cross-linking method was developed to cross-link carbon nanotubes in the buckypaper, resulting in the highly improved tensile strength and electrical conductivity of the buckypaper.	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 12 OPEN DISCUSSION**	**OVERVIEW AND DYNAMISM OF THE WORLDWIDE COMPOSITES MARKET** Daniel Ageda Emerging opportunities from fast growing markets, dynamics of different market segments, trends and innovations, Key applications sectors, From academic research to industrialization	**COMPRESSIVE STRENGTH AND DAMAGE MECHANISMS IN STITCHED CARBON/EPOXY COMPOSITES** Arief Yudhanto(Tokyo Metropolitan University) Effect of important stitching parameters (stitch density, stitch thread thickness) on compressive strength and damage mechanisms of Vectran-stitched carbon/epoxy is experimentally assessed.	**PREDICTION METHOD OF INTERNAL STRUCTURE FOR DESIGNING BRAIDED -COMPOSITES WITH THERMOPLASTIC RESIN-** Takeshi Saito(Kyoto Institute of Technology), Ryo Morinaga(Kyoto Institute of Technology), Masaru Imamura(Kyoto Institute of Technology), Asami Nakai(Gifu University), Akio Ohtani(Gifu University) The purpose of this study is to predict the relationship between dimensional and internal structural parameters for braided fabric reinforced thermoplastic composite.
15:30	**MECHANISMS OF STRAIN INDUCED ALIGNMENT OF CARBON NANOTUBES (CNT): PROCESS SCALE-UP AND QUASI-CONTINUOUS HIGHLY ALIGNED CNT MATERIAL** Richard Liang(Florida State University) This reseach is to study alignment mechanisms and scale-up process development of CNT networks of large aspect ratio MWNTs for composite applications		**THERMAL STABILITY OF CFRP MIRRORS FOR SPACE TELESCOPES UNDER THERMAL CYCLE TEST** Tomohiro Kamiya(Japan Aerospace Exploration Agency), Shin Utsunomiya(Japan Aerospace Exploration Agency), Ryuzo Shimizu(Japan Aerospace Exploration Agency) To demonstrate the validity of CFRP mirrors, the surface accuracy at the each phase of the fabrication process and change of surface preciseness under thermal cycle was studied.	**FRAGMENTATION ANALYSIS OF GLASS FIBRES RECOVERED FROM HYDROLYSIS PROCESSES** Yat-tarng Shyng(University of Exeter), Oana Ghita(University of Exeter) Investigation on the interfacial properties of glass fibres embedded inside epoxy matrix. Single fibre model composites were prepared for fragmentation tests and micromechanics analysis.	**PREDICTION METHOD OF INTERNAL STRUCTURE FOR DESIGNING BRAIDED COMPOSITES WITH THERMOSET RESIN** Masaru Imamura(Kyoto Institute of Technology), Ryo Morinaga(Kyoto Institute of Technology), Akio Ohtani(Gifu University), Asami Nakai(Gifu University) This study aims to clarify the interrelationship among structural parameters of braided composites and establish a prediction method of internal structure for designing braided composites.
15:50	**EFFECT OF IRON-DEPOSITED REDUCED GRAPHENE OXIDES ON THE NEAR-FIELD ELECTROMAGNETIC ABSORBING PROPERTY OF COMPOSITE FILMS** Jin woo Yi(Korea Institute of Materials Science) Effect of the Fe-deposited reduced graphene oxide on the near-field electromagnetic wave absorbing property of composite thin films was studied.		**BONDING OF CFRP PRIMARY AEROSPACE STRUCTURES: OVERVIEW ON THE TECHNOLOGY STATUS IN THE CONTEXT OF THE CERTIFICATION BOUNDARY CONDITIONS ADRESSING NEEDS FOR DEVELOPMENT** Thomas Kruse(Airbus Operations GmbH - Germany) Bonding technology for Aerospace application is today limited by the certification regulations. An overview on actual development and strategies for a certification is given.	**DAMAGE CHARACTERIZATION OF A THIN PLATE MADE OF ABS UNDER UNIAXIAL SOLICITATION** Hicham Farid, fouad erchiqui, fouad slaoui hasnaoui (University of Quebec Abitibi-Temiscamingue), hassan ezzaidi(University of Quebec at Chicoutimi), mohamed elghorba, hkalid elhad (Universite Hassan II - Ain Chock) characterization of a notched ABS flat plate under uniaxial stress. Unified damage theory and the stress concentration criterion are considered to quantify the damage in notched structures.	**MECHANICAL PROPERTIES OF 3D WOVEN COMPOSITES WITH LARGE REPEAT UNIT CELLS** Edward Archer , Alistair Mcilhagger This paper presents in-plane shear, open-hole tension and mode 1 fracture toughness data for 3D woven angle interlock carbon fibre composites
16:10	**SWCNT FUNCTIONALIZATION FOR OPTIMIZED ELECTRICAL CONDUCTIVUTY OF EPOXY MATRICES** Yadienka Martinez rubi, Christopher Kingston, Benoit Simard(NRC), Jose Miguel Gonzalez-dominguez, Alejandro Anson-casaos, Maria Teresa Martinez (Consejo Superior de Investigaciones Cienta-ficas (CSIC)) SWCNTs were functionalized for integration into an epoxy resin. The effect of the functionalization reaction and the degree of functionalization on the composites electrical conductivity is evaluated		**FLOW BEHAVIOR OF ALUMNIUM-BORON CARBIDE COMPOSITE BY DIFFERENTIAL STRAIN RATE COMPRESSION TEST** Srinu Gangolu(Indian Institute of Technology, Bombay), A Gourav Rao(Indian Institute of Technology, Bombay), N Prabhu(Indian Institute of Technology, Bombay), V P Deshmukh(DRDO), B P Kashyap(Indian Institute of Technology, Bombay) The present work is to study the mechanical properties of hot rolled Al and Al-15% B4C composite and to examine the microstructural evolution towards exploring the structure–flow property correlation.	**EXPERIMENTAL AND NUMERICAL STUDIES ON DAMAGE BEHAVIOR OF NYLON 6/CLAY NANOCOMPOSITES** Shaoning Song, Yu Chen, Zhoucheng Su, Chenggen Quan, Vincent Be Tan (National University of Singapore) Experiment has been carried out to obtain the damage parameters for nylon 6. A 3D RVE model for nylon 6/clay nanocomposites was introduced to study its constitutive properties and damage mechanisms.	
16:30	**GENERAL ASSEMBLY**				
18:30	**End**				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
14:50	**BREAK**				
	MICROMECHANICAL MODELING SYMPOSIUM III Chair: Endel Larve, Romana Piat	**PROCESSING IV** Chairs: Abbas Milani, Casey James Keulen	**AUTOMATED COMPOSITES MANUFACTURING IV** Chairs: Nobuya Kamamura, Ralf Schledjewski	**COMPOSITE STRUCTURES 2** Chairs: Antonio Ferreira, Farid Taheri	**DETECTION & DAMAGE 2** Chairs: Richard Butler, John Botsis
15:10	**MULTI-SCALE MODELING OF THE VISCOELASTIC PROPERTIES OF NON-WOVEN, THERMOPLASTIC COMPOSITES** Sascha Fliegener, Michael Luke(Fraunhofer Institute for Mechanics of Materials IWM), Diego Elmer, Thomas Seifert (Fachhochschule Offenburg, Hochschule fur Technik und Wirtschaft) The viscoelastic properties of the thermoplastic matrix are implemented into a microstructural simulation of the composite and the results are compared to those of experimental creep tests.	**INFLUENCE OF CUTTING PARAMETERS AND WEAR IN DRILLING OF 3D WOVEN CARBON/EPOXY COMPOSITES** Nicolas Cadorin(Institut Clément Ader), Redouane Zitoune(Institut Clément Ader), Francis Collombet(Institut Clément Ader), Bruno Castanié(Institut Clément Ader), Mathias Seve(Snecma) This paper discusses the relation between machining damages induced by various machining parameters and various cutting tools as well as tool wear when drilling an interlock composite 3D woven.	**COMPARATIVE CHARACTERIZATION OF THE TC-250 OUT-OF-AUTOCLAVE MATERIAL MADE BY HAND LAY-UP AND AUTOMATED FIBER PLACEMENT PROCESSES** Kulbir Singh Madhok(Concordia University), Ali Naghashpour(Concordia University), Suong Hoa(Concordia University) This paper is aimed at characterizing the OOA prepreg material by comparing the properties of laminates made by Hand Lay-up and AFP processes with Autoclave and OOA curing cycles.	**STRESS ANALYSIS OF A FILAMENT WOUND COMPOSITE FLYWHEEL DISK** Md. Sayem Uddin(University of New South Wales), Evgeny V Morozov(University of New South Wales), Krishnakumar Shankar(Australian Defence Force Academy) The finite element modelling and stress analysis of the filament wound composite flywheel disk with distinctive mosaic patterns generated in the filament winding process is presented in this work.	**MICROMECHANISTIC ANALYSIS OF TOUGHENED CARBON FIBRE COMPOSITE LAMINATE FAILURE BY COMPUTED TOMOGRAPHY** Gregor Borstnar, Daniel J Bull, Mark N Mavrogordato, Ian Sinclair, Simon M Spearing (University of Southampton) Low velocity impact damage and Mode I and II in situ computed tomography experiments captured the failure micromechanisms in particle toughened carbon fibre composites.
15:30	**STREAMLINED COMPOSITE MODELING WORKFLOWS WITH MULTI-OBJECTIVE OPTIMISATION** Gerhard Goldbeck(Goldbeck Consulting Ltd), Danilo Di stefano(ESTECO spa) Micromechanical modeling has been integrated with multi-objective optimization. The integration enables streamlining of workflows such as parametric studies and reverse engineering of material models.	**NANOSTRUCTURE GRADIENTS IN INJECTION-MOLDED PP/MMT COMPOSITES STUDIED BY MICROBEAM SAXS** Norbert Stribeck (University of Hamburg), Konrad Schneider (Institut fiir Polymerforschung), Ahmad Zeinolebadi (University of Hamburg), Xuke Li (University of Hamburg), Zina Vuluga (Institute ICECHIM), Stephan Volkher Roth (HASYLAB at DESY) Neat PP is homogeneous, but the composites show a nanostructure gradient and a tumbling of the local fiber axis indicating solidification under turbulent conditions.	**HANDLING OF PREFORMS AND PREPREGS FOR MASS PRODUCTION OF COMPOSITES** Christian Brecher(Fraunhofer Institute for Production Technology), Michael Emonts(Fraunhofer Institute for Production Technology), Boris Ozolin(Fraunhofer Institute for Production Technology), Richard Schares(Fraunhofer Institute for Production Technology) A self-adaptable gripper kinematic and an area gripper based on the electrostatic effect support the change from a production with manual handling processes to a robust, fully automated process chain.	**EVALUATING LAYERED FIBER COMPOSITE STRUCTURES ACCOUNTING FOR THE ONSET OF DELAMINATION** Jaan Willem Simon(Rheinisch Westfalische Technische Hochschule Aachen), Bertram Stier(Rheinisch Westfalische Technische Hochschule Aachen), Stefanie Reese(Rheinisch Westfalische Technische Hochschule Aachen) A meso-mechanically motivated model for layered composites made of woven fiber-reinforced plastics accounting for delamination is proposed and implemented into a solid-shell finite element.	**INTERLAMINAR CRACK DETECTION IN GRAPHENE NANOPLATELET/ CFRP COMPOSITES USING ELECTRIC RESISTANCE CHANGE** Babak Ahmadi moghadam(Dalhousie University), Babak Soltannia(Dalhousie University), Farid Taheri(Dalhousie University) In this research, the effect of graphene nanoplatlet as a means for improving the electrical resistance change-based detection method of invisible delamination in laminates, is investigated.
15:50	**STOCHASTIC APPROACH TO MICROMECHANICAL MODELING OF POROUS SOLIDS** Borys Drach(University of New Hampshire), Andrew Drach(University of New Hampshire), Igor Tsukrov(University of New Hampshire) A statistical model is proposed to predict the overall Young's moduli of linearly elastic solids with multiple pores of various shapes (extracted from microCT data of a carbon/carbon composite sample)	**MANUFACTURING OF HYBRID STRUCTURES BY PREPREG PRESS TECHNOLOGY** Christian Lauter(Universitat Paderborn), Tim Krooss(Universitat Paderborn), Thomas Troester(Universitat Paderborn) This paper will show basic technological investigations in the field of prepreg press technology. This process is an approach to manufacture automotive steel-CFRP-hybrid structures in large series.	**PROCESS PARAMETER STUDIES AND COMPARISON OF DIFFERENT PREFORM PROCESSES WITH NCF MATERIAL** Frank Härtel(Universitat Stuttgart), Peter Middendorf(Universitat Stuttgart) In this paper forming processes for NCF materials will be evaluated experimentally and compared. Process limitation will be shown and possible spare processes will be identified.	**BENDING TEST OF THERMOPLASTIC COMPOSITE CONE** Farjad Shadmehri(Concordia University), Suong Hoa(Concordia University), Mehdi Hojjati(Concordia University) A tube bending test setup simulating pure bending condition has been developed and a thermoplastic composite cone made using automated fiber placement technique was tested under bending load.	**QUANTITATIVE ASSESSMENT BARELY VISIBLE INDENTATION DAMAGE (BVID) ON CF/EP SANDWICH COMPOSITES USING GUIDED WAVE SIGNALS** Lin Ye(University of Sydney), Samir Mustapha(), Xingjian Dong() BVID in CF/EP sandwich composites was assessed using guided wave signals. The damage index was defined by the changes in characteristics of guided waves and correlated with the severity of BVID.
16:10	**MODELING OF ELASTIC PROPERTIES OF THE CELL WALL MATERIAL IN NANOCLAY-REINFORCED FOAMS** Oksana Shishkina(Katholieke Universiteit Leuven), Larissa Gorbatikh(Katholieke Universiteit Leuven), Stepan V. Lomov(Katholieke Universiteit Leuven), Ignaas Verpoest(Katholieke Universiteit Leuven) A model of the nanoclay-reinforced cell wall is presented. It considers initial clay distribution in a nanocomposite, simulates cell wall stretching during the foaming and predicts its stiffness.	**A CASE STUDY ON DIMENSIONAL CHANGE OF GLASS FIBRE REINFORCED POLYMERS AFTER DEMOULDING: A COMBINED EFFECT OF CURE PROGRESSION AND THERMO-VISCOELASTIC BEHAVIOUR** Maziar Shah mohammadi, Lucie Solnickova, Bryn James Crawford, Mojtaba Komeili, Abbas Milani This case study addresses a practical problem during the manufacture of GFRPs where parts undesirably deform after de-moulding, particularly during transport, storage or post-moulding operation.		**FREE VIBRATION ANALYSIS OF LAMINATED COMPOSITE OPEN CYLINDRICAL SHELLS WITH ARBITRARY BOUNDARY CONDITIONS** Tiangui Ye(Harbin Engineering University), Guoyong Jin(Harbin Engineering University), Yuehua Chen(Harbin Engineering University), Hongda Liu(Harbin Engineering University) In this paper,a Chebyshev-Ritz method is presented to analyse the free vibration of laminated composite open cylindrical shells with arbitrary boundary conditions.	**QUASI-STATIC INDENTATION AND COMPRESSION AFTER IMPACT DAMAGE GROWTH MONITORING USING MICROFOCUS X-RAY COMPUTED TOMOGRAPHY** Daniel J Bull, Simon M Spearing, Ian Sinclair (University of Southampton) X-ray computed tomography was used to monitor damage initiation and growth on carbon fibre materials subjected to quasi-static indentation loads and compression after impact.
16:30	**GENERAL ASSEMBLY**				
18:30	**End**				

	Room 525	Room 520f	Room 520be		Room 516ab
14:50	BREAK				
	IMPACT & DYNAMIC RESPONSES 4 Chairs: Francis Collombet, Michael Sutcliffe	**INTERFACE 3** Chairs: Isaac M. Daniel, Michael R. Wisnom	**Applications - Energy** Chairs: Pierre Mertiny, Simon Joncas		**DAMAGE AND FRACTURE - POSTER** Chair: Ahmed Maslouhi, Navid Zobeiry
15:10	**REDUCTION OF SHOCK WAVE AMPLIFICATION IN MULTIPLE BALLISTIC FABRIC LAYER SYSTEMS** Andi Haris(National University of Singapore), Heow pueh Lee(National University of Singapore), Tong earn Tay(National University of Singapore), Boo cheong Khoo(National University of Singapore), Vincent Bc Tan(National University of Singapore) The double-sided tape approach led to decreasing or eliminating the air gap effectively and thus successfully reducing the peak pressure amplification factor of multiple layers of ballistic fabric.	**INVESTIGATIONS OF INTERFACIAL ADHESION BETWEEN PZT FIBERS AND EPOXY MATRICES** Guido Sebastian Sommer(Leibniz Institute of Polymer Research Dresden), Edith Maeder(Leibniz Institute of Polymer Research Dresden), Jan Sander(Leibniz Institute of Polymer Research Dresden) Single-fiber fragmentation tests are carried out in order to determine and improve the interfacial adhesion between one type of PZT fibers and a selection of epoxy resin matrices.	**SUBCOMPONENT TESTING FOR ROTORBLADES OF WIND TURBINES** Arno Van Wingerde(Fraunhofer IWES), Florian Sayer(Fraunhofer IWES), Eric Putnam(Fraunhofer IWES), Falko Bürkner(Fraunhofer IWES), Alexandros Evangelos Antoniou(Fraunhofer IWES) The use of subcomponent tests is suggested for the development of rotor blades of wind turbines in addition to current coupon and full-scale tests. Examples are provided and an outline is suggested.	15:10	**ENVIROMENTAL EFFECTS OF MOSITURE IN GLASS FIBER POLYMER REINFORCED COMPOSITES** Vladimir Alzamora Guzman
				15:14	**STATIC IMPLEMENTATION OF PERIDYNAMICS FOR THE SIMULATION OF CRACK PROPAGATION** Fabio Luongo, Mirco Zaccariotto, Ugo Galvanetto
				15:18	**PREDICTING DAMAGE PROPAGATION OF COMPOSITE T-JOINTS USING A MIXED DAMAGE MODEL** Jiye Chen
				15:22	**FAILURE ANALYSIS OF WOVEN FABTIC CURVED LAMINATE WITH VARIABLE THICKNESSES** Junqi Zhang, Longquan Liu, Hai Wang
				15:26	**EVALUATION OF SPLICE-TYPE CRACK ARRESTER UNDER MODE II TYPE LOADING FOR FOAM CORE SANDWICH PANEL** Yasuo Hirose, Hirokazu Matsuda, Go Matsubara, Masaki Hojo, Keishiro Yoshida
15:30	**INVESTIGATION OF COMPRESSIVE FAILURE IN ULTRA-HIGH MOLECULAR WEIGHT POLYETHYLENE (DYNEEMA®) FIBER COMPOSITES** Julia Patton Attwood(University of Cambridge), Vikram S Deshpande(University of Cambridge), Norman A Fleck(University of Cambridge) Compressive failure of UHMWPE composites is investigated, yielding values of the material's shear lag length and pressure dependency coefficient and improving our understanding of its impact response.	**EFFECT OF CYCLIC HYGROTHERMAL AGING ON THE INTERLAMINAR SHEAR STRENGTH OF CARBON FIBER/BISMALEIMIDE(BMI) COMPOSITE** Ye Li(Beihang University), Yan Zhao(Beihang University), Dong Xiao Sui(Beihang University) The interlaminar shear strength (ILSS) evolution of carbon fiber(CF)reinforced bismaleimide(BMI) composites during hygrothermal aging were systematically studied through short beam shear tests.	**THE ANCHORING OF A RETROFIT REINFORCEMENT CONCEPT IN THE TRAILING EDGE OF WIND TURBINE BLADES** Pietro Bortolotti(Technical University of Denmark), Konstantinos N. Anyfantis(Technical University of Denmark), Christian Berggreen(Technical University of Denmark), Mikkel Lagerbon(), Raphael Sajous() Experimental and numerical study about the design of reinforcing polymer wires to avoid cracks at the trailing edge of operational wind turbine blades.	15:30	**DAMAGE EVALUATION IN PAPER-BASED FRICTION MATERIALS SUBJECTED TO COMPRESSIVE LOADING** Tomoyuki Fujii, Keiichiro Tohgo, Naoya Urata, Yoshinobu Shimamura, Tomohiro Hasegawa, Shintaro Yagi, Yoichi Ito
				15:34	**CORROSION STUDIES OF SELECTED FIBRE METAL LAMINATES WITH CARBON AND GLASS FIBRES** Barbara Surowska
				15:38	**INFLUENCE OF THE INTERFACE ON THE APPARENT FRACTURE TOUGHNESS AND CRACK PROPAGATION DIRECTION IN LAYERED CERAMIC COMPOSITES** Lubos Nahlik, Bohuslav Masa, Pavel Hutar, Zdenek Majer
				15:42	**ACTIVE THERMOGRAPHY AS AN EVALUATION METHOD OF DELAMINATIONS IN COMPOSITE** Przemyslaw Daniel Pastuszak, Aleksander Muc
15:50	**HIERARCHICAL LIGHTWEIGHT COMPOSITES: GF FABRICS EMBEDDED IN MICROCELLULAR NANOCOMPOSITE PEN** Luigi Sorrentino(Consiglio Nazionale delle Ricerche), Livia Cafiero(Consiglio Nazionale delle Ricerche), Salvatore Iannace(National Research Council) A new lightweight composite structure has been developed, which mimics the multiscale lightweight composite structure of natural composites based on a high performance thermoplastic polymer.	**TEMPERATURE DEPENDENCE OF THE INTERFACIAL SHEAR STRENGTH IN GLASS REINFORCED POLYPROPYLENE AND EPOXY COMPOSITES** James Thomason(University of Strathclyde), Liu Yang(University of Strathclyde) Measurement and analysis of the interfacial shear strength in glass fibre polypropylene and glass fibre epoxy composites measured using the microbond test carried out in a thermomechanical analyser	**ENERGY HARVESTING FROM FLUID FLOW USING A VERTICAL COMPOSITE PIEZOELECTRIC LEAF-STALK CONFIGURATION** Arvind Deivasigamani(Royal Melbourne Institute of Technology), Jesse Mark Mccarthy(RMIT University), Sabu John(RMIT University), Simon Watkins(RMIT University), Floreana Coman() Here, an energy harvesting technique from fluid flow using composite piezoelectric beam is investigated. Computational modelling and experiments are carried out and the results are discussed.	15:46	**DCB TEST SAMPLE OPTIMIZATION FOR MICRO-MECHANICAL TESTING** Sanita Zike, Lars Pilgaard Mikkelsen
				15:50	**AN INVESTIGATION INTO MATRIX CRACKING IN TRANSVERSE PLIES LEADING TO DELAMINATION CRACKS AT PLY BOUNDARIES.** Daniel J Mortell, David A Tanner, Conor T. Mccarthy
				15:54	**DIRECT NUMERICAL SIMULATION OF DAMAGE PROGRESSION IN LAMINATED COMPOSITE PLATES USING MULTI-SCALE MODELLING** Nitesh Kumar Karna, Heejin Kang, Kookjin Park, Kyungmin Nam, Chanhoon Chung, Minkee Kim, Ik-hyeon Choi, Sangjoon
				15:58	**LOCAL STRAIN RATE EFFECT ON DAMAGE IN GLASS FIBER REINFORCED ETHYLENE-PROPYLENE COMPOSITE** Joseph Fitoussi, Michel Bocquet, Fodil Meraghni
16:10	**NUMERICAL AND EXPERIMENTAL DYNAMIC ANALYSIS FOR A CFRP FORMULA SAE IMPACT ATTENUATOR** Simonetta Boria(University of Camerino), Jovan Obradovic(Polytechnic Institute of Turin), Giovanni Belingardi(Polytechnic Institute of Turin) This work deals with the lightweight design and the crashworthiness analysis of a composite front impact attenuator for a Formula SAE racing car through the numerical and experimental point of view.		**HYDROGEN ADSORPTION CHARACTERISTICS OF THE PARTICLES REINFORCED PHENOLIC FOAMS** Seung a Song(Chonbuk National University), Seong su Kim(Chonbuk National University) Carbon particles reinforced microcellular phenolic foams (PF) were fabricated to enhance the capacities of hydrogen storage and mechanical properties by using the different types of particles	16:02	**MICROMECHANICAL MODELLING OF DAMAGE PROCESSES IN COMPOSITE MATERIALS** Darko Ivancevic, Ivica Smojver
				16:06	**ORTHOGONAL STITCHING OF 2D FABRICS FOR IMPROVED DELAMINATION RESISTANCE** William Richard Kennon, Prasad Potluri, Devrim Goktas
				16:10	**IN SITU DAMAGE MECHANISMS INVESTIGATION OF POLYAMIDE/SHORT GLASS FIBER COMPOSITE** Muhamad fatikul Arif, Nicolas Despringre, Yves Chemisky, Gilles Robert, Fodil Meraghni
				16:14	**FAILURE ASPECTS OF FIBER METAL LAMINATES AFTER LOW VELOCITY AND LOW ENERGY IMPACT** Jaroslaw Bienias
16:30	GENERAL ASSEMBLY				
18:30	End				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
7:30					
8:30	**PLENARY (Room 710) - Xiaosu YI: "How to make high performance structural composites multifunctional".** Chair: Stephen Tsai				
	NANOCOMPOSITES II Chairs: Tina Lekakou, Tony Kinloch	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 13** Chair: Yuntian T. Zhu	**APPLICATIONS 5** Chairs: Catharine Marsden, Tony Belcher	**FRACTURE AND DAMAGE 13** Chairs: John D. Whitcomb, Fodil Meraghni	**CERAMIC MATRIX COMPOSITES 1** Chairs: Yongting Zheng, Donald W. Radford
9:30	**ELABORATION AND INVESTIGATION ABOUT THE MECHANICAL PROPERTIES OF REINFORCED ALIGNED MULTI-WALLED CARBON NANOTUBE CARPETS COMPOSITES** Jonathan Bouillonnec(Commisariat a lenergie atomique et aux energies alternatives CEA) The goal is to estimate the effect of the characteristics of vertically aligned multi-walled carbon nanotubes (VACNT) carpets on the final mechanical properties of 1D-nanocomposites.	**THROUGH-THICKNESS ELECTRICAL RESISTANCE IN GLASS/EPOXY/CNTS COMPOSITE LAMINATES SUBJECTED TO MECHANICAL LOADING** Ali Naghashpour(Concordia University), Suong Hoa(Concordia University) Incorporating carbon nanotubes (CNTs)into epoxy in glass/epoxy/CNTs laminate to make the combined material as sensor can be used for measuring through-thickness strain in the laminate.	**DESIGN CONSTRAINTS OF COMPOSITE LATTICE CYLINDERS FOR AEROSPACE APPLICATIONS** Takahira Aoki(The University of Tokyo), Hajime Yamazaki(The University of Tokyo), Tomohiro Yokozeki(The University of Tokyo), Keita Terashima(Japan Aerospace Exploration Agency), Toru Kamita(Japan Aerospace Exploration Agency) The study focuses on the effect of local rotation of composite lattice cylinders under compression, which the global buckling of homogenized cylinders or the local buckling of ribs cannot deal with.	**FATIGUE DELAMINATION GROWTH OF ENVIRONMENTALLY AGED/DEGRADED ADHESIVELY BONDED COMPOSITE JOINTS UNDER MODE I LOADING** Chun Li(National Research Council Canada), Tim Teng(National Research Council Canada), Gang Li(National Research Council Canada), Marko Yanishevsky(National Research Council Canada) Characterization of delamination/ disbond propagation of an adhesively bonded composite joints that are subjected to environmental ageing and Mode I fatigue loading.	**DURABILITY OF CARBON/CERAMIC COMPOSITES SUBJECTED TO ELECTRICAL LOAD** Teresa Gumula(AGH University of Science and Technology), Felix L. Martinez(Universidad Politecnica de Cartagena) The aim of this work is to investigate electrical properties and efficiency of C/C composites impregnated with polysiloxane preceram as well as their durability in their working conditions.
9:50	**ATOMISTIC SIMULATION OF DEFORMATION AND FAILURE MECHANISIMS IN CU/SIC NANOCOMPOSITES** Zhenyu Yang(Beijing University of Aeronautics and Astronautics) This paper focuses on the simulation of deformation and failure mechanisms of Cu/SiC nanocomposites, to elucidate the relationship between length scales and properties of these composites.	**CARBON FIBER / EXPANDED POLYPROPYLENE COMPOSITE FOR ISOTROPIC CONDUCTIVITY** Jeong u Roh(Seoul National University), Woo il Lee(Seoul National University) The semi-isotropic electrical and thermal conductivities of the carbon fiber/expended polypropylene (EPP) composite were evaluated. The secondary expansion of EPP was effective.	**EXPERIMENTAL INVESTIGATION ON ENERGY ABSORBING PRESSURISED COMPOSITE TUBES** Tiansong Hou(University of New South Wales), B. gangadhara Prusty(University of New South Wales), Garth Morgan Kendall Pearce(University of New South Wales), Donald Wainwright Kelly(University of New South Wales), Rodney Thomson() This paper, details the validation through experimental investigation of a novel variable load concept capable of improving energy absorbing structures by using composite materials.	**FAILURE ANALYSIS AND SIZE SCALING STUDY OF NOTCHED COMPOSITE LAMINATES** Dinh chi Pham(Institute of High Performance Computing A*STAR) This work presents progressive failure analysis of double-notched [45/90/-45/0]s CFRP composite laminate. Size scaling study of this laminate is also investigated experimentally and computationally.	**DMA AS A METHOD OF MEASURING TOUGHNESS IN INORGANIC POLYMER MATRIX COMPOSITES** Donald W Radford(Colorado State University) Inorganic polymer matrix composite are modified through interface adjustment and addition of nanofillers. DMA and bend testing are used to evaluate the toughness and the two techniques are compared.
10:10	**SWCNT COMPOSITES, INTERFACIAL STRENGTH AND MECHANICAL PROPERTIES** R. mikael Larsen(Aalborg University), Jing Ma(Aalborg University) The strain transfer of SWCNT composite material is evaluated by monitoring the Raman 2D band shift and is compared to the mechanical properties.	**IMPROVED ELECTRICAL CONDUCTIVITY OF CARBON NANOTUBE MAT COMPOSITE PREPARED BY IN-SITU POLYMERIZATION** Seong yun Kim(Korea Institute of Science and Technology) Fabrication method to enhance processability of the thermoplastic CNT mat composite was developed by using in-situ polymerizable and low viscous cyclic butylene terephthalate oligomers.	**EFFECT OF ADHESIVELY BONDED COMPOSITE PATCH STIFFNESS ON FATIGUE CRACK GROWTH IN AN ALUMINUM FUSELAGE PANEL** Reewanshu Chadha(Drexel University), Tein-min Tan(Drexel University), Jonathan Awerbuch(Drexel University) This paper focuses on an experimental study of the effect of patch stiffness on fatigue crack growth rate in adhesively bonded composite repairs to metallic fuselage panel.	**PRELIMINARY EVALUATION OF THE PERFORMANCE OF NOVEL FIBRE REINFORCED PEEL STOPPER CONCEPT IN SANDWICH STRUCTURES** Georgios Martakos(Aalborg University), Jens H. Andreasen(Aalborg University), Ole T. Thomsen(Aalborg University) A new peel stopper concept is proposed for sandwich structures. The new concept is tested in sandwich beam specimens and shown capable of deflecting as well as arresting a propagating crack.	**DAMAGE CHARACTERIZATION OF A 3D WOVEN SIC/SIC CMC MATERIALS UNDER LOADING** Edith Justine Grippon(Institut de Mecanique et d'Ingenierie de Bordeaux), Stéphane Baste(Universite Bordeaux I), Eric Martin(Universite Bordeaux I), Christophe Aristégui(Universite Bordeaux I), Guillaume Couégnat(Universite Bordeaux I) In order to characterize the damage of a 3D woven SIC/SIC CMC, a macroscopic approach, based on ultrasonic measurement of stiffnesses, is coupled to a multi-scale modelling.
10:30	**THE ROLE OF NITROGEN ON CARBON NANOTUBES-GRAFTED ACTIVATED CARBON FIBERS** Yu-chun Chiang(Yuan Ze University) The objective of this paper is to investigate the physicochemical properties of CNTs/ACFs and determine the role of nitrogen on CNTs/ACFs.	**A STUDY OF THE ELECTROMAGNETIC PROPERTIES OF IRON-MULTIWALLED CARBON NANOTUBES COMPOSITES** Gang Liu(Beijing Institute of Aeronautical Materials BIAM), Jianwen Bao(Beijing Institute of Aeronautical Materials BIAM), Ming Jian Sun(Beihang University), Yan Zhao(Beihang University) Electroless plating was utilized to deposit Iron on the surface of multi-walled carbon nanotubes. The saturation magnetization value is 15.18emu/g	**THERMOPLASTIC COMPOSITES FROM REACTIVE RESIN SYSTEMS - CHALLENGES AND OPPORTUNITIES** Mingfu Zhang(Johns Manville) This paper focuses on the materials, processes, and potential applications for fiber glass-reinforced thermoplastic composites based on reactive resin systems.	**EXPERIMENTAL STUDY OF IMPACT DAMAGE RESISTANCE AND TOLERANCE OF COMPOSITE SANDWICH PANELS** Peter Nash(Loughborough University), Gang Zhou(Loughborough University), Sahdev Gahlay(Loughborough University), Mark Burt(Loughborough University) Under concentrated loads, a multitude of damage mechanisms induced affects the subsequent residual performance sandwich structures, this paper focuses on compression-after-impact (CAI) strength	
10:50	**BREAK**				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
7:30					
8:30	**PLENARY (Room 710) - Xiaosu YI: "How to make high performance structural composites multifunctional".** Chair: Stephen Tsai				
	MODELLING AND SIMULATION X Chairs: Thomas Gereke, Andrew Johnston	**PROCESSING V** Chairs: Paul A. Trudeau, Andreas Endruweit	**AUTOMATED COMPOSITES MANUFACTURING V** Chairs: Stephen W. Tsai, Ewald Fauster	**METAL MATRIX COMPOSITES I** Chairs: Jason Lo, Helmi Attia	**NON DESTRUCTIVE EVALUATION 1** Chairs: Nobuo Takeda, Alexander Horoschenkoff
9:30	**AN ORIGINAL APPROACH BASED ON A MODIFIED HALPIN TSAI MODEL TO INVESTIGATE THE MORPHOLOGY OF SEPIOLITE FILLED THERMOSETS** Aurélie Taguet(Ecole des Mines d'Alès), Melissa Malige(), Stephane Corn(Ecole des Mines d'Alès), José-Marie Lopez-Cuesta(Ecole des Mines d'Alès) The elastic modulus of a VE thermoset reinforced with sepiolite (1.25 to 6.25 wt%) was determined by modal analysis and compared with that obtained by a modified Halpin-Tsai model	**PROCESS INDUCED WARPAGE IN LAMINATED SHELLS** Jos Sinke(Delft University of Technology) The shapes of laminated shells having different constituents warp after curing and further processing. This warping is investigated experimentally and numerically for non-symmetrical laminates.	**INHERENT CURE OF CARBON FIBRE COMPOSITES USING THEIR ELECTRICAL RESISTANCE** Simon Antony Hayes(University of Sheffield), Peter Wilson(University of Sheffield), Evdokia Kouzaridou() Results of a study in to cure of carbon fibre composites using their electrical resistance are presented. Local heating of the resin causes it to cure rapidly and use less energy than alternatives.	**MICROSTRUCTURAL EVOLUTION OF METAL MATRIX COMPOSITES BY IN SITU HIGH ENERGY X-RAY DIFFRACTION** Guillaume Geandier, Matthieu Salib, Mickael Mourot, Lilian Vautrot, Moukrane Dehmas, Benoit Denand, Sabine Denis (Institut Jean Lamour - Universite de Lorraine), Elisabeth Aeby-gautier(Centre National de la recherche scientifique CNRS), Metal matrix composite microstructure has been investigated by synchrotron X-ray diffraction. Results shows the evolution of the mechanical state in relation with phase transformation of the matrix.	**DEVELOPMENT AND TESTING OF A HYBRIDE ACTIVE – PASSIVE ACOUSTIC SHM SYSTEM FOR IMPACT DAMAGE DETECTION IN HONEYCOMB AIRCRAFT STRUCTURES** Michael Scheerer(Aerospace & Advanced Composites GmbH), Daniel Lager(Aerospace & Advanced Composites GmbH), Firat Goeral(Aerospace & Advanced Composites GmbH) Within this work the authors present the recent results for damage detection, localization and quantification in composite honeycomb aircraft structures using a active – passive acoustic SHM system
9:50	**STOCHASTIC SIMULATION OF COMPOSITES CURE** Tassos Mesogitis(Cranfield University), Alex Skordos(Cranfield University), Andrew C Long(University of Nottingham) The effect of cure kinetics variation due to different resin handling/storage conditions on the cure of advanced composites is investigated in this work.	**EFFECT OF VACUUM PRESSURE DURING CURING OF CARBON FIBRE LAMINATES ON THEIR MACHINABILITY** Pierre Coulon(École de technologie supérieure - Université du Québec), Martine Dube(École de technologie supérieure - Université du Québec), Jean-françois Chatelain(École de technologie supérieure - Université du Québec) In this work, the effect of vacuum pressure during curing of carbon fibre laminates on the composite machinability is studied experimentally.	**RELATIONSHIP BETWEEN SLIPPING FRICTION OF PREPREG STACKS AND FORMING QUALITY OF HOT DIAPHRAGM FORMED C-SHAPED THERMOSETTING COMPOSITE LAMINATES** Jing Sun(Beihang University), Yizhuo Gu(Beihang University), Min Li(Beihang University), Yanxia Li(Beijing University of Aeronautics and Astronautics), Zuoguang Zhang(Beihang University) Study the relationship between slipping behavior of prepreg and quality of laminates is very important to understand the hot diaphragm forming technology and control the quality of parts.	**PART II: PHOSPHORYLATED SOL-GEL FLAME RETARDANT COATING FOR POLYESTER FABRIC** Ahmed Abdeen Younis(National Institute for Standards) Phosphorylated sol-gel coating was used for treatment the polyester fabric to be fire retardant materials. FTIR, TGA, DSC, LOI and UL/94 were used for evaluation the best treatment condition.	**ON THE ANISOTROPIC ATTENUATION BEHAVIOR OF THE FLEXURE MODE OF CARBON FIBER COMPOSITES** Brian Michael Burks(National Institute of Standards and Technology(NIST)), Marvin A Hamstad(University of Denver) In this work, we developed a coupled experimental-numercial approach to investigate the frequency specific far field attenuation behavior of unidirectional carbon fiber composites.
10:10	**THREE-DIMENSIONAL CONSTITUTIVE EQUATION OF SHAPE MEMORY POLYMERS AND THEIR COMPOSITES** Haedong Park(Seoul National University), Woong-ryeol Yu(Seoul National University), Philip Harrison(University of Glasgow), Zaoyang Guo(Chongqing University) Three dimensional model of shape memory polymer is proposed. The results of validation test are compared with experimental data. And its applications to composites are also presented.	**ALIGNED SHORT FIBRE COMPOSITES WITH HIGH PERFORMANCE** Hana Yu(University of Bristol), Kevin Potter(University of Bristol), Michael R Wisnom(University of Bristol) In this paper, high volume fraction (55%) well aligned short fibre composites have been successfully produced with a new manufacturing method.	**EFFECT OF THE TAPE/SUBSTRATE ORIENTATION ON THE TAPE DEFORMATION DURING AUTOMATED TAPE PLACEMENT** Xavier Gagné brulotte(McGill University), Arthur Levy(McGill University), Pascal Hubert(McGill University) In the automated tape placement, the consolidation roller induces a spreading of the tape. The effect of the tape to substrate orientation on this widening is studied experimentally and theoretically.	**PRODUCTION OF BULK COST-EFFECTIVE MAGNESIUM MATRIX COMPOSITES** Xiaojun Wang, Z Li, Kun Wu, Chengdong Li, Mingjie Shen, Weiqing Liu, Chao Ding (Harbin Institute of Technology) The mechanical stir assisted by ultrasonic method can be used to fabricate bulk SiCp/AZ91 composites.The mechanical properties of composite were evidently improved.	**APPROACHES FOR AE MONITORING OF DELAMINATION ONSET AND GROWTH IN COMPOSITES** Ahmed Maslouhi(University of Sherbrooke), Silversides Ian(University of Sherbrooke), Laplante Gabriel(University of Moncton) This paper presents methodologies based on acoustic emission (AE) to monitor delamination onset and to evaluate delamination growth in carbon fiber composite materials.
10:30	**HYGROTHERMALLY STABLE ASYMMETRIC COMPOSITE LAMINATES WITH OPTIMAL COUPLING OF DEFORMATION MODES** Robert Haynes(US Army Research Laboratory), Erian Armanios(University of Texas at Arlington) This work presents the bounds on hygrothermally stable asymmetric laminates, and then explores the potential of asymmetric laminates to outperform symmetric laminates.	**COATING POLYMER MATRIX COMPOSITE TOOLING USING PULSED GAS-DYNAMIC SPRAYING** Simon Gosselin(University of Ottawa), Francois Robitaille(University of Ottawa), Mohammed Yandouzi(University of Ottawa), Bertrand Jodoin(University of Ottawa) Pulsed gas-dynamic spraying was used for applying thermally conductive copper coatings on carbon fibre composites and for fabricating an integrally heated composite tooling demonstrator.	**MODELING OF DEFORMATION OF LAYERS IN THERMOPLASTIC COMPOSITES MANUFACTURED BY AUTOMATED FIBER PLACEMENT** Hossein Ghayoor(Concordia University), Suong Hoa(Concordia University) Thermoplastic composites manufactured by Automated Fiber Placement have an uneven layer thickness, and other unwanted strains. In this paper, the deformation and behavior of layers were studied.	**IN SITU SEM MICROBENDING TESTS OF ALUMINIUM ALLOYS AND ALUMINIUM MATRIX COMPOSITES** Pilar Rodrigo(Universidad Rey Juan Carlos), Belén Torres(Universidad Rey Juan Carlos), Lustolde Martínez Laorden(Universidad Rey Juan Carlos), Joaquin Rams(Universidad Rey Juan Carlos) The degradation of different Al/SiCp composites has been evaluated by means of a three-point bending stage in a Scanning Electron Microscope (SEM).	
10:50	**BREAK**				

	Room 525	Room 520f	Room 710	Room 516ab
7:30				
8:30	**PLENARY (Room 710) - Xiaosu YI: "How to make high performance structural composites multifunctional".** Chair: Stephen Tsai			
	IMPACT & DYNAMIC RESPONSES 5 Chair: Hyonny Kim	**INTERFACE 4** Chairs: Murray L. Scott, Ozden O. Ochoa	**THERMOPLASTIC COMPOSITES 1** Chairs: Alfonso Maffezzoli, Peter Mitschang	**IMPACT FATIGUE AND DURABILITY - POSTER** Chair: TBD
9:30	**IMPACT ABSORPTION OF COMPOSITES WITH SHEAR THICKENING FLUID FILLED FOAMS** Veronique Michaud(École polytechnique fédérale de Lausanne) Open cell foams were impregnated with a colloidal suspension showing a shear thickening effect and encapsulated in silicone. Upon impact, these composite pads could dissipate up to 85% of energy.	**THERMAL PROPERTIES OF CARBON MATERIALS REINFORCED ALUMINUM COMPOSITES FABRICATED BY HOT PRESSING WITH SEMI-LIQUID PHASE** Hiroki Kurita(ICMCB), Jean-marc Heintz(ICMCB), Jean-francois Silvain(Centre National de la recherche scientifique CNRS) Al-chopped carbon fiber and -Diamond composites were fabricated by conventional hot pressing with a semi-liquid phase. Thermal conductivity of (Al+Al-Si5%)-D50% composite reached 400 W/mK.	**FUSION BONDING OF THERMOPLASTIC COMPOSITES** Ali Yousefpour (National Research Council Canada) This presentation addresses critical technical aspects of the fusion bonding such as, heat generation, process modeling, methodology, process parameters, mechanical performance, and automation.	9:30 **DURABILITY AND RELIABILITY ASSESSMENT OF CARBON FIBER REINFORCED POLYMERS IN CIVIL APPLICATIONS** Joo Hwan Yoo, Ki young Kim
9:34				**HIGH CYCLE FATIGUE LIFE EVALUATION OF DAMAGED COMPOSITE ROTOR BLADES** Youngjung Kee, Seungho Kim
9:38				**THE INFLUENCE OF TEMPERATURE ON THE STRAIN-RATE DEPENDANT MATERIAL BEHAVIOUR OF CFRP UNDER HIGH-DYNAMIC LOADING** Ralph Bochynek
9:42				**EFFECT OF EMBEDDED FIBER OPTIC SENSOR LENGTH AND ORIENTATION ON SIGNAL PROPERTIES DURING FATIGUE LOADING** Casey James Keulen, Afzal Suleman, Halit Suleyman Turkmen, Erdem Akay, Esat Selim Kocaman, Mehmet Yildiz
9:46				**INFLUENCE OF LOW VELOCITY IMPACT ON THE FATIGUE BEHAVIOR OF WOVEN HEMP/EPOXY COMPOSITE** Davi Silva De vasconcellos
9:50	**ANALYSIS ON LOW-VELOCITY IMPACT DAMAGE OF LAMINATED COMPOSITES USING CDM AND CZM MODELS** Yuxi Jia(Shandong University) The evolution of the impact damage was investigated. It is found that the tangential delamination is the dominant form of the interface damage.	**CHEMICAL GRAFTING CNT ONTO CF SURFACE BY ELECTROPHORESIS METHOD** Yuxin Li(Harbin Institute of Technology) The CNT/CF reinforcement with superhigh grafting density was synthesized by combining electrophoresis and chemical grafting methods. IFSS increases 77% after reaction.		**VIRTUAL TESTING METHODOLOGY FOR THE DEVELOPMENT OF ADVANCED LIGHTWEIGHT DEBRIS CONTAINMENT SYSTEM** Augustin Gakwaya, Ameur Benkhelifa, Dennis Nandlall, Amal Bouamoul, Marie laure Dano
9:54				**ENVIRONMENTAL CONDITIONING EFFECTS ON THE MECHANICAL PROPERTIES OF TITANIUM FIBER-METAL LAMINATES** Edson Cocchieri Botelho, Diego Fernando Silva, Antonio carlos Ancelotti jr, Cesar Augusto Damato
9:58				**INTERFACIAL ADHESION AND FATIGUE RESISTANCE OF POLYKETONE/ RUBBER COMPOSITE** Jongsung Won, Jaejung Yoo, Sunyoung Lee, Seunggoo Lee
10:02				**BALLISTIC IMPACT BEHAVIOR OF CARBON NANOTUBE DISPERSED EPOXY RESIN: PARAMETRIC STUDIES** Kedar Sanjay Pandya, Niranjan K Naik
10:06				**WEAR RESISTANCE INFLUENCERS OF PARTICLE REINFORCED POLYMER COMPOSITE** Aare Aruniit, Jaan Kers, Andres Krumme
10:10	**MECHANICAL BEHAVIOUR OF GLASS FIBER REINFORCED ALUMINIUM HONEYCOMB SANDWICHES** Emre Kara(Hitit University), Vincenzo Crupi(University of Messina), Gabriella Epasto(University of Messina), Eugenio Guglielmino(University of Messina), Halil Aykul() The structures realized using sandwich technologies combine low weight with high energy absorbing capacity, so they are suitable for applications in the transport industry.	**A NEW HIERARCHICAL REINFORCEMENT: GRAFTING GRAPHENE OXIDE ONTO CARBON FIBER** Qingyu Peng(Harbin Institute of Technology) We proposed a new hierarchical reinforcement consisting of grapheme oxide and carbon fibers. The new hierarchical reinforcement has the potential to be applied in high performance polymer composites.	**OPTIMUM PROCESSING CONDITIONS FOR ULTRASONIC WELDING OF THERMOPLASTIC COMPOSITES** Irene Fernandez villegas(Delft University of Technology) The mechanical properties of TPC ultrasonic welds are correlated to the process data provided by the welder, which is a very useful tool for fast definition of the optimum processing parameters.	**EXPERIMENTAL DETERMINATION OF AGEING AND DEGRADATION OF GLASS FIBRE REINFORCED COMPOSITES IN PETROCHEMICAL APPLICATIONS** Anastasios Toulitsis, Morris Roseman, Roderick Martin, Vassilis Kostopoulos
10:14				**OPTIMIZATION OF IMPACT PERFORMANCE OF COMPOSITES USING ARTIFICIAL NEURAL NETWORKS AND EVOLUTIONARY ALGORITHMS** Abul fazal M Arif, Muhammad Haris Malik
10:18				**FOREIGN OBJECT IMPACT DAMAGE SIMULATION OF TITANIUM MATRIX COMPOSITES** Tomohiro Yokozeki, Naoki Kootsuka, Kouta Fujiwara, Toyohiro Sato, Akinori Yoshimura, Hirokazu Shoji
10:22				**FATIGUE TESTING OF CLOSED-CELL FOAMS, SPECIMEN DESIGN AND VISCOELASTIC CHARACTERIZATION** Raphael Gerard, Jamal Fajoui, Fréderic Jacquemin, Pascal Casari
10:26				**THERMAL BEHAVIOUR OF GLASS FIBRE INVESTIGATED BY THERMOMECHANICAL ANALYSIS** L. Yang, J. Thomason
10:30		**CARBON NANOTUBE REINFORCED FIBER/EPOXY MULTI-SCALE HYBRID COMPOSITES VIA ELECTROPHORETIC DEPOSITION: MULTIFUNCTIONAL PROPERTIES, PROCESSING, CHARACTERIZATION AND MODELING** Qi An(University of Delaware), Andrew N Rider(Australian Government Defence Science and Technology Organisation), Erik T Thostenson(University of Delaware) Electrophoresis was used to deposit functionalized multi-walled carbon nanotubes onto unidirectional carbon and glass fabric with significant improvements in mechanical and electrical properties.	**INVESTIGATION OF PROCESS-RELATED DAMAGE DURING THERMAL PIERCING OF A THERMOPLASTIC COMPOSITE** Nicholas W a Brown(The Welding Institude (TWI)), Chris M Worrall(The Welding Institude (TWI)), Ajay Kapadia(The Welding Institude (TWI)), Stephen L Ogin(University of Surrey), Paul A Smith(University of Surrey) The study investigates how process parameters can be optimised to reduce damage during a thermal piercing process for machining holes in thermoplastic composites.	
10:50	**BREAK**			

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
10:50	BREAK				
	NANOCOMPOSITES III Chair: Tina Lekakou	**MULTIFUNCTIONAL COMPOSITES SYMPOSIUM 14** Chairs: Larry Drazl, H. Thomas Hahn	**APPLICATIONS 6** Chairs: Catharine Marsden, Tony Belcher	**FRACTURE AND DAMAGE 14** Chair: Fodil Meraghni	**CERAMIC MATRIX COMPOSITES 2** Chairs: Yongting Zheng, Donald W. Radford
11:10	**EFFECT OF NANOCLAY ON FIRE PERFORMANCE OF HYBRID NANOCOMPOSITE**	**SELECTIVE LASER SINTERING FOR MANUFACTURING OF EXFOLIATED GRAPHITE NANOPLATELETS/POLYAMDIE12 MULTIFUCTIONAL NANOCOMPOSITES**	**MOLDING AND MECHANICAL PROPERTY OF FIBER BRAIDS RODS**	**FRACTURE BEHAVIOR OF CARBON FIBER REINFORCED POLYPROPYLENE UNDER ARTIFICIAL LIGHTNING STRIKE**	**ORDERING NANOSTRUCTURE AND PROPERTIES OF AL2O3/ZRO2 EUTECTIC CERAMIC COMPOSITE PREPARED BY COMBUSTION SYNTHESIS UNDER LOW PRESSURE**
	Quynh Thuy Nguyen(University of Melbourne), Priyan Mendis(University of Melbourne), Tuan Ngo(University of Melbourne), Debes Bhattacharyya(University of Auckland)	Mehdi Karevan(Georgia Institute of Technology), Shaun Eshraghi(Georgia Institute of Technology), Suman Das(Georgia Institute of Technology), Kyriaki Kalaitzidou(Georgia Institute of Technology)	Ma Yan(Donghua University, Shanghai), Yuqiu Yang(Donghua University), Hiroyuki Hamada(Kyoto Institute of Technology), Weiguang Song(Kyoto Institute of Technology), S Matsubara()	Shinichiro Yamashita(The University of Tokyo), Isamu Ohsawa(The University of Tokyo), Akiyasu Morita(The University of Tokyo), Jun Takahashi(The University of Tokyo)	Yongting Zheng(Harbin Institute of Technology)
	The effect of organoclay on the fire retardancy of the hybrid nanocomposite was investigated. Taguchi DoE method was used to evaluate the significance of manufacture parameters to the fire retardancy.	This study demonstrates the fabrication of multifunctional polymer nano-composites (PNCs) with boosted mechanical and electrical properties made by selective laser sintering (SLS) v.s. melt mixing.	By using different braiding structures, ropes were used in pultrusion to make rods.Discussing and analyzing the influence on the mechanical properties.	We performed the artificial lightning strike experiment using CF/PP specimens developed in the Japanese project in order to understand the basic fracture behavior under direct lightning strike.	Al2O3/ZrO2 eutectic ceramics were prepared by combustion synthesis under low pressure. The bending strength and fracture toughness can reach 1060MPa and 11.2 MPa m1/2, respectively.
11:30	**EFFECT OF MORPHOLOGY ON FRACTURE TOUGHNESS OF THERMOPLASTIC/THERMOSET/CLAY HYBRID NANOCOMPOSITES**	**OPTIMAL FIBER PLACEMENT INCLUDING EFFECTS OF EMBROIDERY**	**DAMAGE SENSING IN FIBRE-REINFORCED COMPOSITES USING CARBON NANOTUBE NETWORKS BY SPRAY COATING**	**SHORT FIBER INTERFACIAL TOUGHENING FOR COMPOSITE-FOAM SANDWICH**	**MECHANISM OF CRACK PROPAGATION/DEFLECTION AT FIBER MATRIX INTERFACE IN CERAMICS MATRIX CONTINUOUS FIBER REINFORCED COMPOSITES**
	Sina Chaeichian(Concordia University), Paula Wood-adams(Concordia University), Suong Hoa(Concordia University)	Tatsuya Nishida(Nagoya University), Tadashige Ikeda(Nagoya University), Atsuhiko Senba(Nagoya University)	Han Zhang(Queen Mary and Westfield College, University of London)	Zhi Sun(Dalian University of Technology), Shiyong Sun(Dalian University of Technology), Shanshan Shi(Dalian University of Technology), Haoran Chen(Dalian University of Technology), Xiaozhi Hu(University of Western Australia)	Michael Braginsky(University of Dayton), Craig P Przybyla(AFRL/RXCC)
	A novel technique was used for toughening of unsaturated polyesters by clay/thermoplastic combination.Morphology effect on fracture toughness of the nanocomposites was investigated.	A design method for fiber placement with an embroidery machine was improved by considering effects of the fiber direction, fiber density, thickness variation, and threads.	Air-brushing techniques is used for the deposition of CNTs onto CF fabric/Prepreg, not only introducing damage sensing capability but also enhance the mechanical performance to composites.	A low-density short-fiber interlaminar toughening technique using aramid finers and glass fibers was studied.Gc were measured to quantify the effect of short-fiber interlaminar toughening.	The extended finite element method is employed to determine the influence of the fiber coating in ceramic matrix composites on the development/propagation of cracks at the scale of the fibers.
11:50	**PROCESSING AND TACTICITY EFFECT ON GLASS TRANSITION TEMPERATURE OF PMMA/GRAPHENE NANO-COMPOSITES.**	**ULTRASTRONG, STIFF AND MULTIFUNCTIONAL CARBON NANOTUBE COMPOSITES**	**COMPOSITE PRESSURE VESSELS FOR COMMERCIAL APPLICATIONS**	**PREDICTING THE THROUGH-THICKNESS ENHANCEMENT OF Z-PINNED COMPOSITE LAMINATES**	**3YTZP-NANOALUMINA-NANODIAMOND COMPOSITES WITH GEMOLOGICAL PROPERTIES**
	Shigeru Aoyama(University of Minnesota - Twin Cities Campus), Ken-Hsuan Liao(University of Minnesota - Twin Cities Campus), Christopher W. Macosko(University of Minnesota - Twin Cities Campus)	Yuntian T. Zhu(North Carolina State University)	Luis Andre pinto Oliveira(Pole for Innovation in Polymer Engineering), Joao Pedro Nunes(Universidade do Minho), Joao Francisco Silva(Instituto Politecnico do Porto), Bruno Henrique rodrigues Barros(), Luis Manuel Amorim(), Jose Miguel Vasconcelos(VIDROPOL, S.A.)	Galal F.a. Mohamed(University of Bristol), Fabrice Helenon(National Composites Centre), Stephen Richard Hallett(University of Bristol), Mehdi Yasaee(University of Bristol), Giuliano Allegri(University of Bristol)	Luis Antonio Díaz(CINN-CSIC)
	In situ polymerization of MMA with graphene resulted in increased Tg of atactic PMMA but solvent blending did not. However, solvent blending of isotactic PMMA did increase Tg.	Here we report the fast incorporation of long CNTs into polymer matrix using a novel approach, stretch-winding, to produce composites that are much stronger than any current engineering composite.	Composite pressure vessels for large scale markets are studied. They consist on a plastic liner wrapped with a fiber reinforced composite deposited by multi-axial filament winding prototype equipment	To predict the interlaminar fracture in z-pin reinforced composite laminates, a numerical approach that combines the cohesive FE method with a semi-analytical bridging model is presented.	Design and characterization of a new family of zirconia- alumina-nanodiamond composites that can be used in gemology, dentistry and other applications.
12:10	**ON SLIDING FRICTION OF PEEL-PLY TEXTURED EPOXY RESIN SURFACES CONTAMINATED BY AIRCARFT OPERATING FLUIDS**	**COMPARING ELECTROMECHANICAL CHARACTERISTICS OF POLYMER – CARBON NANOTUBE AND POLYMER – CARBON FIBRE – CARBON NANOTUBE COMPOSITES**	**METALIZED CARBON FIBERS FOR SOLDERABLE AND WEAR-RESISTANT COMPOSITE MATERIALS**	**DELAMINATION INITIATION DUE TO INTERLAMINAR TENSION IN FIBRE REINFORCED PLASTICS**	
	Lennart Weiß(Deutsches Zentrum fuer Luft- und Raumfahrt e.V. (DLR)), Thilo Glaser(Deutsches Zentrum fuer Luft- und Raumfahrt e.V. (DLR)), Christian Hühne(Deutsches Zentrum fuer Luft- und Raumfahrt e.V. (DLR))	Cyrill Cattin(McGill University), Wenjiao Liu(McGill University), Pascal Hubert(McGill University)	Matthias Nier, Toni Böttger, Falko Böttger-hiller, Daniela Nickel, Ingolf Scharf, Daisy Nestler, Bernhard Wielage, Thomas Lampke (Technische Universitat Chemnitz-Zwickau)	Jamie Peter Blanchfield(University of Bristol), Giuliano Allegri(University of Bristol)	
	Employing a pin-on-flat type test apparatus, effects of texture and contamination by aircraft operating fluids on the sliding friction response of epoxy resin surfaces are investigated.	This research looks at the potential of carbon nanotube modification for improved electrical resistance measurement based strain sensing in carbon fibre epoxy composites.	Metalized carbon fibers provide a strong interface for wear-resistant top coatings on carbon fiber reinforced polymers. Also joining zones for the soldering of metals with composites are achieved.	This research focuses on the generation of SN-curves for the initiation of delamination in a carbon-fibre epoxy composite. The test methods used and the detection of damage initiation are discussed.	
12:30	LUNCH				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
10:50	BREAK				
	MECHANICAL PROPERTIES 1 Chair: Peter Hine	**PROCESSING VI** Chairs: Paul A. Trudeau, Andreas Endruweit	**AUTOMATED COMPOSITES MANUFACTURING VI** Chair: Stephen W. Tsai, Ralf Schledjewski	**METAL MATRIX COMPOSITES II** Chairs: Jason Lo, Helmi Attia	**NON DESTRUCTIVE EVALUATION 2** Chairs: Nobuo Takeda, Alexander Horoschenkoff
11:10	**INTERFACE-CORRELATED BONDING PROPERTIES OF A ROLL BONDED AL-CU SHEET** Kwang seok Lee(Korea Institute of Materials Science), Yong-nam Kwon(Korea Institute of Materials Science) The effect of reduction ratio on the mechanical properties of roll-bonded Al/Cu clad metal was studied. The highest reduction ratio adopted in this study exhibited excellent mechanical properties.	**DEVELOPMENT AND PROCESSING OF INTERMEDIATE MATERIAL FOR CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITES** Kazufumi Nakazawa(Kyoto Institute of Technology), Toshihiro Motochika(Kyoto Institute of Technology), Mitsurou Takagi(Kaji Group Co. Ltd), Akio Ohtani(Gifu University), Asami Nakai(Gifu University) We have developed a new intermediate material for continuous fiber reinforced thermoplastic composites in which carbon fibers and resin fibers were commingled.	**SENSOR GUIDED CURE PROCESSES – A STUDY OF PRODUCTIVITY AND QUALITY OPTIMIZATION POTENTIAL** Nico Liebers, Daniel Stefaniak, Markus Kleineberg, Martin Wiedemann (Deutsches Zentrum fuer Luft- und Raumfahrt e.V. (DLR)) Report of a trial of a variation of autoclave cure cycles to determine the time saving potential of ultrasound sensor guided process control and validation of achieving similar mechanical properties.	**MICROSTRUCTURE AND MECHANICAL BEHAVIOR OF 6061 AL ALLOY REINFORCED WITH SICP NANOPARTICLES PROCESSED BY EXTRUSION AND COLD ROLLING** Xia Jiang(University of Oxford), Alexander Knowles(University of Oxford), Marina Galano(University of Oxford), Fernando Audebert(University of Buenos Aires) Powder processed 6061 Al alloy reinforced with SiC nanoparticle composites followed by extrusion and cold rolling have been analyzed in both "as extruded" and "as rolled" condition.	**INSPECTION OF COMPOSITE COMPONENTS BY PURE GUIDED WAVE BASED ULTRASONIC IMAGING WITH ONE PHASED ARRAY PROBE.** Michel Castaings(Universite Bordeaux I), Alban Leleux(Universite Bordeaux I), Philippe Micheau(University of Sherbrooke) A removable, multi-element, ultrasonic, matrix probe is used for generating/detecting Lamb modes in/from principal directions of orthotropic materials, and for imaging defects in composite components.
11:30	**CRUSH RESPONSE OF 2D AND 3D HYBRID WOVEN COMPOSITES** Mark Pankow(North Carolina State University), Anthony M Waas(University of Michigan - Ann Arbor), Chian-fong Yen() Through the thickness response of 2D and 3D composites comprised of carbon, glass, and kevlar have been examined to determine their response to loading.	**EVALUATION OF THE FRACTURE TOUGHNESS OF COMPOSITE/ADHESIVE INTERFACE APPLIED BY IN-MOLD SURFACE MODIFICATION UNDER MODE II LOADING** Yukimoto Yoshikazu(Tokyo University of Science) We proposed in-mold surface modification and evaluated the resistance to crack propagation of CFRP/adhesive interface applied by the modification under mode II loading.	**AN EXPERIMENTAL INVESTIGATION ON BUCKLING BEHAVIOR OF VARIABLE ANGLE TOW LAMINATES SUBJECTED TO UNIFORM COMPRESSION LOAD** Aymen Marouene(Ecole Polytechnique de Montreal) This paper presents the results of an experimental investigation of the buckling behavior of variable stiffness laminates made by Automated Fiber Placement.	**MICROSTRUCTURE AND PROPERTIES OF TiB2–TiAL COMPOSITES SHEETS PREPARED BY FOIL METALLURGY** Xiping Cui(Harbin Institute of Technology) TiB2-TiAl composite sheets prepared by foil metallurgy exhibit unique micro-laminated structure and enhanced tensile properties and thus show potential for high-temperature structural applications.	**EXAMINATION OF DRAPE-INDUCED DEFECTS USING COMPUTER X-RAY TOMOGRAPHY** James Stephen Lightfoot(University of Bristol), Kevin Potter(University of Bristol), Michael R Wisnom(University of Bristol) CT scanning has been trialled as a possible NDE for woven preforms technique firstly using arbitrary geometry, showing a number of defects. Trial propeller blade performs were also scanned.
11:50	**THE HIVOCOMP PROJECT: CARBON FIBRE/PA12 HYBRID SINGLE POLYMER COMPOSITES** Peter Hine(University of Leeds), Yentl Swolfs(Katholieke Universiteit Leuven), Ian Ward(University of Leeds), Ignaas Verpoest(Katholieke Universiteit Leuven), Mark Bonner(University of Leeds), Maximilian Mitwalsky(Technische Universitat Munchen) A study of the production and properties of hybrid composites manufactured from co-mingled T700 carbon fibres and oriented PA12 fibres.	**A NOVEL COMPOSITION FOR REMOVABLE INNER TOOLING OF HOLLOW COMPOSITE STRUCTURES** David Schultheiss(Technische Universitat Munchen), Cornelia Becker(Technische Universitat Munchen), Swen Zaremba(Technische Universitat Munchen), Christoph Ebel(Technische Universitat Munchen), Klaus Drechsler(Technische Universitat Munchen) In this paper a novel composition of a removable inner tooling based on gypsum plaster is presented. First tests and results will be depicted.	**THE EFFECTS OF TRANSVERSE SHEAR DEFORMATION ON TOW STEERED COMPOSITE LAMINATES** Rainer J. Groh(University of Bristol), Paul M Weaver(University of Bristol) A single-layer model is used to assess transverse shear effects in bending of tow steered laminates. The shear terms are related to Timoshenko's shear factor and derivatives of the bending rigidity.	**IN-SITU SYNTHESIZED MAGNESIUM MATRIX COMPOSITES** Tongxiang Fan(Shanghai Jiao Tong University) TiC reinforced Mg matrix composites were successfully synthesized by spontaneously infiltrating molten Mg alloy into Al–Ti–C preforms and in situ forming TiC particles in the liquid of Mg alloy.	**THE INFLUENCE OF DELAMINATION OPENING IN CARBON FIBRE/EPOXY LAMINATES ON SIGNAL CHARACTERISTICS OF PULSE PHASE THERMOGRAPHY** Henrik Schmutzler, Narumichi Sato, Alejandro Garcia, Martin Schuett, Hans Wittich, Hermann Rohling, Karl Schulte (Technische Universitat Hamburg-Harburg) Masaaki Nishika, Masaki Hojo (Kyoto University) The influence of delamination opening on pulse phase thermography is investigated using DCB and CAI tests. With increasing delamination opening the contrast of the thermography results increases.
12:10	**STUDY OF NOTCH-SENSITIVITY OF CARBON-GLASS INTRAPLY LAMINATES FOR AEROSPACE APPLICATIONS** Don Lee(Toray Composites (America)), Jeffrey Satterwhite(Toray Composites (America)) Hybridization of carbon fiber with glass fiber was studied. Hybridized panels showed acceptable property retention in basic mechanical tests (tension and shear tests) as well as advanced tests (CAI).	**CURE MONITORING OF THICK CFRP LAMINATE BY OPTICAL-FIBER-BASED DISTRIBUTED SENSOR** Yusaku Ito(Tokyo University), Takato Obo(Tokyo University), Shu Minakuchi(The University of Tokyo), Nobuo Takeda(The University of Tokyo) This study utilized the optical-fiber-based distributed sensor for cure monitoring of thick composite material. The strain distribution in the cure and cooling processes was monitored.	**DESIGN AND MANUFACTURING OF OPTIMUM VARIABLE STIFFNESS LAMINATES** Kazem Fayazbakhsh(McGill University), Mahdi Arian nik(McGill University), Damiano Pasini(McGill University), Larry Lessard(McGill University), Jihua Chen(National Research Council Canada), Ali Yousefpour(National Research Council Canada) This paper includes experimental investigation and Finite Element Analysis (FEA) of variable stiffness laminates to determine the effect of manufacturing defects on their structural performance.	**CARBON NANOTUBE (CNT)-ALUMINUM: TOWARDS CNT-REINFORCED ALUMINUM CONDUCTOR CABLES** Orson Bourne, Jingwen Guan, Michael Jakubinek, Shuqiong Lin, Ryan Macneil, Benoit Simard (National Research Council Canada), Ainul Akhtar(University of British Columbia), Frank Ko(University of British Columbia), Jason Lo, Ruby Zhang(CANMET, Natural Resources Canada) CNT-Al composites with conductivity comparable to Al are reported. Initial tests show significant improvement in strength, which is encouraging in terms of the potential for CNT-reinforced Al cables.	
12:30	LUNCH				

	Room 525	Room 520f	Room 520be		Room 516ab
10:50	**BREAK**				
	IMPACT & DYNAMIC RESPONSES 6 Chair: Hyonny Kim	**INTERFACE 5** Chairs: Murray L. Scott, Ozden O. Ochoa	**THERMOPLASTIC COMPOSITES 2** Chairs: Alfonso Maffezzoli, Peter Mitschang		**NANOCOMPOSITES I - POSTER** Chairs: Erik T Thostenson, Behnam Ashrafi
11:10	**COMPRESSION AFTER IMPACT STRENGTH OF A BUCKLING RESISTANT TOW STEERED PANEL** Andrew Thomas Rhead(University of Bath), Richard Butler(University of Bath), Wenli Liu(University of Bath), Stephen Richard Hallett(University of Bristol), Byungchul Kim(University of Bristol) Optimised, steered fibre laminates, manufactured using Continuous Tow Shearing have regions of high stress. The effect on residual compressive strength of impact to these regions is investigated.	**MECHANICAL PERFORMANCE OF GLASS WOVEN FABRIC COMPOSITE: EFFECT OF HYBRID INTERPHASE WITH DIFFERENT SURFACE TREATMENT AGENTS** Kohsuke Togashi(Kyoto Institute of Technology), Mengyuan Liao(Kyoto Institute of Technology), Yuqiu Yang(Donghua University), Hiroyuki Hamada(Kyoto Institute of Technology) Resin impregnation and the interfacial interaction of fiber/matrix after treating by polyurethane, silane coupling and its hybrid interphase treatment were investigated.	**EXPERIMENTAL CHARACTERISATION OF RECYCLED (GLASS/TPU WOVEN FABRIC) FLAKE REINFORCED THERMOPLASTIC COMPOSITES** Mohammed iqbal Abdul rasheed(University of Twente), Remko Akkerman(University of Twente), Bert Rietman(University of Twente), Hendrikus A. Visser(University of Twente) This paper deals with the experimental characterisation of tensile strength of recycled thermoplastic composites; compression molded with flake like reinforcements having random size and orientation.	11:10	**ELECTRICAL PROPERTIES OF SELF-ALIGNED IN-SITU REDUCED GRAPHENE OXIDE/EPOXY NANOCOMPOSITES** Nariman Yousefi, Xiuyi Lin, Qingbin Zheng, Xi Shen, Jayaram R Pothnis, Jingjing Jia, Jang-kyo Kim
				11:14	**WRINKLING IN GRAPHENE OXIDE PAPERS: EFFECT ON YOUNG'S MODULUS** Xi Shen, Xiuyi Lin, Nariman Yousefi, Jingjing Jia, Jang-kyo Kim
				11:18	**THE TOUGHNESS OF EPOXY POLYMERS AND FIBRE COMPOSITES MODIFIED WITH RUBBER MICROPARTICLES AND SILICA NANOPARTICLES** Tony Kinloch
				11:22	**NANOCLAY EXFOLIATION PROCESS FOR EPOXY/ORGANOCLAY NANOCOMPOSITES: EFFECT OF EPOXY REACTIVE DILUENTS AND DIAMINE CURING AGENTS** Wiwat Keyoonwong, Masatoshi Kubouchi, Saiko Aoki
11:30	**EFFECT OF BASALT FIBRE HYBRIDIZATION ON THE LOW VELOCITY IMPACT BEHAVIOUR OF WOVEN CARBON FIBRE/EPOXY LAMINATES** Luca Ferrante, Fabrizio Sarasini, Jacopo Tirillò, Marco Valente, Teodoro Valente (University of Roma La Sapienza), Salvatore Cioffi(Consiglio Nazionale delle Ricerche), Salvatore Iannace(National Research Council), Luigi Sorrentino(Consiglio Nazionale delle Ricerche) Interply woven basalt-carbon/epoxy composites were impacted and the influence of impact energy on their flexural residual properties was assessed by bending tests monitored by acoustic emission.	**SURFACEMODIFICATIONS ON BASALTFIBERS** Yanpei Li(Donghua University, Shanghai), Jilong Wang(Donghua University, Shanghai), Hiroyuki Hamada(Kyoto Institute of Technology), Yiping Qiu(Donghua University, Shanghai), Yang Yuqiu(Donghua University, Shanghai) This study aims to investigate the effects of plasma or polyurethane dispersion (PUD) treatments on the basalt fiber surface properties.	**TENSILE BEHAVIOUR OF CARBON FIBRE COMPOSITES HYBRIDISED WITH SELF-REINFORCED POLYPROPYLENE** Yentl Swolfs(Katholieke Universiteit Leuven), Liesbet Crauwels(Katholieke Universiteit Leuven), Larissa Gorbatikh(Katholieke Universiteit Leuven), Peter Hine(University of Leeds), Ian Ward(University of Leeds), Ignaas Verpoest(Katholieke Universiteit [illegible]) Self-reinforced and carbon fibre reinforced polypropylene to obtain hybrid composites with high stiffness and strength, but without losing the ductility of the self-reinforced polypropylene.	11:26	**IMPROVED YOUNG'S MODULUS OF GRAPHENE PAPERS MADE FROM LARGE GRAPHENE OXIDE SHEETS** Xi Shen, Xiuyi Lin, Nariman Yousefi, Jingjing Jia, Jang-kyo Kim
				11:30	**ELECTRICAL PROPERTY OF MULTIWALLED CARBON NANOTUBES/EPOXY COMPOSITES** Jun Li, George Zhenghong Zhu, Shen Gong
				11:34	**MECHANICAL PROPERTIES AND ENERGY ABSORPTION BEHAVIOUR OF POLYMER-NANOCOMPOSITES** James Njuguna, Laura Gendre, Jinchun Zhu
11:50	**IMPACT BEHAVIOUR OF ELASTOMER BASED FIBRE METAL LAMINATES** Raj Das(University of Auckland), Sanjeev Rao(Centre for Advanced Composite Materials), Richard Lin() Novel Fibre Metal Laminates (FML) with thermoplastic elastomers have been manufactured and characterised to improve energy absorption capabilities and to develop shock and impact resistant composites.	**ADHESION BETWEEN A FLAX FIBER AND BIOBASED THERMOSET MATRIX** Laetitia Marrot(Universite de Bretagne Sud) New biobased thermoset resins start to appear on the biocomposite market. The adhesion between this new type of resins and a flax fiber is investigated at the micro and macroscopical scale.	**SUSCEPTORLESS CONTINUOUS INDUCTION WELDING OF CARBON FIBER REINFORCED THERMOPLASTICS** Martina Hümbert(Institut fuer Verbundwerkstoffe GmbH), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) Within this paper, the influence of a surface cooling on the through-thickness heat distribution during susceptorless induction welding of carbon fiber reinforced thermoplastics was investigated.	11:38	**THERMAL ELASTIC BUCKLING OF PLATES MADE OF CARBON NANOTUBE-REINFORCED POLYMER COMPOSITE MATERIALS** Jairan Nafar dastgerdi
				11:42	**FABRICATION OF AG-MWNT COMPOSITE NANOPASTE FOR STRETCHABLE AND PRINTABLE ELECTRONICS** Kwang-seok Kim, Bum guen Park, Kwangho Jung, Seung-boo Jung
				11:46	**MANUFACTURING AND CHARACTERIZATION OF** Dakyoung Yong, Jaejung Yoo, Taemin Hong, Seunggoo Lee
				11:50	**MECHANICAL BEHAVIOR OF SILANE GRAFTED GRAPHENE NANOPLATELETS / SILICONE RUBBER COMPOSITES** Ting-yu Wu, Ting-yu Chang
12:10	**COMPARISON OF THE THROUGH THICKNESS STRAIN RATE SENSITIVITY OF E-GLASS/LPET AND E-GLASS/EPOXY UD LAMINATES** Rasmus Eriksen(Technical University of Denmark), Janice Marie Dulieu-barton(University of Southampton), Duncan Andrew Crump(University of Southampton), Christian Berggreen(Technical University of Denmark) The influence of the matrix ductility on the strain rate sensitivity in the through-thickness direction of unidirectional (UD) E-glass fibre reinforced polymer composite is studied.	**MOLECULAR MODELING OF EPON-862/GRAPHITE COMPOSITES:INTERFACIAL CHARACTERISTICS** Cameron Hadden(Michigan Technological University) Molecular dynamics simulations were used to create models of EPON-862 epoxy in the presence of a graphite surface. The interfacial molecular composition is examined and reported.	**SQUEEZE FLOW OF RANDOMLY-ORIENTED STRANDS THERMOPLASTIC COMPOSITES** Gilles-philippe Picher-martel(McGill University), Arthur Levy(McGill University), Pascal Hubert(McGill University) Studying the flow front provided a better understanding of the forming mechanisms of ROS composites. The results obtained in this work will provide insight to the forming of complex composite parts.		
12:30	**LUNCH**				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
12:30	LUNCH				
13:30	PLENARY (Room 710) - Michael Wisnom: "The challenge of predicting failure in composites". Chair: François Trochu				
	NANOCOMPOSITES IV Chairs: Carlos Alberto Cimini Jr., Jang-Kyo Kim	**ENERGY DEVICES 1** Chairs: Emile Smith Greenhalgh, Leif Erik Asp	**APPLICATIONS 7** Chairs: Dirk Lukaszewicz, Leroy Michel	**FRACTURE AND DAMAGE 15** Chairs: Kenneth L. Reifsnider, Michael John Hinton	**CERAMIC MATRIX COMPOSITES 3** Chairs: Yongting Zheng, Donald W. Radford
14:30	**HYBRID WOVEN GLASS FIBRE FABRIC-CARBON NANOTUBE-EPOXY COMPOSITES**	**COATED CARBON FIBRE BATTERY HALF-CELLS FOR STRUCTURAL BATTERY COMPOSITES**	**APPLICABILITY OF C-PLY BI-ANGLE NCF TO AIRCRAFT PARTS**	**EXPERIMENTAL AND NUMERIC MULTISCALE ANALYSES OF FAILURE MECHANISMS ON PULTRUDED POLYMERIC COMPOSITE MATERIAL**	**A MESO-SCALE NUMERICAL APPROACH FOR DAMAGE AND FAILURE IN SHORT FIBRE REINFORCED CERAMICS**
	Tina Lekakou(University of Surrey)	Leif Erik Asp, Tony Carlson (Swerea SICOMP), Goeran Lindbergh, Simon Leijonmarck, Maria Hellqvist Kjell (Royal lnstitute of Technology), Alexander Bismarck, Henry Maples(Imperial College of Science)	Akira Kuraishi(Kawasaki Heavy Industries Ltd.), Toru Itoh(Kawasaki Heavy Industries Ltd.), Jyunichi Kimoto(Kawasaki Heavy Industries Ltd.), Sayaka Ochi(Kawasaki Heavy Industries Ltd.), Noriyoshi Hirano(Kawasaki Heavy Industries Ltd.)	Henri-alexandre Cayzac(Ecole Nationale Superieure des Mines de Paris), Sébastien Joannès(Ecole Nationale Superieure des Mines de Paris), Lucien Laiarinandrasana(Ecole Nationale Superieure des Mines de Paris)	Alessandro Airoldi, Paolo Iavarone, Luca Di landro, Gabriele Imbalzano (Polytechnic Institute of Milan), Marco Orlandi (Brembo SGL Carbo Ceramic Brakes), Massimiliano Valle (Petroceramics spa)
	Hybrid composites with electrospun MWNT-epoxy interlayers had increased penetration energy (by 22%) and damage area (by 145%) under impact, compared with the standard glass fabric-epoxy laminates.	We present a novel structural battery composite material concept.By coating a thin SPE on to carbon fibre electrodes an extremly short distance for Li-ion transportation is achieved.	The applicability of C-ply Bi-angle NCF to aircraft parts was evaluated through the fabrication trial of the representative stiffeners and the strength tests performed with and without impact damage.	Experimental and numerical investigations on a pultruded composite material have been performed in order to study the influence of microstructural variabilities on failure mechanisms.	The paper presents a numerical approach for damage development and failure in short fibre reinforced C-SiC composites based on non-linear finite element models developed at the meso-scale level.
14:50	**FUNCTIONAL COMPOSITES OF EPOXY / SILVER-FILLER USING SELF-ASSEMBLY PHASE STRUCTURES**	**DURABILITY AND DEGRADATION OF POLYMER MATRIX COMPOSITES AT ELEVATED TEMPERATURE AND PRESSURE FOR WAVE AND TIDAL ENERGY DEVICES**	**SUPPRESSION OF DELAMINATION CRACK FOR THE FOAM CORE SANDWICH PANEL JOINT**	**CORELLATIONS OF DAMAGE MECHANISMS AND MATERIAL MICRO-STRUCTURE IN TENSILE LOADED HOOP STRUCTURES**	**STABILITY OF T-ZRO2 PARTICLES IN ALUMINA-ZIRCONIA COMPOSITES: PART. 1 COMPETITION BETWEEN SIZE AND STRAIN EFFECT**
	Hajime Kishi(University of Hyogo)	Zhongyi Yi Zhang(University of Portsmouth)	Keishiro Yoshida(Kanazawa Institute of Technology), Hisayuki Kimura(Kanazawa Institute of Technology), Yasuo Hirose(Kanazawa Institute of Technology), Akira Kuraishi(Kawasaki Heavy Industries Ltd.)	Anna E Scott(University of Southampton), Ian Sinclair(University of Southampton), Simon M Spearing(University of Southampton), Mark N Mavrogordato(University of Southampton), Warren Hepples()	Camille Rabache(Ecole Centrale de Paris), Guillaume Bouchet(), Guillaume De calan(), Jean-michel Kiat(Ecole Centrale de Paris), Nicolas Guiblin(Ecole Centrale de Paris), Florence Porcher()
	Electric conductivity and adhesive properties of epoxy/silver-fillers composites were studied in relation to the phase structures of the epoxy/polyethersulfone for the matrix resins of the composites.	Water absorption and ILSS of PMCs were determined to characterize the durability and degradation behaviours at elevated temperature and pressure for wave and tidal energy devices.	For the tapered end-closure type joint of CFRP face and foamed plastic core sandwich panels, how to design the taper angle to suppress the initial failure is investigated.	Computed Tomography has resolved material-structure and damage-mechanisms in loaded composite-structures, 3D-tessellation has determined correlations between the damage and material structure.	Structural properties of alumina-zirconia composites produced at massive scale have been studied to understand the influence of composition, grain size, strain, additional phases, temperature, etc...
15:10	**ELECTROSPUN NANOFIBROUS COMPOSITES TO CONTROL DRUG RELEASE AND INTERACTION BETWEEN HYDROPHILIC DRUG AND HYDROPHOBIC BLENDED POLYMER MATRIX**	**PERFORMANCE OF LITHIUM-INTERCALATED CARBON FIBRES FOR STRUCTURAL ELECTRODE APPLICATIONS**	**EUROPEAN COMPOSITES DEVELOPMENTS FOR LAUNCHERS APPLICATIONS**	**IN-SITU TENSILE FIBRE FAILURE ANALYSIS BY SYNCHROTRON RADIATION COMPUTED TOMOGRAPHY**	**SYNTHESIS OF CMC MATRIX BY NITRIDATION OF TISI2**
	Yu Dong(Curtin University of Technology), Hazim J. Haroosh(Curtin University of Technology)	Eric Jacques, Dan Zenkert, Maria Hellqvist Kjell, Göran Lindberg, Mårten Behm(Royal lnstitute of Technology)	Rafael Bureo dacal(European Space Agency)	Hannah Morton(University of Southampton), Philippa Reed(University of Southampton), Ian Sinclair(University of Southampton), Simon M Spearing(University of Southampton), Anna E Scott(University of Southampton)	Jerome Roger(Universite Bordeaux I), Laurence Maillé(Universite Bordeaux I), Marie-anne Dourges(Universite Bordeaux I)
	A novel electrospun hybrid nanocomposite structure was generated by combining PLA:PCL blends with HNT-ASP to overcome a poor drug-carrier interaction.	This paper focuses on the effect of intercalated lithium on the mechanical properties of the carbon fibre for lightweight structural electrode applications.	This paper will present an innovative research on composite material structures and will show an extended application range for composite materials and novel design concepts for launcher applications.	SRCT is used to analyse the interaction of fibre breaks in CFRP coupons, loaded in tension in situ. The results show that fibre break cluster formation varies between representative CFRPs.	The effects of temperature and grain size on the nitridation of TiSi2 by pure nitrogen were examined at temperatures comprised between 1000 and 1200°C for durations up to 100 hours.
15:30	**CERAMIC/METAL NANOCOMPOSITES: LYOPHILIZATION AND SPARK PLASMA SINTERING**	**MICRO-CRACK DEVELOPMENT IN CARBON FIBER BATTERY IN CYCLIC CHARGE/DISCHARGE**	**EXPERIMENTAL AND ANALYTICAL STUDY OF COMPOSITE LATTICE STRUCTURE FOR FUTURE JAPANESE LAUNCHER**	**TIME AND TEMPERATURE INFLUENCE ON THE FAILURE OF TEXTILE COMPOSITES**	**INFLUENCE OF THE DIAMOND-CERAMIC COMPOSITE THERMAL CONDUCTIVITY ON CUTTING PROPERTIES**
	Carlos Fidel Gutierrez-Gonzalez, Ramon Torrecillas, Sonia Lopez-esteban (Consejo Superior de Investigaciones Cienta-ficas (CSIC)), Said Agouram(Universidad Politecnica de Valencia)	Andrejs Pupurs(Lulea University of Technology), Janis Varna(Lulea University of Technology)	Keita Terashima(Japan Aerospace Exploration Agency), Toru Kamita(Japan Aerospace Exploration Agency), Gaku Kimura(), Toshiyuki Uzawa(), Takahira Aoki(The University of Tokyo), Tomohiro Yokozeki(The University of Tokyo)	Amine El mourid(Ecole Polytechnique de Montreal), Martin Lévesque(Ecole Polytechnique de Montreal), Rajamohan Ganesan(Concordia University)	Lucyna Renata Jaworska, Piotr Klimczyk, Marcin Henryk Rozmus (Institute of Advanced Manufacturing Technology), Wojciech Zebala (Cracow University of Technology), Pawel Rutkowski (AGH University of Science and Technology)
	Combining spray-freezing and lyophilization is a feasible technique for preparing high-quality ceramic/metal nanostructured powders that lead to compacts with excellent mechanical features.	Development of mechanical stresses and possible micro-crack initiation and propagation scenarios in carbon fiber battery are analyzed in this paper using analytical and FEM models.	Experimental and analytical approach for evaluation of composite lattice structure for launch vehicle's structure is described through manufacturing, tests and analysis of large scale demonstrator.	The aim of this study is to understand the influence of high temperature and aging on the failure of textile composites. The study is based on experimental data as well as analytical methods.	Diamond composite was obtained by HP-HT method. Ceramics bonding phase improved the graphitization and oxidation resistance but has influence on decreasing thermal conductivity.
15:50	**SYNTHESIS OF METAL AND METAL OXIDE/CNTS HYBRID NANOPARTICLES AND THEIR REINFORCEMENTS IN POLYMERS**	**ADDRESSING ENGINEERING ISSUES FOR A COMPOSITE STRUCTURAL POWER DEMONSTRATOR**	**COMPOSITE PHASE CHANGE MATERIALS WITH ENHANCED THERMAL DIFFUSIVITY**	**MODELING OF MECHANICAL RESPONSE IN CFRP ANGLE-PLY LAMINATES**	**FRACTURE TOUGHNESS BEHAVIOR OF ALUMINA MATRIX COMPOSITES AT ELEVATED TEMPERATURE.**
	Vijaya K Rangari(Tuskegee University)	Mayur Kishorbhai Mistry(Imperial College of Science), Anthony Kucernak(Imperial College of Science), Sang Nguyen(Imperial College of Science), Jesper Ankersen(Imperial College of Science), Emile Smith Greenhalgh(Imperial College of Science)	Adam Dominiak(Technical University of Warsaw), Jan Alexander Blaszczyk(Technical University of Warsaw)	Shinji Ogihara(Tokyo University of Science), Hayato Nakatani(Osaka City University)	Magdalena Szutkowska(Institute of Advanced Manufacturing Technology), Barbara Smuk(Institute of Advanced Manufacturing Technology), Marek Boniecki(Institute of Electronic Materials Technology)
	The as-prepared hybrid nanoparticles were further infused in to the nylon-6 or epoxy resin to produce hybrid nanoparticles based polymer nanocomposites for multifunctional applications	Efficient current collection in terms of mass and resistive loss on structural energy storage laminates and susceptibility of the laminates to finishing processes such as machining were investigated.	Carbon structures with high thermal conductivity may be used to enhance thermal conductivity of PCM. Measurements results indicates that thermal conductivity could raise at least few times.	The nonlinear mechanical response in CFRP (+45/-45)s angle-ply laminates is experimentally evaluated and analytically modeled by using a finite strain viscoplasticity model.	Evaluation of the elevated temperature influence on the fracture toughness for alumina matrix composites reinforced by means of TiC and Ti(C,N)in micro- and nanoscale.
16:10	**CARBON NANOFIBERS WITH MULTI-CHANNELED SILICON COMPARTMENTS: FABRICATION AND ELECTROCHEMICAL PROPERTIES**		**EFFECT OF MANUFACTURING DEFECTS AND THEIR UNCERTAINTIES ON STRENGTH AND STABILITY OF STIFFENED PANELS**	**DESING OF TRANSVERSE BIAXIAL TENSILE TESTS ON CRUCIFORM SPECIMENS**	
	Hosung Yang (Seoul National University), Byoung-sun Lee (Seoul National University), Woong-ryeol Yu (Seoul National University)		Frank F Abdi(AlphaSTAR Corporation), Jean-philippe Marouzé(Bombardier)	Federico Paris(Universidad de Sevilla), Alberto Barroso(Universidad de Sevilla), Elena Correa(Universidad de Sevilla), Maria Dolores Pérez(Universidad de Sevilla), David Vega(Universidad de Sevilla)	
	Multi-channel Si core/C shell nanofibers are fabricated by electrospinning for better electrochemical performance as a LIB anode due to more contact points between Si and C, and high buffering effect.		This paper examines the effect of composites manufacturing defects on the strength and stability of stiffened structural panels as well as their effect on coupons and flat panels.	Biaxial testing on cruciform specimens is studied. Manufacturing of a biaxial device and numerical design of cruciform specimens are presented. Experimental tension-tension tests are carried out.	
16:30	BREAK				

	Room 522	Room 518ab	Room 520ad	Room 710	Room 520c
12:30	LUNCH				
13:30	PLENARY (Room 710) - Michael Wisnom: "The challenge of predicting failure in composites". Chair: François Trochu				
	MECHANICAL PROPERTIES 2 Chair: Peter Hine	**PROCESSING VII** Chair: Mylene Deleglise, David Wilson	**REPAIRS AND MACHINING** Chairs: Helmi Attia, Chris Arvanitelis	**METAL MATRIX COMPOSITES III** Chair: Jason Lo	**NON DESTRUCTIVE EVALUATION 3** Chairs: Nobuo Takeda, Patrick Peres
14:30	**GRAPHENE BASED POLY(VINYL ALCOHOL) NANOCOMPOSITES: EFFECT OF HUMIDITY CONTENT** Alessandro Pegoretti(University of Trento) PVOH nanocomposites filled with various amounts of both graphene oxide (GO) and chemically reduced GO were prepared. The effects of humidity content on the thermomechanical behaviour were analyzed.	**COMPARISON OF MECHANICAL PROPERTIES BETWEEN FRTP USING IN-SITU POLYMERIZABLE PA6 AND FRP USING FIRST CURABLE EPOXY RESIN** Kazuhiro Sakata(Nihon University), Goich Ben(Nihon University), Hirofumi Nishida() The mechanical properties of the HFRTP using the in-situ polymerizable polyamide 6 were investigated, and their results were compared with those of the HFRP using first curable epoxy resin.	**HEALING CARBON FIBER/POLYMER COMPOSITES BY RESISTIVE HEATING** Lifeng Hao(Harbin Institute of Technology), Chengqin Dai(Harbin Institute of Technology), Hongtao Zhang(Harbin Institute of Technology), Rongguo Wang(Harbin Institute of Technology), Sichuan Li(), Xianglong Huang(), Fanjun Meng(), Zaiwen Lin() This paper focuses on the healing carbon fiber composites via resistive heating. The healing efficiency is studied by microdroplet measurements.	**CHALLENGES OF APPLYING COMPOSITE MATERIALS TO THE NEXT GENERATION OF AEROENGINES** Dale Richard Carlson (GE) Historically materials used in propulsion systems have been metallic in nature and most of these metallic materials need performance robbing cooling flows to survive in the hottest areas of an engine.	**RESISTIVE HEATING STRUCTURAL DAMAGE DETECTION IN NANOCOMPOSITES** Roberto Guzman de villoria(IMDEA Materials), Vanesa Martinez(IMDEA Materials) A novel non destructive evaluation technique based on carbon nanofibers is implemented. Joule effect resistive heating is used to detect and localize the damage of a structure.
14:50	**EFFECTS OF THE CURE PRESSURE ON INTERLAMINAR SHEAR STRENGTH OF CFRP/STEEL HYBRID LAMINATE CURED BY HOT PRESSING FOR A SHORT TIME** Wen-xue Wang(Kyushu University), Terutake Matsubara(Kyushu University), Yoshihiro Takao(Kumamoto Institute of Technology), Kenzo Yasuda(NHK SPRING Co. LTD.), Ryousuke Hayashi() n this paper, The effects of the cure pressure and thermal shock on the interlaminar shear strength of the CFRP/steel hybrid laminates cured by hot pressing for a short time are investigated.	**CURE MONITORING OF CFRP: ELECTRICAL IMPEDANCE ANALYSIS** Philippe Margueres(Institut Clément Ader), Philippe A Olivier(Institut Clément Ader), Thierry Camps(), Sonia Sassi(Institut Clément Ader), Mahamadou Mounkaila() This study presents the use of electrical impedance analysis for in situ monitoring of the curing of CFRP using sensors developed for the purpose.	**EXPERIMENTAL INVESTIGATION OF SCARF JOINTS WITH MISMATCHED ADHERENDS** Jun yi Goh(Royal Melbourne Institute of Technology), Chun H Wang(RMIT University), Adrian Orifici(Royal Melbourne Institute of Technology) This paper investigates the effect of flaws on the strength of scarf joints with mismatched adherends. Mismatched adherends is a unique problem in composite repairs that needs to be resolved.		**PLY WAVINESS DETECTION AND MESH GENERATION FOR COMPOSITES BASED ON X-RAY COMPUTED TOMOGRAPHY** Yuri G Nikishkov(University of Texas at Arlington), Gennadiy Nikishkov(University of Aizu), Andrew Makeev(University of Texas at Arlington) Automated generation of quadrilateral mesh based on X-Ray Computed Micro-Tomography of unidirectional composite specimens with ply waviness is validated by comparison of structural analysis and tests
15:10	**MECHANICAL CHARACTERISTIC AND STRENGTH PREDICTION OF FILLED HOLE COMPOSITE LAMINATE UNDER COMPRESSION LOADING** Xiao Jing Zhang(Shanghai Jiaotong University), Zhuyu Jin(Shanghai Jiao Tong University), Cheng Chen(Shanghai Jiao Tong University), Hai Wang(Shanghai Jiao Tong University) A predictive method was proposed to estimate FHC strength of laminates based on load distribution between plate and filled bolt.	**REINFORCEMENT OF PARTIALLY CURED AEROSPACE STRUCTURES WITH B-STAGED PATCHES** Julia Studer(Fachhochschule Nordwestschweiz), Kunal Masania(Fachhochschule Nordwestschweiz), Clemens Dransfeld(University of Applied Sciences and Arts Northwestern Switzerland), Nicolas Eguemann(Cross Composite AG) A B-stage curing method has been developed to reinforce fastener areas in an aircraft floor beam. The developed cure kinetic models, and effect of co curing on the bearing strength will be presented.	**DETECTION OF CONTAMINANTS ON CFRP SURFACES - A NECESSITY FOR COMPOSITE REPAIR?** Georg christian Wachinger(EADS Innovation Works) The paper will focus on research results determined with Infrared-Spectroscopy, Laser-Fluorescence and mainly with Electronic Noses for the contamination detection on CFRP surfaces.	**FABRICATION OF AL-TIB2-B4C COMPOSITES BY QUICK SPONTANEOUS INFILTRATION PROCESS** Jung-moo Lee(Korea Institute of Materials Science), Jingjing Zhang(Shandong University), Young-hee Cho(Korea Institute of Materials Science), Su-hyeon Kim(Korea Institute of Materials Science), Huashun Yu(Shandong University) A sound Al-TiB2-B4C composites having excellent properties were produced by quick spontaneous infiltration process in a few minutes in atmosphere.	**A STUDY ON MULTI-AXIAL FORCE MEASUREMENT OF POLYMER SKINS USING FBG SENSOR** Oh min Kwon(Andong National University), Hui yun Hwang(Andong National University), Sang kyun Hwang(Andong National University), Hyun ju Oh(Chonbuk National University), Seong su Kim(Chonbuk National University) In this study, multi-axial force detection in polymer structures was investigated using FBG sensor for developing a new tactile sensing system experimentally
15:30	**THE EFFECT OF GAS TEXTURING TECHNOLOGY ON THE TENSILE BEHAVIOUR OF UNIDIRECTIONAL (UD) CARBON FIBRE (CF) REINFORCED POLYAMIDE-12(PA-12) COMPOSITE** Hele Diao(Imperial College of Science), Paul Robinson(Imperial College of Science), Michael R Wisnom(University of Bristol), Alexander Bismarck(Imperial College of Science) A gas-texturing device was used to combine CF tows and introduced a small misalignment into CF/PA-12. The composite fails in steps rather than in a catastrophic fracture when subjected to tension.	**EFFECT OF FIBER VOLUME FRACTION AND PROCESS ORIENTATION ON MODULES OF POLYETHYLENE GLASS FIBER COMPOSITE FIBER** Amir Khorsand(University of Manitoba), Jayaraman Raghvan(University of Manitoba) In this study effect fiber volume fraction on orientation of HDPE/Fiber glass manufactured by extrusion is studied.Volume fraction is varied from 10%-%50.	**ON THE EFFECT OF MQL PARAMETERS ON MACHINING QUALITY OF CFRP** Helmi Attia(National Research Council Canada) This paper investigates the effect of Minimum Quantity Lubrication (MQL) parameters on the quality of the machined surface in routing of CFRP laminates; surface roughness and geometrical accuracy.	**HIGH TEMPERATURE TENSILE PROPERTIES OF IN SITU TIBW/TI60 COMPOSITES WITH NOVEL NETWORK MICROSTRUCTURE** Lujun Huang(Harbin Institute of Technology), Xudong Rong(Harbin Institute of Technology), Lin Geng(Harbin Institute of Technology), Fuyao Yang(Harbin Institute of Technology) In situ TiB whiskers reinforced Ti60 (TiBw/Ti60) composites with a tailoring network microstructure were successfully designed and fabricated by reaction hot pressing.	**A STUDY ON THE TACTILE SENSING SYSTEM USING PIEZOELECTRIC FIBER** Sang kyun Hwang(Andong National University), Hui yun Hwang(Andong National University), Oh min Kwon(Andong National University), Seong su Kim(Chonbuk National University) The continuous and discontinuous PVDF strips were considered and experiments were conducted with respect to the magnitude of the load, distance between loading and sensing positions.
15:50	**MECHANICAL BEHAVIOR OF THIN TITANIUM FILMS / CFRP HYBRID LAMINATES CONTAINING TRANSITION REGION** Yuhei Nekoshima(Tokyo University of Science), Daiki Mitsumune(Tokyo University of Science), Hayato Nakatani(Osaka City University), Shinji Ogihara(Tokyo University of Science) The effects of the transition region with various stacking sequence on mechanical behavior of thin titanium films/CFRP hybrid laminates are evaluated by tensile tests and 4 point bending tests.	**CHARACTERIZING VISCOELASTIC PROPERTIES OF CURING EPOXY FROM PRE-GELATION TO FULL CURE** Ryan J Thorpe(Convergent Manufacturing Technologies Inc.), Anoush Poursartip(University of British Columbia) A generalized Maxwell model was fit to viscosity and modulus data of a thermoset epoxy. Rheometer and DMTA tests generated the data set spanning all cure and temperature ranges typical to processing.	**EXPERIMENTAL OPTIMIZATION OF ORBITAL DRILLING OF WOVEN CARBON FIBER REINFORCED EPOXY LAMINATES** Helmi Attia(National Research Council Canada), Ahmad Sadek(McGill University) The objective of this research work is to investigate the effect of the OD process key parameters with respect to the produced hole quality attributes and cutting forces and temperatures.	**A CFD-MODEL FOR PREDICTION OF UNINTENDED POROSITIES IN METAL MATRIX COMPOSITES** Shizhao Li(Technical University of Denmark), Jon Spangenberg(Technical University of Denmark), Jesper Henri Hattel(Technical University of Denmark) A numerical model that enables for the simulation of the flow through the porous corridors of the preform is proposed and shows the capability of predicting unintended porosities in MMCs.	**GENERELIZED COMPLIANCE, A NEW TECHNIQUE FOR PROGRESSIVE DAMAGE ANALYSIS IN COMPOSITE MATERIALS** Kenneth L Reifsnider(University of South Carolina - Columbia), Md Rassel Raihan(University of South Carolina - Columbia) We present a generalized compliance method based on the dielectric nature of micro-cracking for the analysis of the specific nature of the progressive damage of composite materials.
16:10	**IMPROVED COMPRESSION STRENGTH OF CARBON/GLASS/EPOXY HYBRID COMPOSITES** Christen Malte Markussen(Technical University of Denmark) A series of new test results demonstrating higher compression strengths of carbon/glass/epoxy hybrid composites. Laminates are made using filament winding and vacuum infusion.	**CURE MONITORING OF 3D ANGLE INTERLOCK WOVEN CARBON FIBRE COMPOSITES** AT. McIlhagger, J. Broderick, E. Archer (University of Ulster) This study presents results of embeded fibre optic sensors for the purpose of monitoring strain during the cure cycle/resin infusion of a 3D woven composite.	**MATERIAL REMOVAL MECHANISM OF CARBON/EPOXY COMPOSITES IN SINGLE DIAMOND GRAIN MACHINING** Helmi Attia(National Research Council Canada), Ireen Sultana(McGill University), Zhongde Shi(National Research Council of Canada NRC), Vincent Thomson(McGill University) The material removal mechanism of CFRP by a single diamond grain, using a geometrically well-defined diamond grain is investigated. FE modeling was also conducted to reveal the failure modes.	**ENCHANCEMENT OF MECHANICAL PROPERTIES OF CAST NANO CABONS REINFORCED A356 ALUMINIUM MATRIX COMPOSITES** Sang bok Lee(Korea Institute of Materials Science) CNFs and SiCp reinforced A356 aluminium composites were successfully fabricated by unique casting process. Their mechanical properties were improved by uniform distribution of CNFs and SiCp.	**STRUCTURAL METHODS FOR COMPOSITES IN THE PRESENCE OF POROSITY/VOIDS** Guillaume Seon(University of Texas at Arlington), Yuri G Nikishkov(University of Texas at Arlington), Andrew Makeev(University of Texas at Arlington) Porosity/void locations and shapes obtained by X-Ray Computed Tomography are essential for accurate predictions of strength and fatigue life by structural analysis models of curved-beam tests
16:30	BREAK				

	Room 525	Room 520f	Room 520be		Room 516ab
12:30	LUNCH				
13:30	PLENARY (Room 710) - Michael Wisnom: "The challenge of predicting failure in composites". Chair: François Trochu				
	IMPACT & DYNAMIC RESPONSES 7 Chairs: Reza Vaziri, Christophe Bois	**INTERFACE 6** Chair: TBD	**THERMOPLASTIC COMPOSITES 3** Chairs: Irene Fernandez Villegas, Ali Yousefpour		**NANOCOMPOSITES II - POSTER** Chairs: Tri-Dung Ngo, Cagri Ayranci
14:30	**CURE MULTIPHYSIC COUPLINGS EFFECTS ON THE DYNAMIC BEHAVIOUR OF A THICK EPOXY** Christian Jochum(École Nationale Supérieure de Techniques Avancés, Bretagne) This paper presents simulation results for a cylindrical epoxy block, exposed to laser induced shock waves, by taken into account internal stresses and gradients of properties induced by the curing.	**CURING REACTION OF BENZOXAIZNE CONTAINING CYANO AND PROPARGYL GROUPS** Qiao Long Yuan(East China University of Science and Technology), Lei Du(East China University of Science and Technology), Farong Huang(East China University of Science and Technology) The self-catalysis thermal polymerization of the propargyl group in the benzoxazine with cyano and propargyl groups is easier than that of the cyano group.	**COMPRESSION MOULDING OF COMPLEX PARTS FOR THE AEROSPACE WITH DISCONTINUOUS NOVEL AND RECYCLED THERMOPLASTIC COMPOSITE MATERIALS** Nicolas Eguemann(Cross Composite AG) This development concerns the production of complex parts capable of withstanding concentrated loads with up to 84% weight saving compared to metallic discontinuous thermoplastic composite materials.	13:30	**SOL GEL MODIFIED DERIVED CAO-MGO-SIO2 CERAMIC GLASS SYSTEM PREPARATION AND IN VITRO CHARACTERIZATION** Chieko Yamagata, Mayara Rafaela Soares Paiva, Olga Zazuko Higa, Andrea Cecilia Dorion Rodas, Antonio Carlos Franco
				13:34	**STRUCTURE-PROCESS-PROPERTY RELATIONSHIP OF EXFOLIATED GRAPHITE NANOPLATELET / POLYLACTIC ACID COMPOSITES THIN FILMS** Erin Sullivan, Kyriaki Kalaitzidou, Ben Wang
				13:38	**EFFECT OF CARBON NANOFIBERS ON COMPRESSION PROPERTIES OF POLYESTER** Yuanxin Zhou, Shaik Zainuddin, Shaik Jeelani
				13:42	**CURRENT-VOLTAGE CHARACTERISTICS OF NANO-PLATELET BASED CONDUCTIVE NANO-COMPOSITES** Amirhossein Biabangard oskouyi, Uttandaraman Sundararaj, Pierre Mertiny
14:50	**STUDY ON PREDICTION OF PENETRATTION ENERGY FOR CA/EP COMPOSITE LAMINATES SUBJECTED TO HIGH-VELOCITY IMPACT USING QUASI-STATIC PERFORATION EQUATION AND KINECTIC ENERGY MODEL** Hyun-jun Cho(Chungnam National University), Seokje Lee(Chungnam National University), In-gul Kim(Chungnam National University), Kyeongsik Woo(Chungbuk National University) The high velocity impact behavior through quasi-static perforation equation and kinetic energy model is examined. The high-velocity impact test is conducted by gun under the different test conditions.	**CHARACTERIZATION OF SHORT GLASS-FIBRE REINFORCED POLYPROPYLENE COMPOSITES IN TENSION AND COMPRESSION** Michael Jerabek(Borealis Polyolefine GmbH), Simon Gastl(Borealis Polyolefine GmbH), Anna Maria Hartl(Johannes Kepler University Linz), Martin Reiter(Johannes Kepler University Linz) The behaviour of short glass fibre reinforced polypropylene composites was characterized in uniaxial tension and compression for a series of specimens with different fibre orientations.	**CHARACTERIZATION OF STOCHASTIC HONEYCOMB SANDWICH FAILURE** Megan Hostetter(University of Toronto), Brent Cordner(OCAD University), Glenn D Hibbard(University of Toronto) Stochastic honeycombs are a new type of sandwich core material that are simple to make and have comparable mechanical properties to commercial honeycombs.	13:46	**UREAURETHANES WITH ADDITION OF BOEHMITE** Kamila Pietrzak, Joanna Ryszkowska
				13:50	**EFFECTS OF COUPLING AGENTS AND SURFACE TREATED CARBON NANOTUBES IN PET REGRANULATES DERIVED FROM BOTTLE WASTES** Csilla Varga
				13:54	**ON THE INTERFACE MODIFICATION AND MICROSTRUCTURE CONTROL OF REINFORCING PARTICLES IN AGSNO2 ECM** Lawson Chen, Xiaotong Chen, Weili Liu
				13:58	**A STUDY ON THERMAL SHOCK RESPONSE OF AL-AL2O3 MICRO- AND NANOCOMPOSITES** Khushbu Dash, Bankim Chandra Ray
15:10	**IMPACT BEHAVIOR OF A SIMPLE MULTIFUNCTIONAL PLATE STRUCTURE** Teo Mudric, Ugo Galvanetto, Alessandro Francesconi, Cinzia Giacomuzzo, Mirco Zaccariotto, Antonio Mattia Grande, Luca Di landro (Polytechnic Institute of Milan) A multifunctional panel able to act as a self-repairing structure, is investigated numerically and experimentally under impact. It consists of two layers: a ionomer plate bonded to a CFRP laminate.	**EFFECT OF AU-ION IRRADIATION ON SILICON CARBIDE COMPOSITES** Nihed Chaâbane, Marion Le flem, Thierry Vandenberghe, Stéphane Urvoy, Paul Dumas, Yves Serruys (Commisariat a lenergie atomique et aux energies alternatives CEA) Irradiation-induced changes of three kinds of SiCff/SiC composites with TS, TSA3 and HNS fibers were measured after Au-ion irradiation at 0.05 and 1 dpa at RT and 800 °C.	**INFLUENCE OF TEXTILE PARAMETERS AND LAMINATE BUILD-UP ON SURFACE QUALITY OF THERMOPLASTIC FIBER-REINFORCED COMPOSITES** Klaus Hildebrandt(Institut fuer Verbundwerkstoffe GmbH), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH), Felix Schulte-hubbert(Institut fuer Verbundwerkstoffe GmbH) The paper is about surface development during variothermic thermoforming of thermoplastic FRPC. It comprises the influence of textile and polymeric parameters on waviness.	14:02	**EFFECT OF CARBON NANOTUBES ADDITION ON THE PROPERTIES OF FLEXIBLE POLYURETHANE FOAMS** Anna Bryskiewicz, Joanna Ryszkowska
				14:06	**DEVELOPMENT STUDY OF LIGHTWEIGHT STRUCTURAL MATERIALS USING UD CARBON NANOTUBE SHEET** Hirokazu Nakayama, Ken Goto, Tran Huu Nam, Satoru Yoneyama, Shuichi Arikawa, Kimiyoshi Naito, Yoshinobu
15:30	**TESTING OF SANDWICH STRUCTURES WITH CFRP SKINS IN EDGEWISE COMPRESSION** Dirk Lukaszewicz(BMW Group), Sindy Engel(Technische Universitat Bergakademie Freiberg), Christian Boegle(BMW Group) A novel test rig for edgewise compression of sandwich structures and flat plates was developed. A large number of different sandwich configurations was then tested in edgewise compression.	**PIEZO-RESISTIVE BEHVIOUR OF MULTIFUNCTIONAL CNT REINFORCED INTERPHASES IN GF/PP COMPOSITES DURING THERMAL-MECHANICAL LOADING** Niclas Wiegand(Leibniz Institute of Polymer Research Dresden), Edith Maeder(Leibniz Institute of Polymer Research Dresden) The objective of this study is to investigate the influence of the temperature onto DC conductivity of CNT reinforced glass fibre interphases.	**IMPACT OF THE MANUFACTURING PROCESS OF LOCALLY LOAD-RELATED REINFORCED COMPOSITES ON THE INTERFACE BEHAVIOR** Rene Holschuh(Institut fuer Verbundwerkstoffe GmbH), Jovana Dzalto(Institut fuer Verbundwerkstoffe GmbH), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) The aim of the study is the investigation of the impact of the manufacturing process of locally load-related reinforced composites on the interface behavior.		
15:50	**FAILURE OF SINGLY CURVED SANDWICH PANELS SUBJECTED TO BLAST LOADING** Chris Von klemperer(University of Cape Town), Genevieve Langdon(University of Cape Town), Gerald N Nurick(University of Cape Town), Gregory Sinclair(University of Cape Town) Singly curved glass fibre epoxy sandwich panels with PVC foam cores were manufactured using a combination of core thermoforming and VARTM and then subjected to blast tests using PE4 explosive.	**SURFACE TREATMENT OF CARBON FIBERS BY ULTRAVIOLET LIGHT+OZONE: ITS EFFECT ON FIBER SURFACE AREA AND TOPOGRAPHY** Michael Rich(Michigan State University), Lawrence T Drzal(Michigan State University), Edward K Drown(Michigan State University), Per Askeland(Michigan State University) The effect of UVO treatment on fiber surface oxygen concentration, fiber surface area, fiber topography and fiber-matrix adhesion will be discussed.	**DEVELOPMENT OF AN ON-LINE ANALYSIS METHOD FOR THE THERMOPLASTIC IMPREGNATION PROCESS** Marcel Christmann(Institut fuer Verbundwerkstoffe GmbH), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) The paper will give information about the development of an special tool for the observation of the thermoplastic impregnation process.		
16:10	**BIRD IMPACT STUDY OF A PRELOADED COMPOSITE WIND TURBINE BLADE** Norimichi Nanami(Texas A&M University), Ozden O Ochoa(Texas A&M University) We present computational damage assessment of a bird (soft body) impact on a composite wind turbine blade with and without pre-loads.	**INTERFACIAL EVALUATION OF CARBON FIBER/CNT-PHENOLIC COMPOSITES BY DUAL MATRIX COMPOSITES** Joung-man Park(Gyeongsang National University), Zuo jia Wang(Gyeongsang National University), Dong-jun Kwon(Gyeongsang National University), Ga-young Gu(Gyeongsang National University), Lawrence K. Devries(University of Utah) Atmospheric pressure plasma treatment on carbon nanotube (CNT) surfaces was performed to modify reinforcement effect and interfacial adhesion of carbon fiber reinforced CNT-phenolic composites.	**MECHANICAL PROPERTIES OF RANDOMLY ORIENTED STRAND (ROS) THERMOPLASTIC COMPOSITES** Marina Selezneva(McGill University), Kouwonou Kodjo Dodji(Ecole de Technologie Superieure), Larry Lessard(McGill University), Pascal Hubert(McGill University) Performance of ROS composites was studied using mechanical testing coupled with digital image correlation. Results will help to relate the heterogeneous nature of this material to its behavior.		
16:30	BREAK				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
16:30	BREAK				
	NANOCOMPOSITES V Chairs: Carlos Alberto Cimini Jr., Jang-Kyo Kim	**ENERGY DEVICES 2** Chairs: Emile Smith Greenhalgh, Leif Erik Asp	**APPLICATIONS 8** Chairs: Dirk Lukaszewicz, Leroy Michel	**FRACTURE AND DAMAGE 16** Chairs: Kenneth L. Reifsnider, Michael John Hinton	**FRACTURE AND DAMAGE 18** Chairs: Gabriel Laplante, Paul A. Smith
16:50	**MICROSCOPIC PROPERTIES AND NUMERICAL SIMULATION OF ALIGNED CNT SHEET COMPOSITES** Tsuda Terumasa(The University of Tokyo) The nanoscopic damage behavior of CNT/epoxy composites was observed in detail using TEM. Numerical simulationswere carried out to elucidate the fracture mechanisms.	**MATCHING MATRIX AND FILLER DIELECTRIC CONSTANTS TO INCREASE DIELECTRIC BREAKDOWN STRENGTH** José Eliseo De León(Iowa State University of Science and Technology), Daniel J O'brien(US Army Research Laboratory), Michael Richard Kessler(Iowa State University of Science and Technology) Dielectric breakdown strength increases by matching dielectric constant values at the composite interface. Cyanate ester resin is modified with BaTiO3 nano-powder to match E-glass dielectric constant.	**BIOMASS BASED GREEN COMPOSITES: FABRICATION AND PERFORMANCE EVALUATION** Vidhya Nagarajan(University of Guelph), Amar K Mohanty(University of Guelph), Manjusri Misra(University of Guelph) Perennial grass based green composites were developed in this study. Effect of incorporation of fiber at 30 wt% and the effect of adding a compatibilizer was investigated.	**FRACTURE MECHANICS OF COMPOSITE PLIES ON MICROSCALE** Christian Marotzke(BAM-Federal Institute for Materials Research & Testing), Titus Feldmann(BAM-Federal Institute for Materials Research & Testing) The debonding of individual fibers inside a composite ply and the kinking of interface cracks into the matrix is analysed by calculating the energy release rate for different fiber volume fractions.	**DAMAGE EVOLUTION LAW IN THE FRAMEWORK OF CONTINUUM DAMAGE MECHANICS FOR UD COMPOSITES** Shuguang Li(University of Nottingham), Qing Pan(University of Nottingham), Tian-hong Yu(University of Nottingham) This is a contiuation of the work on CMD representation as presented in a recent paper by the authors into damage evolution by following the same rational approach as previously adopted.
17:10	**SELF-DISPERSION OF CARBON NANOTUBES IN THERMOPLAST POLYMER** Ekaterina Pavlenko, Pascal Puech, Wolfgang Bacsa (Universite Paul Sabatier (Toulouse III)), Victoria Tishkova, Philippe Salles (Centre National de la recherche scientifique CNRS) We use Raman spectroscopy and transmission electron microscopy to monitor the self-dispersion of multiwall and double wall carbon nanotubes in surface layer in PEEK.	**MANUFACTURING OF A MULTIFUNCTIONAL COMPOSITE PART FOR USE IN AUTOMOTIVE APPLICATIONS** Tony Carlson(Swerea SICOMP), Leif Erik Asp(Swerea SICOMP), Viktor Ekermo(), Per-ivar Sellergren() The component manufactured was a plenum cover for a Volvo S80 start/stop. The component adds torsion stiffness to the car while replacing the start/stop battery and plenum cover.	**ARTIFICIAL NEURAL NETWORKS MODELING OF THE VISCOELASTIC PROPERTIES OF VAPOR-GROWN CARBON NANOFIBER/VINYL ESTER NANOCOMPOSITES** Osama Y Abuomar(Mississippi State University), Sasan Nouranian(Mississippi State University), Roger King(Mississippi State University) ANN was trained using the re-substitution method and the three-fold cross validation technique to predict the responses of VGCNF/VE nanocomposites when the design factors were applied as ANN's inputs.	**EFFECT OF VOIDS ON INITIAL FAILURE OF CFRP LAMINATES** Shigeki Aratama(Kawasaki Heavy Industries Ltd.), Yusuke Tsumura(Kyoto University), Masaaki Nishikawa(Kyoto University), Masaki Hojo(Kyoto University) Effects of voids on transverse crack initiation were investigated by three point bending experiments in SEM, and microscopic strain measurement based on the image analysis of SEM pictures.	**DAMAGE TOLERANCE OF STIFFENED COMPOSITE STRUCTURES** Joanne Emma Davies(University of Southampton), Adam J. Sobey(University of Southampton), James I.r. Blake(University of Southampton), Ajit Shenoi(University of Southampton) This paper presents an analysis investigating the effect of damage parameters on the residual capability of top-hat multi-stiffened composite structures.
17:30	**STIFF AND DUCTILE NANOCOMPOSITES OF EPOXY REINFORCED WITH CELLULOSE NANOFIBRILS** Mohd Farhan Ansari(Royal lnstitute of Technology), Sylvain Galland(Royal lnstitute of Technology), Patrik Sven Fernberg(Swerea SICOMP), Lars A. Berglund(Royal lnstitute of Technology) Nano composites of epoxy reinforced with nano fibrillated cellulose, prepared via impregnation of nanofibril network, showed large strain to failure coupled with high stiffness and strength.	**MECHANICAL AND MICROSTRUCTURAL CHARACTERISATION OF MULTIFUNCTIONAL STRUCTURAL POWER COMPOSITES** E. Smith Greenhalgh, J. Ankersen, A. Bismarck, A. Kucernak, S. Nguyen, J. Hg Steinke, N. Shirshova (Imperial College of Science), M. Wienrich, G. Kalinka (BAM Federal Institute for Materials Research & Testing), L. Erik Asp, S. Nilsson (Swerea SICOMP), Q. P.v. Fontana (Cytec), M. Houlle [illegible] An overview of mechanical properties of structural power materials from the STORAGE programme is given, and this provides an insight into the microstructures of these multifunctional materials.	**DESIGN AND MANUFACTURE OF ANISOTROPIC HOLLOW BEAM USING THERMOPLASTIC COMPOSITES** Tsuyoshi Matsuo(The University of Tokyo), Kosuke Takayama(Tokyo University), Satoshi Nagoh(Toyobo Co., Ltd.), Kohei Kiriyama(), Jun Takahashi(The University of Tokyo), Takahiro Hayashi() This paper discusses about a potential of anisotropic design with hybrid composition of uni-directional sheet (UD-sheet) and chopped tapes CFRTP (CTT) sheet.	**OPTIMISATION OF CARBON-FIBER COMPOSITE SHELLS FOR TYPE IV PRESSURE VESSELS** Clémence Devilliers(Air Liquide - CRCD), Anthony R. Bunsell, Alain Thionnet, Heng-yi Chou, Sébastien Joannès(Ecole Nationale Superieure des Mines de Paris) The intrinsic failure processes controlling ultimate lifetimes of CFRP filament wound composites have been investigated experimentally and by multi-scale modelling.	**NUMERICAL ANALYSIS ON LOW-VELOCITY IMPACT DAMAGE OF LAMINATED COMPOSITES BY COMBINING CONTINUUM DAMAGE MECHANICS WITH COHESIVE ZONE MODEL** Xiaochen Sun(Shandong University), Peng Qu(Shandong University), Yunli Guo(Shandong University), Yuxi Jia(Shandong University) In this paper, a finite element method is proposed to study the damage behavior of Hexply AS4/8552 laminated composites under low-velocity impact.
17:50	**MICROSTRUCTURE AND MECHANICAL PROPERTIES OF ISOTACTIC POLYPROPYLENE REINFORCED WITH TIO2 NANOPARTICLES** Ahmad Zohre vand(Ecole Polytechnique de Montreal), Abdellah Ajji(Ecole Polytechnique de Montreal), Frej Mighri(Laval University) The effects of adding TiO2 nanoparticles on crystalline microstructure and mechanical properties of nanocomposites based on isotactic polypropylene were investigated.	**MULTIFUNCTIONAL STRUCTURAL POWER COMPOSITES BASED ON CARBON AEROGEL MODIFIED HIGH PERFORMANCE CARBON FIBRE FABRICS** Hui Qian, Anthony Kucernak, Emile Smith Greenhalgh, Alexander Bismarck, Milo S p Shaffer (Imperial College of Science) A new hierarchical composite structure has been created by embedding structural carbon fabrics into nanostructured carbon aerogels for multifunctional structural power applications.	**DESIGN, MANUFACTURING AND TESTING OF A CYLINDRICAL DRUM-SHELL USING A SANDWICH STRUCTURE** Ajith Damodaran(Anna University), Larry Lessard(McGill University), Suresh babu Annamalai(Anna University), Gary Scavone(McGill University), Hossein Mansour(McGill University) A carbon fiber reinforced sandwich structure suitable for replacing wood in the drum-shells was developed. An Indian drum was constructed and sound characteristics were compared with traditional drum.	**THE MUTUAL EFFECTS OF SHEAR AND TRANSVERSE DAMAGE IN POLYMERIC COMPOSITES** Lloyd Smith(Washington State University), Mohammedmahdi Salavatian(Washington State University) A CDM model proposed based on a coupon that was designed to study the evolution of shear and transverse damage.	**DETERMINATION OF INTERFACIAL SHEAR STRENGTH IN EPOXY/GLASS COMPOSITES BY MULTI-FIBER FRAGMENTATION TEST (MFFT)** Edward David Mccarthy, Jae hyun Kim, Nathanael Alan Heckert, Stefan D. Leigh, Gale A Holmes, Jeffrey W. Gilman (National Institute of Standards and Technology(NIST)) In this paper we discuss the multi fiber fragmentation test (MFFT), which is applied to epoxy / E-glass composites. Results indicate that fiber break distribution is uniform.
18:10	**OPTIMIZING THE PRODUCTION OF NANOCOMPOSITES VIA EXTRUSION TECHNIQUES USING NANOPARTICLE CONTAINING DISPERSIONS AND THEIR DISPERSION QUALITY** Irene Hassinger(Institut fuer Verbundwerkstoffe GmbH), Thomas Burkhart(Institut fuer Verbundwerkstoffe GmbH), Rolf Walter(Institut fuer Verbundwerkstoffe GmbH) Nanoparticles are applied in polymers in order to increase stiffness and toughness. To prevent agglomeration, nanoparticle dispersions using appropriate extrusion technology are incorporated.		**MATERIALS FOR LIGHTWEIGHT RADIATION SHIELD FOR CANADIAN POLAR COMMUNICATIONS AND WEATHER (PCW) SATELLITE MISSION** Adebayo Emmanuel(University of Manitoba), Raghavan Jayaraman(University of Manitoba), Philip Andrew Ferguson(Magellan Aero), Raymond Harris(Magellan Aero) Using simulation, we have shown that polymer-based shielding materials in a Molniya orbit give the least shield weight which meets the radiation dose requirement for PCW satellite mission.	**USING SPIRAL NOTCH TORSION TEST TO EVALUATE FRACTURE TOUGHNESS OF FIBER-REINFORCED POLYMERIC COMPOSITES** Jy-an John Wang(Oak Ridge National Laboratory), Ting Tan(University of Vermont), Hao Jiang(Oak Ridge National Laboratory) This paper studied the fracture behavior of fiber-reinforced composites using the spiral notch torsion test. The critical loads upon failure were studied at different loading rates.	
18:00	COCKTAILS (Cash Bar)				
19:00	BANQUET				
22:00	End				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
16:30	BREAK				
	MECHANICAL PROPERTIES 3 Chair: Navid Zobeiry	**PROCESSING VIII** Chair: Mylene Deleglise, David Wilson	**EXPERIMENTAL TECHNIQUES 1** Chairs: Isabelle Paris, Adam John Sawicki	**METAL MATRIX COMPOSITES IV** Chair: Jason Lo	**MICROSTRUCTURES** Chairs: TBD
16:50	**A NEW REGULARIZED VIRTUAL FIELDS METHOD FOR COMPOSITE MATERIAL PARAMETERS IDENTIFICATION** Behzad Rahmani(Ecole Polytechnique de Montreal), Martin Lévesque(Ecole Polytechnique de Montreal), Isabelle Villemure(Ecole Polytechnique de Montreal) Mechanical constraints, consisting of a homogenization model, are used in an optimization problem in order to regularize the Virtual Fields Method and obtain more accurate mechanical properties	**HEAT RESISTANCE PROPERTIES OF FRTP COMPOSED OF IN-SITU PORIMERIZATION PA6 AND CF AND GF FABRICS** Akiko Hirabayashi(Nihon University), Goich Ben(Nihon University), Hikaru Ozeki() The in-situ polymerization PA6 was the one of the most suitable matrix of the FRTP. In this study, heat resistance properties of the FRTP were examined.	**AN EXPERIMENTAL AND FINITE ELEMENT STUDY OF THE LONGITUDINAL BENDING BEHAVIOR OF T-JOINTS IN VEHICLE STRUCTURES** Ermias Gebrekidan Koricho(Polytechnic Institute of Turin), Giovanni Belingardi(Polytechnic Institute of Turin) In this work behaviour of carbon/epoxy composite T-joint located on B-pillar of a vehicle body structure, subjected to bending loading, was investigated using experimental and numerical methods.	**MICROSTRUCTURE AND WERE RESISTANCE IN HYBRID ALUMINIUM COMPOSITES WITH SIC WHISKER AND CARBON NANOTUBES** Xuexi Zhang(Harbin Institute of Technology), Aibin Li(Harbin Institute of Technology), Lin Geng(Harbin Institute of Technology) Hybrid 2024Al composites reinforced with SiCw and CNTs were prepared by pressure infiltration. The homogeneous distribution of CNTs and excellent mechanical and wear properties were demonstrated.	**PREDICTION OF FIBRE ORIENTATION IN SHORT GLASS FIBRE REINFORCED COMPOSITE INJECTION MOULDING** Fin Caton-rose(University of Bradford), Peter Hine(University of Leeds), Bushra Parveen(University of Bradford) Within this paper we compare predictions of short glass fibre orientation developed during injection moulding based on the RSC, Folgar-Tucker and modified Folgar-Tucker models
17:10	**A STUDY ON THE DEVELOPMENT OF PREDICTION EQUATION OF PIEZOELECTRIC CHARATERISTICS FOR GLASS FIBER EPOXY COMPOSITES** Hui yun Hwang(Andong National University) In this work, we predicted piezoelectric constants of glass fiber reinforced epoxy composite materials. By comparison between predicted result and experimental results, it showed similar results.	**HOLLOW STRUCTUAL PRODUCT OF CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITES BY HIGH CYCLE MOLDING** Koichi Bun(Kyoto Institute of Technology), Toshihiro Motochika(Kyoto Institute of Technology), Asami Nakai(Gifu University), Hitoshi Kitamura(Toyobo Co. Ltd.), Hidetoshi Sonoda(Toyobo Co. Ltd.), Satoshi Nagoh(Toyobo Co., Ltd.) The purpose of this study is to establish high-cycle molding for the continuous fiber reinforced thermoplastic composites by braiding technique.	**MEASUREMENT OF THERMAL DEFOEMATION IN CFRP LAMINATE AT DIFFERENT SCALES** Yoshihisa Tanaka(National Institute for Materials Science) The measurement of thermal deformation around the interface was analyzed by moire and DIC method and the transverse and longitudinal CTE of carbon fiber was estimated by strain distribution.	**KINETICS OF PHASE TRANSFORMATION IN TI-TIB COMPOSITES CHARACTERISED USING HIGH ENERGY X-RAY DIFFRACTION** Ludovic Ropars(EADS France), Moukrane Dehmas(Institut Jean Lamour - Universite de Lorraine), Sophie Gourdet(EADS France), David Tricker(Materion AMC), Elisabeth Aeby-gautier(Centre National de la recherche scientifique CNRS) The transition from TiB2 to TiB, via the TiB-Bf metastable phase, was characterised. The kinetics of phase transformations and the beta transus were found modified by the mechanical alloying process.	**GENERATION, MODELLING AND VALIDATION OF STATISTICALLY EQUIVALENT MICRO-STRUCTURES** Frank Gommer(University of Nottingham), Andreas Endruweit(University of Nottingham), Andrew C Long(University of Nottingham) An automated procedure for the precise detection of carbon fibre cross-sections in micrographs is presented. The gathered data is used for the generation of statistically equivalent micro-structures.
17:30	**THERMAL CONDUCTIVITY OF CARBON FIBER FABRICS** Yue Yang(University of Ottawa), Francois Robitaille(University of Ottawa), Simon James Hind(National Research Council Canada) In-plane and through thickness thermal conductivity of a non-crimp and twill carbon fabric are measured at various Vfs. Defined trends showing the effect of Vf and presence of air are identified.	**TOOL MATERIAL EFFECTS ON PROCESS INDUCED DEFORMATION OF COMPOSITE SPAR STRUCTURES** Takayuki Shimizu(Mitsubishi Heavy Industries, Ltd.), Toshio Abe(Mitsubishi Heavy Industries, Ltd.) Tool material effects on process induced deformation of composite wing spar structures were investigated using three tools made of different materials: aluminum, invar and CFRP.	**WEAR BEHAVIOUR OF PARTICULATE REINFORCED ALUMINIUM COMPOSITES** Dimitrios Myriounis(Sheffield Hallam University), Syed T Hasan(Sheffield Hallam University) The aim of the study is to compare the wear behaviour and the thermal profiles of different formulations of aluminium composites reinforced with different types of ceramic particles, SiC and Al2O3.	**PREPARATIONS AND EVALUATION OF ELECTRICAL CONDUCTIVITY FOR TIB2/ AL COMPOSITES BY SPARK SINTERING PROCESS** Gen Sasaki(Hiroshima University) 20vol%TiB2 particle dispersed Al composites with high density were fabricated by spark sintering process. This composites have high electrical conductivity.	**3D FULL-FIELD DISPLACEMENTS/STRAINS MEASUREMENTS IN COMPOSITES AT MICRO-SCALE** Farhad Mortazavi(Ecole Polytechnique de Montreal), Elias Ghossein(Ecole Polytechnique de Montreal), Martin Lévesque(Ecole Polytechnique de Montreal), Isabelle Villemure(Ecole Polytechnique de Montreal) The measurement of 3D full-field displacement/strain in composites at microscale based on the correlation of volume images from the undeformed and deformed state of the sample under loading.
17:50	**STIFFNESS EVALUATION OF THE COMPOSITE LAMINATES WITH WAVY PLIES AND THEIR STABILITY ANALYSIS** Hamid Dalir(Bombardier), Jean-Evrard Brunel(Bombardier), Franck Dervault(Borland Software Corporation), Alain Landry() The main objective of this paper is to present explicit formulas to evaluate the influence of the out-of-plane fiber waviness on the stiffness of the composite panels.	**NUMERICAL APPLICATIONS AND VERIFICATION OF AN INTEGRATED FLOW-STRESS MODEL IN PROCESSING OF THERMOSET COMPOSITES** Mehdi Haghshenas(University of British Columbia), Reza Vaziri(University of British Columbia), Anoush Poursartip(University of British Columbia) Numerical examples are presented to verify and highlight the capabilities of an integrated approach to modeling flow and stress development in processing of thermoset composites.	**SYNTHESIS, MICROSTRUCTURE AND MECHANICAL PROPERTIES OF NB-BASED COMPOSITES CONTAINING CARBIDE AND BORIDE CERAMIC PHASES** Xinjiang Zhang(Harbin Institute of Technology) Nb-based composites containing carbide and boride ceramic phases were synthetized. The introduction of boride and carbide improved the harden and strength of Nb-based composites.	**MICROSTRUCTURE, MECHANICAL AND TRIBOLOGICAL PROPERTIES OF AUSTENITIC STAINLESS STEEL COMPOSITES REINFORCED WITH TIB2 PARTICLES** Iwona Sulima(Pedagogical University of Krakow) The present work aims to investigate the effect of the reinforcing ceramic particles on the mechanical and tribological properties and microstructure of the steel-TiB2 composites.	**MULTIAXIALLY LOADED SHORT FIBRE POLYAMIDE: A CONTRIBUTION TO NON-DESTRUCTIVE EVALUATION OF MICRO CRACKING AND DAMAGE EVOLUTION** Karoline Metzkes(BAM Federal Institute for Materials Research and Testing), Yvonne Hentschel(BAM Federal Institute for Materials Research and Testing), Volker Trappe(BAM Federal Institute for Materials Research and Testing) The micro cracking behaviour and the damage evolution in short glass fibre reinforced polyamide due to multiaxial mechanical loadings is presented.
	MODELING 4-POINT BENDING OF THIN CARBON-EPOXY LAMINATES David Thibaudeau(Royal Military College of Canada), Diane Wowk(Royal Military College of Canada), Catharine Marsden(Royal Military College of Canada) Methodology for predicting the interlaminar stress distributions within an angle-ply laminate in four-point bending. FEA is used to develop consistent methods for model creation and result extraction.	**MODELING AND CHARACTERIZATION OF THERMOPLASTIC COMPOSITES PEEK/CARBON** Kouwonou Kodjo Dodji(Ecole de Technologie Superieure), Tan Pham(École de technologie supérieure - Université du Québec), Gilbert Lebrun(University of Quebec at Trois-Rivieres) One of the manufacturing methods is the stamp-forming. Before simulation, it's necessary to perform the characterization tests. This paper present the results for thermoplastic composites PEEK/CARBON.	**HOW VARIOUS UNCERTAINTIES AND ASSUMPTIONS AFFECT B-BASIS ALLOWABLES DEVELOPMENT** Carl Quinn Rousseau(Lockheed Martin) This paper examines the complexity of test-method-induced effects on B-basis allowable strengths, and how that interacts with failure-criteria to influence strength prediction reliability/accuracy.	**TITANUM ENHANCED SINTERING THROUGH LIQUID PHASE SINTERING** Evan Schumann(ICMCB), Mélanie Majimel(ICMCB), Jean-louis Bobet(ICMCB), Jean-françois Silvain(ICMCB) We aim to achieve fully dense titanium by sintering blended elemental Ti/TiH2-Al powders at low temperatures, thus reducing processing costs, and achieve industrially applicable mechanical properties	
18:00	COCKTAILS (Cash Bar)				
19:00	BANQUET				
22:00	End				

	Room 525	Room 520f	Room 520be		Room 516ab
16:30	BREAK				
	IMPACT & DYNAMIC RESPONSES 8 Chairs: Reza Vaziri, Christophe Bois	**INTERFACE 7** Chairs: TBD	**THERMOPLASTIC COMPOSITES 4** Chairs: Irene Fernandez Villegas, Ali Yousefpour		**STIMULUS RESPONSIVE POLYMER & COMPOSITES & INTERFACES - POSTER** Chairs: Tri-Dung Ngo, Daniel Therriault
16:50	**EFFECT OF VARIOUS KNITTING TYPES ON IMPACT PROPERTIES OF TEXTILE COMPOSITES** Ozgur Demircan(Kyoto Institute of Technology), Tadashi Fujimura(Shima Seiki Mfg., Ltd.), Shinsuke Ashibe(SHIMA SEIKI Mfg. Ltd.), Tatsuya Kosui(SHIMA SEIKI MFG. Ltd..), Asami Nakai(Gifu University) Biaxial weft knitted fabric includes warp and weft yarn layers which are held together by knitted yarn. The present work concentrates on the impact properties of biaxial weft knitting composites.	**INVESTIGATION OF SUBCRITICAL CRACK GROWTH IN GLASS FIBERS USING LOAD RELAXATION TESTS ON BUNDLES** Jacques Luc Lamon(Centre National de la recherche scientifique CNRS) An approach to static fatigue is proposed, based on tests on tows under deformation-controlled condition. A closed form expression for statistical distributions of fibre lifetimes was established.	**INDUCTION WELDING OF PPS-CARBON COMPOSITES: MODELING AND EXPERIMENTAL RESULTS** Alfonso Maffezzoli(University of Salento) In this work, the experimental and numerical analysis of continuous induction welding of Poly phenilene sulfide (PPS)-carbon composites was carried out	16:50	**BENDING DEFORMATION LIMITS FOR CORRUGATED MORPHING SKINS** Andre Schmitz, Peter Horst
				16:54	**EFFECT OF SIZING ON THE INTERFACIAL PROPERTIES OF CARBON FIBER/BMI UNDER DIFFERENT PROCESSING TEMPERATURE** Qing Wu, Min Li, Mingming Zhu, Yizhuo Gu, Yanxia Li, Zuoguang Zhang
				16:58	**EXPERIMENTAL EVIDENCE OF THE INTERFACE/INTERPHASE FORMATION BETWEEN POWDER COATING AND COMPOSITE MATERIAL** Ahmad Fahs, Aurore Lafabrier
				17:02	**THE PERFORMANCE OF THE IONIC LIQUID-CONTAINING ELECTROACTIVE POLYMER ACTUATORS UNDER AMBIENT AIR CONDITIONS** Indrek Must, Alvo Aabloo, Inga Põldsalu, Friedrich Kaasik, Urmas Johanson, Andres Punning
17:10	**MODAL ANALYSIS OF COMPOSITE SANDWICH STRUCTURES WITH VISCOELASTIC LAYERS** Christophe Leclerc(Ecole Polytechnique de Montreal), Edith roland Fotsing(Ecole Polytechnique de Montreal), Annie Ross(Ecole Polytechnique de Montreal) Damping of composite sandwich beams was improved by inserting viscoelastic layers between face sheet plies. Modal analysis was investigated by means of laser vibrometer and curve fitting.	**SIMULATION OF THE MECHANICAL BEHAVIOR OF A THREE DIMENSIONAL COMPOSITE** Alain Rassineux(Universite de Technologie de Compiegne), Manh hung Ha(Universite de Technologie de Compiegne), Ludovic Cauvin(Universite de Technologie de Compiegne) We propose an approach to characterize the mechanical properties of interlock woven composite structures : creation of geometry, meshing and homogenization	**REPAIR OF CF/PA6 LAMINATE BELOW MELTING POINT WITH BARELY VISIBLE IMPACT DAMAGE** Manato Kanesaki, Masaaki Nishikawa, Masaki Hojo (Kyoto University), Chika Uchijo, Mototsugu Tanaka, Hiroshi Saito, Isao Kimpara (Kanazawa Institute of Technology) Compression test with specimen repaired the dent below melting point were carried out to evaluate the efficiency of repair of carbon fiber reinforced thermoplastic with barely visible impact damage.	17:06	**INFLUENCE OF THERMAL TREATMENT ON PROPERTIES OF THIN-FILM COMPOSITES CDS–PBS OBTAINED AT THE CDS(SOL)/PB2+(AQUA) INTERFACE** Larisa Maskaeva, Natalia Forostyanaya, Zinaida Smirnova, Vyacheslav Markov
				17:10	**OXIDATION OF ZIRCONIUM DIBORIDE-SILICON CARBIDE CERAMIC COMPOSITES IN DISSOCIATED OXYGEN** Hua Jin, Songhe Meng, Weihua Xie, Chenghai Xu, Liyuan Qin
				17:14	**CONSTITUTIVE THEORY OF YEOH TYPE ELASTIC DIELECTRICS POLYMER** Liwu Liu, Xinghuan Qi, Yinzi Zhao, Yanju Liu
				17:18	**THERMAL DECOMPOSITION OF PBO FIBER AND HIGH THERMAL MECHANICAL PROPERTIES OF PBO COMPOSITE MATERIALS** Liping Bian, Jiayu Xiao, Jingcheng Zeng, Suli Xing, Changping Yin, Jinshui Yang
17:30	**DAMAGE RESISTANCE AND DAMAGE TOLERANCE OF COMPOSITE LAMINATES WITH DISPERSED STACKING SEQUENCES** Claudio Saul Lopes(IMDEA Materials), Tamer Abdella Sebaey(Zagazig University), Emilio V González(Universidad de Gerona), Norbert Blanco(Universidad de Gerona), Josep Costa(Universidad de Gerona) A strategy to optimize the low-velocity impact behavior of laminates, by tailoring their stacking sequence without affecting in-plane properties, is proposed and verified by experiments.	**PHASE SEPARATED EPOXY/POM MATRIX FOR CARBON FIBRE REINFORECED COMPOSITES** Mohammadali Aravand(Katholieke Universiteit Leuven), Larissa Gorbatikh(Katholieke Universiteit Leuven), Stepan V. Lomov(Katholieke Universiteit Leuven), Ignaas Verpoest(Katholieke Universiteit Leuven) Reaction induced phase separating Polyoxymethylene microphases were found to be able to improve the fracture properties of the neat epoxy matrix as well as the carbon fibre reinforced composites.	**EXPERIMENTAL AND NUMERICAL INVESTIGATION OF LONG-TERM BEHAVIOUR OF MODIFIED TEXTILE-REINFORCED POLYPROPYLENE** Werner A. Hufenbach, Volker Ulbricht, Dominik Branke, Markus Kaestner(Technische Universitat Dresden), Edith Maeder(Leibniz Institute of Polymer Research Dresden), Martin Pohl(Leichtbau-Zentrum Sachsen GmbH) Here, the creeping behaviour of unreinforced polypropylene (PP) and textile reinforced PP with surface modification under compression have been investigated experimentally and simulated numerically.		
17:50		**INFLUENCE OF CROSSLINK RATIO ON THE MECHANICAL PROPERTIES OF POLYMERIC NANOCOMPOSITES AND INTERPHASE: A MOLECULAR DYNAMICS SIMULATION** Byungjo Kim(Seoul National University), Joonmyung Choi(Seoul National University), Suyoung Yu(Seoul National University), Seunghwa Yang(Dong-A University), Maenghyo Cho(Seoul National University) The mechanical properties of various cases of nanocomposites are investigated via MD simulations. A reinforcing effect is observed as particle size decreases or crosslink ratio increases.	**THE EFFECT OF FABRIC SCOURING ON FIRE AND MECHANICAL PERFORMANCE OF FLAME RETARDED FLAX/PP AND FLAX/PLA COMPOSITES** Wiwat Pornwannachai(University of Bolton), Baljinder Kandola(University of Bolton), Gill Smart(University of Bolton) Scouring increased the flammability and mechanical properties of laminates. However, the increases were minimal. Hence there is no advantage of using extra process to produce FR composite laminate.		
18:10		**DETERMINING THE MECHANICAL INTERPHASE THICKNESS OF POLYMERIC NANOCOMPOSITES USING MULTISCALE APPROACH** Joonmyung Choi(Seoul National University), Hyunseong Shin(Seoul National University), Suyoung Yu(Seoul National University), Seunghwa Yang(Dong-A University), Maenghyo Cho(Seoul National University) Throughout a multiscale method which connects MD with FEA, an effective interphase thickness of spherical SiC/Epoxy nanocomposites is characterized numerically.	**CHALLENGES FOR THE MANUFACTURING OF A LATTICE STRUCTURE FUSELAGE SECTION WITH PREPREG LAY-UP TECHNOLOGY** Jens Mack(Institut fuer Verbundwerkstoffe GmbH), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) First results for a manufacturing process in which a metallic fuselage section is replaced with a carbon fiber prepreg reinforced lattice structure are properties of this paper.		
18:00	COCKTAILS (Cash Bar)				
19:00	BANQUET				
22:00	End				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
7:30					
8:30	**PLENARY (Room 710) - Mohini Sain: A review: Carbon Fiber Reinforced composites for automotive".** Chair: Hiroyuki Hamada				
		NANOCLAYS 1 Chairs: Cagri Ayranci, Edu Ruiz	**APPLICATIONS 9** Chairs: Marie-Josée Potvin, Wanping Zheng	**FRACTURE AND DAMAGE 17** Chair: Shuguang Li	**FRACTURE AND DAMAGE 19** Chair: Gabriel Laplante
9:30		**HIGH-PERFORMANCE EPOXY HYBRID NANOCOMPOSITES MODIFIED BY NANOCLAY AND PES** Boming Zhang(Beihang University), Yang Wang(Beihang University) Hybrid nanocomposites were prepared. They have semi-IPN structure and orderedly exfoliated structure. Organoclay and PES synergically toughened the epoxy resin.	**ENVIRONMENTAL-FRIENDLY FOOTBRIDGE MADE OF CFRP, GFRP AND TIMBER** Urs Otto Meier(Empa, Swiss Federal Laboratories for Materials Science & Technology) It has been shown that in combination with new connecting elements, like pin loaded CFRP straps, it is possible to use glulam in highly stressed and dynamically loaded structures.	**FINITE ELEMENT MULTI-SCALE MODELING OF THE FAILURE MECHANISMS IN A 3D WOVEN COMPOSITE** Lucien Laiarinandrasana(Ecole Nationale Superieure des Mines de Paris), Wassim Trabelsi(Ecole Nationale Superieure des Mines de Paris), Alain Thionnet(Ecole Nationale Superieure des Mines de Paris) Progressive degradation and failure mechanisms of 3D woven composite are analyzed using X-ray tomography technique. Multi-scale FE modeling taking these mechanisms into account is performed	**INVESTIGATING DELAMINATION MIGRATION IN COMPOSITE TAPE LAMINATES** Nelson V De carvalho, James Gordon Ratcliffe A new test method is presented, which is designed for characterizing the migration of a delamination in composite tape laminates between different ply interfaces.
9:50		**MIXED MODE FRACTURE BEHAVIOR OF EPOXY/NANOCLAY NANOCOMPOSITES** Michele Zappalorto(University of Padua), Marco Salviato(), Marino Quaresimin(University of Padua) The mixed mode toughness of epoxy/nanoclay nanocomposites is analysed. It is found that nanomodification generally enhances the fracture toughness, but improvements depend on the mode mixity.	**STUDYING THE HETEROGENEITY OF DISCONTINUOUS FIBER COMPOSITES USING A NEW FULL-FIELD STRAIN MEASUREMENT SYSTEM** Kevin Johanson(University of Nottingham), Lee T Harper(University of Nottingham), Michael Johnson(University of Nottingham), Andrew Kennedy(University of Nottingham), Nicholas A Warrior(University of Nottingham) The advantages of Digital Image Correlation (DIC) over traditional strain measurement techniques, highlighting the importance of collecting data from both surfaces of a discontinuous fiber specimen.	**FAILURE MODELLING OF IMPREGNATED FLAX YARNS FROM FIBRE AND INTERPHASE PROPERTIES** Shyam Mohan Panamoottil(University of Auckland), Raj Das(University of Auckland), Krishnan Jayaraman(University of Auckland) This paper aims to understand the failure behavior of the fibre and interface components of a flax composite, and to use this understanding to describe the failure of matrix-impregnated flax yarns.	**REPRESENTING TRANSLAMINAR FRACTURE AS A COHESIVE CRACK** Rita Teixeira(Imperial College of Science), Silvestre T Pinho(Imperial College of Science) Experimental work on CT multidirectional laminates is done. Each of the toughness values is used to define a cohesive law, and the specimens are simulated using a cohesive approach in a FE model.
10:10		**FABRICATION AND PROPERTY STUDY OF POLYMER/FIBER/CLAY TERNARY COMPOSITES** Xu Li(Istitute of Materials research and Engineering) Simultaneous reinforcing and toughening effect can be realized by melt compounding a few percent of specifically designed clay into polyamide/glass-fibre composites.	**NUMERICAL DESIGN OPTIMISATION OF A COMPOSITE REACTION LINK** Yang Yang(The Welding Institude (TWI)), Clement Schuhler(The Welding Institude (TWI)), Chris M Worrall(The Welding Institude (TWI)) A gradient descent method was applied for implicit FEA-based optimisation of a composite reaction link. The final weight was reduced by 45%, and the maximum predicted deflection was reduced by 33%.	**DAMAGE ANALYSIS OF ALUMINUM / CFRP HYBRID BEAM UNDER THREE POINT BENDING** Hee chul Kim, Dong kil Shin, Jung goo Kim, Jung ju Lee (Korea Advanced Institute of Science & Technology), Kum cheol Shin (Shin Ansan University) Failure mechanism of hybrid beam under the three point bending loading was investigated by FEA. Al SHS beam wrapped by four plies of UD-CFRP with designed stacking sequence was used.	**AN EXPERIMENTAL METHOD TO DETERMINE THE CRITICAL ENERGY RELEASE RATE ASSOCIATED WITH LONGITUDINAL COMPRESSIVE FAILURE IN CFRP** Daniel Svensson(University College of Skovde), Ulf Stigh(University College of Skovde), Svante Alfredsson(University College of Skovde) This paper focuses on longitudinal compressive failure in CFRP. A cohesive law associated with the damage growth is measured experimentally and FE-simulations are performed to validate the method.
10:30		**DEVELOPMENT HIGH TEMPERATURE RESISTANT MATERIALS USING CARBON/PHENOLIC PREPREGS WITH NANOCLAYS** Exequiel Santos Rodríguez(Universidad Nacional de Mar del Plata) Composite materials used in the aerospace industry must meet severe requirements such as dimensional stability, high stiffness and high temperature resistance.	**MODELING THE FIRE STRUCTURAL PERFORMANCE OF ALUMINUM AND REINFORCED POLYMER COMPOSITES** Everson Kandare(Royal Melbourne Institute of Technology) This paper presents analytical models for the prediction of the fire structural performance of aluminum and FRP composites. The models accurately modeled failure times.	**DAMAGE SUPPRESSION IN THIN PLY ANGLE-PLY CARBON/EPOXY LAMINATES** Jonathan Fuller(University of Bristol), Michael R Wisnom(University of Bristol) Thinply angle-ply laminates tested under uniaxial tension have the potential to exhibit high strains to failure with little or no delamination or microcracking.	**MICROMECHANICAL FAILURE ANALYSIS OF UNIDIRECTIONAL FIBER-REINFORCED COMPOSITES UNDER IN-PLANE AND TRANSVERSE SHEAR** Lei Yang(Beihang University), Ying Yan(Beijing University of Aeronautics and Astronautics), Zhiguo Ran(Beihang University) The failure behavior of unidirectional FRPs subjected to in-plane and transverse shear is studied. The shear strength is predicted and the failure mechanism is clearly revealed.
10:50	**BREAK**				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
7:30					
8:30	**PLENARY (Room 710) - Mohini Sain: A review: Carbon Fiber Reinforced composites for automotive".** Chair: Hiroyuki Hamada				
	MECHANICAL PROPERTIES 4 Chairs: Chun Li	**JOINTS 1** Chairs: Yasutomo Nomura, Eric Pomerleau	**EXPERIMENTAL TECHNIQUES 2** Chair: Hamid Dalir	**METAL MATRIX COMPOSITES V** Chair: Helmi Attia	**COMPOSITE IN CIVIL INFRASTRUCTURES 1** Chair: Guijun Xian
9:30	**TIME-TEMPERATURE BEHAVIOUR OF POLYIMIDE MATRIX** Thibaut Crochon(Ecole Polytechnique de Montreal), Martin Lévesque(Ecole Polytechnique de Montreal), Chun Li(National Research Council Canada), Simon Dulong(Ecole Polytechnique de Montreal) The temperature and physical aging dependence of the viscoelastic behaviour of a polyimide matrix was investigated using 3 point bending and modeled using Schapery's theories. A good fit was achieved.	**EFFECTS OF PROCESSING PARAMETERS ON ELECTRO-FUSION JOINING BEHAVIOR OF CF/PPS COMPOSITES** Daiki Tanabe(Osaka University), Shinji Tsutaya(Kinki University), Kazuaki Nishiyabu(Kinki University), Tetsusei Kurashiki(Osaka University) In this study, the electro-fusion welding behavior of UD-CF/PPS and woven-CF/PPS laminates jointed using the Ni-Cr wire as a resistance heating element was investigated.	**EXPERIMENTAL AND NUMERICAL VALIDATION OF AN ANALYTICAL CALCULATION METHOD FOR NOTCHED FIBRE-REINFORCED MULTILAYERED COMPOSITES UNDER BENDING AND COMPRESSIVE LOADS** Bernd Grüber(Technische Universitat Dresden), Werner A. Hufenbach(Technische Universitat Dresden), Robert Gottwald(Technische Universitat Dresden), Martin Lepper(Technische Universitat Dresden), Binquan Zhou(Technische Universitat Dresden) Experimental investigations on stress concentrations in notched composites are presented, using adapted measurement methods for large deflections and a new test rig for in-plane compression loading.	**INFLUENCE OF DEFORMATION DEGREE ON THE MICROSTRUCTURE OF TITANIUM MATRIX COMPOSITES** Weijie Lu(Shanghai Jiao Tong University), Xianglong Guo(Shanghai Jiaotong University) Few researches focus on the deformation of titanium matrix composites. Microstructure evolution of titanium matrix composites with the increase of deformation degree is discussed in this work.	**COMPARISON BETWEEN TRC AND CFRP AS EXTERNAL REINFORCEMENT FOR PLAIN CONCRETE BEAMS** Svetlana Verbruggen(Vrije Universiteit Brussel), Jan Wastiels(Vrije Universiteit Brussel), Tine Tysmans(Vrije Universiteit Brussel), Silke Puystiens(Vrije Universiteit Brussel) Textile Reinforced Inorganic Phosphate Cement (IPCTRC) can be used to strengthening concrete structures. The behaviour of concrete beams externally reinforced with IPCTRC and CFRP is compared.
9:50	**PBO FABRIC REINFORCED THERMOPLASTIC COMPOSITE MANUFACTURED BY SOLUTION IMPREGNATION METHOD** Anchang Xu(Shinshu University) This study explores a reformative solution impregnation method for molding fabric reinforced thermoplastic composite, aiming for a high fiber volume fraction.	**SURFACE PRE-TREATMENT OF CFRP BY USING LASER RADIATION** Fabian Fischer(Technische Universitat Carolo-Wilhelmina Braunschweig), Stefan Kreling(Technische Universitat Carolo-Wilhelmina Braunschweig), Klaus Dilger(Technische Universitat Carolo-Wilhelmina Braunschweig) Adhesive bonding is an optimal method for joining CFRP. This paper presents laser radiation as an innovative tool to ensure a defined surface pre-treatment as the key process step of adhesive bonding.	**RESIDUAL STRESS MEASUREMENTS OF GLASS/EPOXY COMPOSITE LAMINATE USING A NEW TYPE OF SPECIMEN DESIGN** Johnny Jakobsen(Aalborg University), Jens H. Andreasen(Aalborg University), Ole T. Thomsen(Aalborg University) The presented paper aims on characterizing residual stresses in a glass/epoxy laminate as the laminate is subjected to different boundary conditions. A new type of specimen is explored in this work.	**NACRE-INSPIRED, STRONG AND DUCTILE CNT/AL COMPOSITES FABRICATED BY FLAKE POWDER METALLURGY** Zhiqiang Li(Shanghai Jiao Tong University), Genlian Fan(Shanghai Jiaotong University), Lin Jiang(Shanghai Jiaotong University), Yishi Su(Shanghai Jiao Tong University), Di Zhang(Shanghai Jiao Tong University) A bottom-up flake powder metallurgy route was developed to fabricate strong and ductile nacre-inspired CNT/Al composite, which was stacked alternatively with parallel aligned CNTs and Al lamellae.	**FINITE ELEMENT ANALYSIS ON GLASS FIBRE REINFORCED COMPOSITES WITH INORGANIC PHOSPHATE CEMENT MATRIX: COMPARISON OF INBUILT ABAQUS CONCRETE MODELS** Maciej Mikolaj Wozniak(Vrije Universiteit Brussel), Tine Tysmans(Vrije Universiteit Brussel), Johnny Vantomme(Vrije Universiteit Brussel) The paper compares inbuilt concrete models available in the commercial FEM software Abaqus, to prove their adequacy for simulating the mechanical behaviour of cement composites.
10:10	**TENSILE AND COMPRESSION PROPERTIES OF HYBRID COMPOSITES – A COMPARATIVE STUDY** Durai prabhakaran Raghavalu thirumalai(Technical University of Denmark) To study hybrid & non-hybrid UD composites performance of hybrid filament wound and hybrid fabric consists of glass and carbon fibres are considered.	**EVALUATION OF BEARING DAMAGE BEHAVIOR IN THIN TITANIUM FILMS-CFRP HYBRID LAMINATE** Tomoki Yamada(Tokyo University of Science), Hayato Nakatani(Osaka City University), Shinji Ogihara(Tokyo University of Science) Fiber metal laminates that consist of carbon fiber composites and thin titanium films were applied to bolted joints to improve damage behavior of composite laminates.	**UNCERTAINTY ANALYSIS FOR OPTICAL PERMEABILITY MEASUREMENT OF REINFORCING TEXTILES** Ewald Fauster(Montanuniversitat Leoben), Harald Grössing(Montanuniversitat Leoben), Ralf Schledjewski(Montanuniversitat Leoben) An optical permeability measurement system is investigated in terms of the measurement uncertainty associated with the resulting 2-dimensional permeability values.	**TURNING MACHINABILITY OF FIBER REINFORCED ALUMINUM ALLOY COMPOSITES** Kazunori Asano(Kinki University), Kenji Higashi(KUBOTA Corporation), Hiroyuki Yoneda(Kinki University) To develop a machinable aluminum matrix composite, short potassium titanate fiber was selected as a reinforcement. The effects of the fiber in the composite on the machinability were clarified.	**EFFECTS OF COMBINED ENVIRONMENTAL AGENTS ON PULTRUDED GFRP COMPOSITES FOR BUILDING CONSTRUCTIONS** Valter Carvelli(Polytechnic Institute of Milan), Guglielmo Carra(Polytechnic Institute of Milan) This paper presents a research dealing with the durability of pultruded Glass Fiber Reinforced Polymers (GFRP), with three different resins, used in building construction as structural members.
10:30	**RANDOM DISTURBING MODEL FOR THERMAL EXPANSION PROPERTY PREDICTION OF UNIDIRECTIONAL COMPOSITE** Zhiguo Ran(Beihang University), Ying Yan(Beijing University of Aeronautics and Astronautics), Lei Yang(Beihang University) This paper developed a new random disturbing model for coefficient of thermal expansion prediction of UD composite.the predicted results agreed with Schapery's predictions and experimental data well.	**COMPARISON OF MECHANICAL PROPERTIES IN WELDING JOINT METHODS OF CF/PP** Yasutomo Nomura(The University of Tokyo), Kiyoshi Uzawa(Kanazawa Institute of Technology), Hideaki Murayama(The University of Tokyo), Isamu Ohsawa(The University of Tokyo), Jun Takahashi(The University of Tokyo) In order to apply the welding joint technology for CF/PP, we evaluated the mechanical properties of jointed parts by tensile test.	**NANOINDENTATION OF A CARBON-FIBRE COMPSOSITE MICROSTRUCTURE: INTERPHASE CHARACTERISATION AND THE EFFECT OF RESIDUAL THERMAL STRESS** Mark Hardiman(University of Limerick), Conor T. Mccarthy(University of Limerick) Nanoindentation can be used to determine the properties of carbon-fibre composite constituents. Finite-element studies are used to determine the area of contact and residual stress influence.	**STRENGTHENING OF POWDERMETALLURGICALLY PRODUCED ALUMINUM BY NANOSCALE PARTICLES** Alla Kasakewitsch(Technische Universitat Clausthal) A powder metallurgical (PM) route using nano-scale ceramic and micro-scale aluminum (Al) powders were used to produce dispersion strengthened MMCs.	**EFFECT OF TRM ON THE FLEXURAL PERFORMANCE OF RC BEAMS** Sassan Rakhshani(University of British Columbia), Ahmad Rteil(University of British Columbia), Mojtaba Komeili(University of British Columbia), Abbas Milani(University of British Columbia) The effect of different types of textile reinforced mortar on the flexural performance of reinforced concrete beams is examined numerically and critical force/deflection curves were extracted.
10:50	**BREAK**				

	Room 525	Room 520f	Room 520be		Room 516ab
7:30					
8:30	**PLENARY (Room 710) - Mohini Sain: A review: Carbon Fiber Reinforced composites for automotive".** Chair: Hiroyuki Hamada				
	STRUCTURAL RESPONSE & DESIGN 1 Chairs: Rajamohan Ganesan, Dineshkumar Harursampath	**INTERFACE 8** Chair: Iosif Daniel Rosca	**THERMOPLASTIC COMPOSITES 5** Chairs: Malin Akermo, Arthur Levy		**CMC AND MMC - POSTER** Chairs: Pascal Hubert, Jason Lo
9:30	**NEW DEVELOPMENTS IN STRUCTURE/PROPERTY RELATIONSHIPS** Wendy Wenjun Tian(CSIRO), Buu Dao(CSIRO), Russell John Varley(CSIRO) This study investigate the correlations between the epoxy and amine chemical structures and their thermal and mechanical properties through a range of epoxy and amine system.	**CNT-GRAFTED CARBON FIBER COMPOSITES: CHARACTERIZATION OF THE FIBER/MATRIX INTERFACE** Niels De greef(Katholieke Universiteit Leuven), Aranud Magrez(École polytechnique fédérale de Lausanne), Jean-pierre Locquet(Katholieke Universiteit Leuven), László Forró(École polytechnique fédérale de Lausanne), Jin won Seo(Katholieke Universiteit Leuven) Carbon nanotubes are successfully grafted on carbon fibers at 500°C, without any degradation of carbon fibers. The fiber/matrix interface is evaluated using different interface strength measurements.	**ALIGNED DISCONTINUOUS CARBON FIBRES IN THERMOPLASTIC MATRICES VIA EXTRUSION OF UD TAPE** Jonny Blaker(Imperial College of Science), Alexander Bismarck(Imperial College of Science), Ulf Nagel(University of Strathclyde) Aligned discontinuous high volume fraction (54%) carbon fibre/PEEK composites with excellent fibre alignement were produced via extrusion of pre-wetted UD composite 'waste' feedstock.	9:30	**EFECTS OF SHORT CARBON FIBERS APPLICATION** Anita Olszowka-myalska, Jerzy Myalski
9:34					**GLASSY CARBON PARTICLES AS A COMPONENT** Anita Olszowka-myalska, Jerzy Myalski
9:38					**STIMULUS RESPONSE POLYMER AND MULTIFUNCTIONAL COMPOSITES: CHALLENGES AND PROSPECTS** Anna Janina Dolata, Maciej Dyzia
9:42					**MOULD CASTING OF ALUMINIUM MATRIX HETEROPHASE COMPOSITES** Maciej Dyzia, Anna Janina Dolata
9:46					**ELECTRICAL CONDUCTIVITY AND SPATIAL DISTRIBUTION OF PARTICLE DISPERSED COMPOSITES** Kenjiro Sugio, Narihiro Kawano, Kota Ishikawa, Moonhee Lee, Gen Sasaki
9:50	**OPTIMUM DESIGN OF LAMINATED PLATE WITH DISCRETE PLY ANGLES BASED ON GSFP METHOD** Shutian Liu(Dalian University of Technology) The method of Generalized Shape Function based Parameterization is proposed,and can be seen as a common method for solving the optimization problem with discrete variables.	**PRODUCTION AND EVALUATION OF INTRA-FILAMENT HYBRIDS** Richard Murray(University of Birmingham) This paper reports on the design and development of a rig to enable the production of intra-filament hybrids. Methodology is based on spreading of carbon and glass bundles then secondary manipulation.	**PROCESSING CONDITIONS AND PROPERTIES OF CONTINUOUS FIBER REINFORCED GF/PP THERMOPLASTIC MATRIX COMPOSITES MANUFACTURED FROM DIFFERENT PRE-IMPREGNATED MATERIALS** Joao Pedro Nunes, Marta Sofia Santos (Universidade do Minho), Joao Francisco Silva (Instituto Politecnico do Porto), Paulo Jorge Novo(Escola Superior de Tecnologia e Gestao), António Torres Marques (Universidade do Porto) This work compares the processing conditions and properties of continuous GF/PP composites made from thermoplastic pre-impregnated materials produced by direct melting and intimate contact methods	9:50	**LASER SURFACE TREATMENT OF AL-SIP COMPOSITES** Lustolde Martínez Laorden, Pilar Rodrigo, Belén Torres, Joaquin Rams
9:54					**LIFETIME PREDICTION OF SELF-HEALING CERAMIC MATRIX COMPOSITE STRUCTURES** Myriam Kaminski, Elen Hemon, Jean-françois Maire, Florent Bouillon, Christian Fagiano
9:58					**TRIBOLOGICAL BEHAVIOR OF A319-AL2O3 OR C PARTICULATE COMPOSITES FABRICATED BY STIR AND SQUEEZE CASTING METHODS** Essam Ahmed Shalaby
10:02					**SIZE EFFECTS OF SIC PARTICLES ON MECHNICAL PROPERTIES OF CAST CARBON NANOFIBERS REINFORCED AZ91 MAGNESIUM COMPOSITES** Sang kwan Lee
10:10	**ROTORDYNAMICS OF TAPERED COMPOSITE DRIVESHAFT BASED ON A LAGRANGIAN FINITE ELEMENT** Majed Almuslmani(Concordia University), Rajamohan Ganesan(Concordia University) In this study, the rotordynamics analysis of tapered composite driveshaft is carried out using the Lagrangian finite element formulation, and for this purpose, the Timoshenko beam theory is used.	**SURFACE TREATMENT OF CONTINUOUS FIBER FOR IMPREGNATION AND MECHANICAL PROPERTIES OF THERMOPLASTIC COMPOSITES** Koichi Bun(Kyoto Institute of Technology), Jun Hirai(Tsudakoma Corporation), Asami Nakai(Gifu University), Hiroyuki Hamada(Kyoto Institute of Technology), Akira Fudauchi(Kyoto Institute of Technology) In this study, in order to improve both impregnation state and interfacial properties, surface treatment by using resin with low molecular weight and same materials with matrix was proposed.	**HIGH STRAIN RATE OMPRESSIVE BEHAVIOUR OF SELF REINFORCED - POLY(ETHYLENE TEREPHTALATE) COMPOSITE CORRUGATED CORES** Christof Schneider(Royal lnstitute of Technology), Sohrab Kazemahvazi(Royal lnstitute of Technology), Dan Zenkert(Royal lnstitute of Technology), Mark Battley(University of Auckland) The compression strain rate sensitivity of the material and the influence of slenderness ratio will be investigated by quasi static and high strain rate out-of-plane compression testing.		
10:30	**UNBALANCED AND SYMMETRIC LAMINATES: NEW PERSPECTIVES ON A LESS WELL-KNOWN DESIGN RULE.** Christopher B. York(University of Glasgow) The last of four very special laminate classes, decoupled between extension and bending behavior; as would be expected from symmetric laminate configurations.	**FINITE ELEMENT ANALYSIS OF DELAMINATION GROWTH WITH FRACTURE RESISTANCE DEPENDENT ON MIXED-MODE RATIO AND FIBER ORIENTATION** Atsushi Kondo(Tokyo Metropolitan University), Yasuhito Mikami(Tokyo Metropolitan University) A numerical technique to analyze the mixed mode delamination crack growth by using cohesive zone model is proposed based on the local coordinate system based on the calculated crack shape.	**THE EFFECT OF DECONSOLIDATION ON INTERLAMINAR SHEAR STRENGTH FOR THERMOPLASTIC COMPOSITES** Markus Brzeski(Institut fur Verbundwerkstoffe GmbH), Peter Mitschang(Institut fuer Verbundwerkstoffe GmbH) In order to get a deeper knowledge on the effect of deconsolidation on the interlaminar behavior, many different materials were investigated in respect to thickness increase and interlaminar strength.		
10:50	**BREAK**				

	Room 515	Room 519a	Room 514	Room 524ab	Room 524c
10:50	BREAK				
	CARBON, NANOTUBES & GRAPHENES Chairs: Behnam Ashrafi, Yadienka Martinez Rubi		**APPLICATIONS 10** Chair: Wanping Zheng		
11:10	**HIERARCHICHAL COMPOSITES WITH PRESERVED CARBON FIBER STRENGTHS** Richard Li(Massachusetts Institute of Technology), Peter Florin(Massachusetts Institute of Technology), Stephen Alan Steiner(Massachusetts Institute of Technology), Brian Wardle(Massachusetts Institute of Technology) Carbon nanotubes are grown on carbon fibers without reducing fiber strength, thus preserving in-plane mechanical properties of hierarchical composites. Single fiber and ply-level testing are discussed		**LIGHTNING STRIKE PROTECITON FOR COMPOSITE LAMINATES BY PITCH BASED CARBON FIBER SKIN** Norihiko Hosokawa(Mitsubishi Plastics Inc.), Teruo Ooto(Mitsubishi Plastics Inc.), Shinya Kubo(Mitsubishi Plastics Inc.), Anzai Anzai(Mitsubishi Plastics Inc.), Akira Nakagoshi(Mitsubishi Plastics Inc.), Akihiko Yoshiya(Mitsubishi Plastics Inc.) Lightning strike proteciton for composite laminates by carbon fiber skin was researched. Because of its high thermal and electrical conductivity, pitch based carbon fiber skin seems to be effective.		
11:30	**MECHANICAL PROPERTY OF CARBON NANOTUBE YARN REINFORCED EPOXY** Yoshinobu Shimamura(Shizuoka University), Kahori Oshima(Shizuoka University), Keiichiro Tohgo(Shizuoka University), Tomoyuki Fujii(Shizuoka University), Yoku Inoue(Shizuoka University) Tensile tests of CNT spun yarn reinforced epoxy were conducted and mechanical properties were obtained to investigate the mechanical behavior of CNT spun yarn reinforced composite.		**EXACT BUCKLING SOLUTION OF COMPOSITE WEB/FLANGE ASSEMBLY** Jeremie Sauve(École de technologie supérieure - Université du Québec), Martine Dube(École de technologie supérieure - Université du Québec), Guillaume Corriveau(Bombardier), Franck Dervault(Borland Software Corporation) In this work, the case of a composite frame made of a web and flange is discussed, taking into account a clamped boundary condition between the web and the fuselage skin.		
11:50	**ROLL-TO-ROLL MANUFACTURING OF CARBON NANOTUBE FORESTS ON METAL FOILS** Erik Shaun Polsen(University of Michigan - Ann Arbor), A. john Hart(University of Michigan - Ann Arbor) A prototype system for roll-to-roll carbon nanotube forest manufacturing is presented, combining continuous-feed evaporative assembly of catalyst particles, and a novel concentric tube reactor.		**APPLICATION OF FOAM CORE TO CFRP SANDWICH MIRRORS FOR SPACE TELESCOPES** Shun Honda(Tokyo University of Science), Masashi Ishikawa(Tokyo University of Science), Yasuo Kogo(Tokyo University of Science), Tomohiro Kamiya(Japan Aerospace Exploration Agency), Shin Utsunomiya(Japan Aerospace Exploration Agency) In this study, we measured the surface roughness and out-of-plane deformation shape of foam core CFRP sandwich mirrors at dry and humid condition.		
12:10	**SCALABLE PRODUCTION OF EPOXY BASED NANOCOMPOSITES AND HIERARCHICAL COMPOSITES WITH VERY HIGH CNT LOADINGS** Tomi Herceg, Mohd shukur Zainol abidin, Emile Smith Greenhalgh, Alexander Bismarck, Milo S p Shaffer(Imperial College of Science), Clara Delfour(Institut Catholique d'Arts et Metiers Lille) A scalable, powder based processing route was developed to manufacture CNT composites. Microstructure homogeneity was controlled by altering processing parameters, resulting in improved properties.				
12:30					
12:50	End				

	Room 522	Room 518ab	Room 520ad	Room 519b	Room 520c
10:50		**BREAK**			
		JOINTS 2 Chairs: Yasutomo Nomura, Eric Pomerleau	**EXPERIMENTAL TECHNIQUES 3** Chairs: Pascal Hubert, Andrew Johnston	**PLEASE NOTE THAT THE BELOW SESSION WILL BE THE 5th PAPER IN FRIDAY-SESSION 1 STARTING AT 10:50**	**COMPOSITE IN CIVIL INFRASTRUCTURES 2** Chairs: Urs Otto Meier, Marciej Wozniak
11:10		**PULL-OFF TEST AND SIMULATION OF DUCTILE ADHESIVE BONDED CONPOSITE T-JOINTS** Hao Cui(Delft University of Technology), Sotiris Koussios(Delft University of Technology), Yulong Li(Northwestern Polytechnical University) The effect of adhesive ductility on the failure process of composite T-joint was revealed through experiments, which was nicely predicted with finite element model using novel traction-separation law	**HYBRID TESTING OF COMPOSITE STRUCTURES WITH SINGLE-AXIS CONTROL** Jacob Paamand Waldbjoern, Jacob Høgh, Henrik Stang, Christian Berggreen, Jacob Wittrup-schmidt, Kim Branner (Technical University of Denmark) A hybrid testing platform has been developed. The platform is capable of running a hybrid test of a composite structure loaded in three point bending.	**TITANIUM NANO COMPOSITES USING HYDROGENATED METHOD** M.Bardet (Université Bordeaux), A. Veillere (Université Bordeaux), J.L.Bobet (Université Bordeaux), J.M. Heintz (Université Bordeaux), K.Xia (University of Melbourne), J.F.Silvain (Université Bordeaux) TiH2 powder is mixed with TiC or TiB2 nanometric powder and then sintered at 1400°C for 4 hours under UHV. The dehydrogenation of TiH2 leads to a rapid sintering, and get a fully dense materials.	**COMPRESSIVE BEHAVIOUR OF CONCRETE CYLINDER CONFINED BY NATURAL FIBER REINFORCED POLYMER SHEET** Guijun Xian(Harbin Institute of Technology) Natural fiber (flax) fabrics with a room temperature curable epoxy resin were used to wrap a plain concrete cylinder. The compressive behaviors of the confined cylinder were dramatically enhanced.
11:30		**OPTIMAL DESIGN OF THE EPOXY ADHESIVE JOINTS WITH CORE-SHELL STRUCTURED META-ARAMID/EPOXY NANOFIBER AT CRYOGENIC ENVIRONMENT** Hyun ju Oh(Chonbuk National University), Da hye Kim(Chonbuk National University), Hakyong Kim(Chonbuk National University), Hui yun Hwang(Andong National University), Seong su Kim(Chonbuk National University) The optimal design parameters with core-shell structured nanofibers on adhesive joints for cryogenic environments were suggested based on the experimental results and verified using FE-analysis.	**MULTI AXIS MACHINING OF HIGH PERFORMANCE CFRP FOR AEROSPACE INDUSTRY** Seyedbehzad Ghafarizadeh(École de technologie supérieure - Université du Québec), Jean-françois Chatelain(École de technologie supérieure - Université du Québec), Gilbert Lebrun(University of Quebec at Trois-Rivieres) This research focuses on the effects of different cutting parameters such as feed rate, cutting speed, and lead angle on cutting forces and surface roughness in CFRP machining.		**HYGROTHERMAL AGEING AND CREEP BEHAVIOR OF GLASS FIBER REINFORCED POLYMER COMPOSITES** Guijun Xian(Harbin Institute of Technology), Yang Yuqiu(Donghua University, Shanghai), Hiroyuki Hamada(Kyoto Institute of Technology), Eisuke Fukui(Fukui Fibertech Co. Ltd.) A glass fiber reinforced polymer pipe was studied on the water uptake and flexural performance when immersed in water. The creep performance of the GFRP pipe was also conducted in the north of China.
11:50		**FRACTURE MECHANISM OF MECHANICALLY FASTENED CFRTP** Kotaro Shinohara(The University of Tokyo), Jun Takahashi(The University of Tokyo), Kiyoshi Uzawa(Kanazawa Institute of Technology), Hideaki Murayama(The University of Tokyo), Isamu Ohsawa(The University of Tokyo) This paper presents an experimental investigation of the relationship between the bearing strength and the damage progress behavior in mechanically fastened composite structures.	**USING THE LAP-SHEAR TEST TO MEASURE POLYMER COMPOSITE INTERFACIAL STRENGTH** Jeff Wood(University of Western Ontario), Ian N Swentek(University of Western Ontario) A new test method for the determination of matrix/reinforcement interfacial properties is described. Results for a glass/epoxy and a glass/polyester system are presented.		**PRESTRESS LOSS MONITORING OF NEAR-SURFACE MOUNTED CFRP STRIPS EMBEDDED IN CONCRETE BASED ON OFBG SENSORS** Chuan Wang(Harbin Institute of Technology), Lijuan Cheng(University of California, Davis) The OFBG technique is applied to monitor the prestress losses in a series of reinforced concrete beams strengthened with NSM CFRP strips pre-tensioned by a newly developed prestressing device.
12:10		**AN ANALYTICAL MODEL TO IMPROVE THE EFFICIENCY OF NUMERICAL ANALYSES OF COMPOSITE BOLTED LAP JOINTS SUBJECTED TO HIGH RATES OF LOADING** Philip Anthony Sharos(University of Limerick), Conor T. Mccarthy(University of Limerick) An analytical was developed for the efficient finite element analysis of composite bolted joints at high loading rates. The model was validated against high-rate joint test data.	**EFFECT OF SUPERHEATED STEAM TREATMENT ON TENSILE STRENGTH OF CARBON FIBER AND FIBER-RESIN INTERFACIAL SHEAR STRENGTH** Masashi Wada, Kazuhiko Kawai, Kazumi Hayashi, Satoshi Kitaoka (Japan Fine Ceramics Center), Yuta Shimizu(Daido University), Tomoyuki Suzuki (Aichi Science and Technology Foundation), Hirohito Hira (Daido University) The treatment of carbon fiber with superheated steam containing N2 gas was effective in improving the shear strength of fiber-epoxy resin interface.		**DESIGN AND STRUCTURAL FEASIBILITY STUDY OF A LIGHTWEIGHT FLOOR SYSTEM FOR RENOVATION** Sven De sutter(Vrije Universiteit Brussel), Tine Tysmans(Vrije Universiteit Brussel), Olivier Remy(Vrije Universiteit Brussel) This paper describes a new floor concept, composed of a smart combination of concrete and composites. At the end, the results of a preliminary structural feasibility study are shown.
12:30		**ON THE PROLIFERATION OF STANDARD TESTS FOR COMPOSITE BEARING STRENGTH** Adam John Sawicki(The Boeing Company) This paper will review test methods for composite bearing strength, provide guidance on test selection and recommend improvements to industry standards.			**DURABILITY OF STEEL-CFRP ADHESIVE JOINTS UNDER SUSTAINED LOADING AND WET THERMAL-CYCLE** Ankit Agarwal(University of New South Wales), Tian Sing Ng(University of New South Wales), Ehab Hamed(University of New South Wales), Stephen J Foster(University of New South Wales) Influence of combined effects of thermal and mechanical loading on the bond strength of steel-CFRP single lap joints are investigated using experimental testings and theoretical modelling.
12:50		**End**			

	Room 525	Room 520f	Room 520be		Room 516ab
10:50	BREAK				
	STRUCTURAL RESPONSE & DESIGN 2 Chairs: Rajamohan Ganesan, Dineshkumar Harursampath	**INTERFACE 9** Chair: Iosif Daniel Rosca			
11:10	**DAMAGE ACCUMULATION IN A FIBER REINFORCED COMPOSITE FOR SPACE APPLICATIONS** Jihane Ajaja(McGill University), Francois Barthelat(McGill University) We investigated the performance of a carbon fiber reinforced cyanate ester composite for space applications, focusing on the accumulation of damage from extreme thermal and externally applied stresses	**INTERFACE DESIGN OF 3D WIRE STRUCTURES FOR METAL MATRIX COMPOSITES** Steffen Kaina(Technische Universitat Dresden), Bernd Kieback(Technische Universitat Dresden), Daniel Weck(Technische Universitat Dresden), Olaf Andersen(Fraunhofer IFAM Dresden), Günter Stephani(), Eva Kieselstein(), Andreas Bascha() This work presents results with regard to the manufacturing of a new MMC with a focus on the interface design to create a good material bond between carbon steel wires and a magnesium alloy matrix.			
11:30	**RESISTANCE OF NICKEL-COATED THERMALLY CYCLED COMPOSITES TO LUNAR DUST ABRASION** Marie-josée Potvin(Agence spatiale canadienne Canadian Space Agency), Francis Martin(Agence spatiale canadienne Canadian Space Agency) Composites are highly abraded by lunar dust. Composites samples coated with a nickel alloy have been subjected to impingement by simulant of lunar dust and have shown very good resistance to abrasion.	**NOTCHED-BUTT TEST FOR THE DETERMINATION OF ADHESION STRENGTH AT BIMATERIAL INTERFACES** Bernd Lauke(Leibniz-Istitut fue Polymerforschung Dresden e.V.), Alberto Barroso(Universidad de Sevilla) A notch at the interface of a bimaterial joint prevents stress singularities. Calculations provide notch geometry appropriate for uniform stresses as the basis for adhesion strength determination.			
11:50	**EFFECT OF EXTREME TEMPERATURE CYCLES ON DAMAGE IN COMPOSITE LAMINATES** Marie-laure Dano(Laval University), Francis Martin(Agence spatiale canadienne Canadian Space Agency), Marie-josée Potvin(Agence spatiale canadienne Canadian Space Agency), Mathilde Jean-st-laurent(Laval University) Thermal cycles were performed on carbon/cyanate ester composite materials. For given cycles number, damage was quantified and mechanical tests were performed to evaluate material property degradation.	**TENSILE PROPERTIES OF PAN- AND PITCH-BASED HYBRID CARBON FIBER REINFORCED EPOXY MATRIX COMPOSITES** Kimiyoshi Naito(National Institute for Materials Science) The tensile properties of PAN- and pitch-based hybrid carbon fiber reinforced epoxy matrix composites were investigated. The tensile stress-strain curves of hybrid specimens show complicated shape.			
12:10	**TENSILE STRENGTH MODELING OF GLASS FIBER-POLYMER COMPOSITES AND SANDWICH MATERIALS IN FIRE** Stefanie Feih(Royal Melbourne Institute of Technology), Aslina Anjang(Royal Melbourne Institute of Technology), Venkata Chevali(Royal Melbourne Institute of Technology), Everson Kandare(Royal Melbourne Institute of Technology), Adrian Mouritz(Royal Melbourne Institute of Technology) The failure behavior is compared for a GFRP laminate and sandwich material under tensile loading during fire. The balsa core has a significant effect on prolonging the time-to-failure at low loads.	**IMPROVEMENT OF INTERFACIAL SHEAR STRENGTH USING ELECTROSTATICALLY DEPOSITED NANO-PARTICLES** Benjamin Rutz(University of Washington), John C Berg(University of Washington) Poly(ethyleneimine) functionalized silica nano-particles were bound to glass fibers to increase the toughness and modulus of the interphase, increasing the interfacial shear strength.			
12:30	**STRUCTURAL OPTIMISATION OF DISCONTINUOUS FIBRE COMPOSITES** Connie Cheng Qian(University of Nottingham), Lee Thomas Harper(University of Nottingham), Thomas Turner(University of Nottingham), Nicholas Warrior(University of Nottingham) A stiffness optimisation model is developed to determine the fibre architecture of discontinuous carbon fibre components and facilitate the downstream modelling for fibre deposition routes.	**NUMERICAL APPROACH FOR EFFECTIVE PROPERTIES OF WOOD COMPOSITES WITH PARTIAL RESIN COVERAGE OF STRANDS** Sardar Malekmohammadi(University of British Columbia), Benjamin Tressou(Institut Pprime CNRS ISAE-ENSMA), Carole Nadot-martin(Institut Pprime CNRS ISAE-ENSMA), Fernand Ellyin(University of British Columbia), Reza Vaziri(University of British Columbia) Based on full-field finite element simulations, a numerical approach is presented for determining the effective properties of strands that are partially bonded with a thin layer of resin.			
12:50	**End**				

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ICCM20 Copenhagen Denmark

Welcome to the ICCM20 in Copenhagen, 19-24 July 2015!

Copenhagen - the capital of Denmark

Copenhagen is a vibrant metropolis, the gateway to Scandinavia and amongst the safest and cleanest cities in the world. Copenhagen is very easy to get to and is, with one of the most efficient transport systems in the world, also very easy to get around in.

As the oldest monarchy in the world and one of the world's greatest design capitals the city offers a wide variety of cultural experiences and stunning architecture within its compact city centre.

With the dates of the ICCM20 being in the summer month of July the delegates will be visiting Copenhagen at one of the most attractive and pleasantly warm times of year.

Copenhagen Airport is Northern Europe´s main traffic hub with direct flights from approximately 140 destinations all over the world. The city centre can be reached within 12 minutes by metro or train.

Bella Center – the venue of ICCM20

The venue for ICCM20 is the Bella Center. Bella Center is a large and magnificent, ultramodern, state-of-the-art facility which is situated just 5 minutes from Copenhagen International Airport and 9 minutes from the city centre by metro.

Scientific program

The overall theme for the ICCM20 will be “Sustainable Composite Solutions to Global Challenges”. The scientific program will cover all relevant aspects of the science and technology of composite materials and their application.

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Open for ICCM20 in 2015

Social program and tours

A range of social opportunities for networking and for enjoying Wonderful Copenhagen and the surroundings will be provided. The social program currently include

» Welcome Reception in Tivoli Gardens in the heart of Copenhagen.

» Conference Dinner with a Midsummer Theme in Bella Center.

» Pre and post congress tours, sightseeing tours as well as a program for accompanying persons.

Organization of the ICCM20

The ICCM20 is organized by the Scandinavian Organizing and Scientific Committee which encompasses Aalborg University (AAU), the Technical University of Denmark (DTU), the Danish Plastics Federation (Danish composites industry), along with Swedish and Norwegian key researchers in the field of composite materials, and finally the professional congress organizers MCI Copenhagen.

www.iccm20.org

WE LOOK FORWARD TO SEEING YOU IN COPENHAGEN FOR THE ICCM20!

Ole Thybo Thomsen, ICCM General Chair (University of Southampton, UK & Aalborg University, Denmark)

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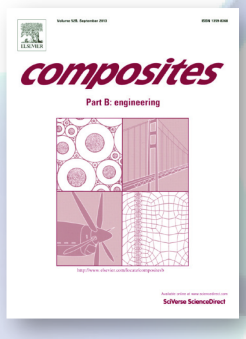

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