

#### **TWENTY-THIRD INTERNATIONAL CONFERENCE ON COMPOSITE MATERIALS (ICCM23)**





# FEASIBILITY STUDY OF A CFRP BOSS FOR APPLICATION IN

## **LINERLESS COMPOSITE TYPE V TANKS**

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## **CFRP VS. METALL BOSS**

- Less structural weight
- Reduced CTE mismatch  $\rightarrow$  reduced thermal stresses in dome/boss-interface
- Enhanced bonding behavior in dome/bossinterface
- Reduced heat entry in tank system



Load path conform

#### **SPIRAL WEAVE FABRIC**

- Fibers oriented in
  - 0° radial



- **Highly toughened** epoxy matrix for cryogenic application
- **Enhanced micro**crack resistance
- **In-Situ application** during preforming
- High tear-out force

• 90° circumferential

#### **2K TOUGHENDED LIQUID INFUSION C-Fiber in Epoxy** SYSTEM

- $K_{\rm IC} = 0.97 \pm 0.18 \,\rm MPa \,m^{1/2}$
- G<sub>IC</sub> 360 J/m<sup>2</sup>
  - → Fracture energy release maximized for enabling interlaminar toughening mechanisms

5 µm Plastic

Crack

Plastic Zone:  $R_{\rm P}$  = 2-3  $\mu$ m

### **TEAR-OUT TESTING**



**Vacuum infusion process** 

**RTM process in next step** for less voids

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Project CryoFuselage (LABAY108A) Sponsored by

**Bavarian Ministry of Economic Affairs, Regional Development and Energy** 

