



## **WHAT WE HAVE ACCOMPLISHED IN NEDO PROJECT FOR AUTOMOTIVE STRUCTURES**

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**Keywords:** *CFRP, Automotive Structure, Mileage, Super Short Cycle Fabrication, Joint, Safety Design, Recycle.*

Carbon fiber reinforced plastics (CFRP) have been widely used in aerospace and other industrial application fields because of their high specific strength and high specific modulus. Especially, the CFRPs are highly noticed due to contribute a lightweight of automobiles, which lead to solve environmental problems, such as a reduction of exhaust gas in the automobiles.

We are now conducting Japanese national project, named "Research and development of carbon fiber-reinforced composite materials to reduce automobile weight". The purpose of this project is reducing greenhouse gas by developing lighter CFRP automobile bodies. The term of project is from October 2003 to March 2008 for about 5 years. Its total budget is about 18 million dollar.

This project is conducted by the funding of Ministry of Economy, Trade and Industry to NEDO (New Energy & Industrial Technology Development Organization). NEDO is the public corporation that mainly focuses on energy issues and entrust this project to Toray Industry and Nissan Motor and 5 Universities, including Tokyo Institute of Tech., Nihon University, Kyoto Institute of Technology, University of Hyogo, and University of Tokyo.

In order to reduce CO<sub>2</sub> emission dramatically, we set an aggressive design target. Our first target is 50% lightweight that means the reduction of vehicle mass by 200kg on a 1.5t vehicle including 400kg body in white. Additionally, improved vehicle safety is of global importance. So, we set a second target of 1.5 times energy absorption compared with a steel body (Fig.1).

To achieve such an aggressive target, we mainly focused on structural parts that consist of 70% of a total body weight. The structural parts require both

stiffness and strength. So we selected continuous fiber CFRP

For achieving these targets, we selected four technical subjects in this project, corresponding to stages of automotive life. fabrication, assemblage, use and scrap (Fig.2).

Subject 1: "Short cycle integrated fabrication technology" is about the fabrication of CFRP automobile body with continuous carbon fiber that is adaptable for mass production of automotive industry.

Subject 2: "Metal/CFRP joint technology" is about the adhesive joint between metal and CFRP having almost equivalent strength to the conventional welding joint between metals.

Subject 3: "Safety design technology" is about the simulation technology for CFRP energy absorbers that assists CAE design of the automobile body and the CFRP automobile body design gains 1.5 times larger energy absorption than that of steel body.

Subject 4: "Recycle technology" is about the separation of the metal and CFRP easily like a mechanical joint when automobile body is scrapped and the fabrication of recycled CFRP materials that can be applied to automobile non-structural parts.

Fig.3 shows the master schedule of the project. This project started in 2003 and is successfully proceeding. On February 2006, the trial product of the door inner panel was fabricated with use of this project's innovative technologies. And finally, in the 2007 fiscal year, a trial product of platform will be fabricated. Also, we plan to fabricate and assemble a full CFRP body in white and demonstrate its safety.

In my plenary talk, the outline of this project including background, target, schedule and some topics of technical subjects are explained.

### Goals of NEDO Project

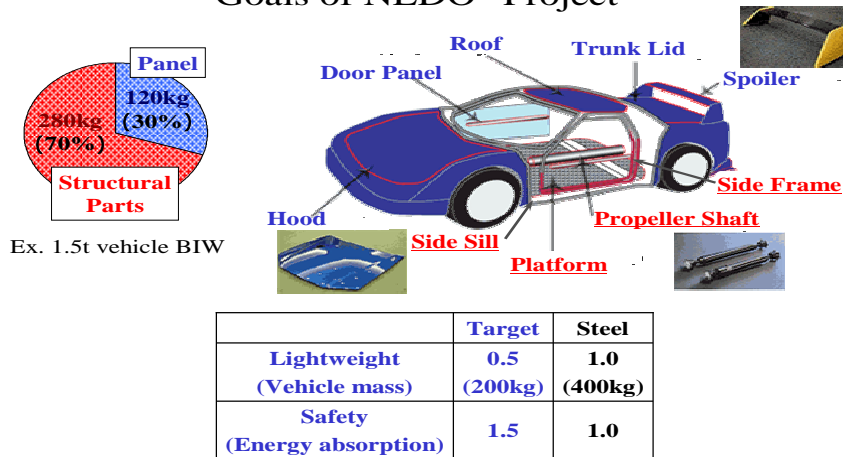


Fig 1 Goal of Nedo Project

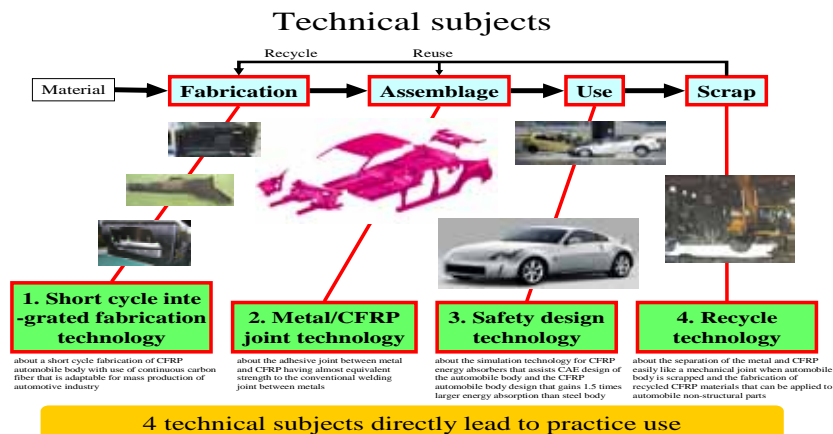


Fig.2 Technical subjects in NEDO Project

### Master schedule

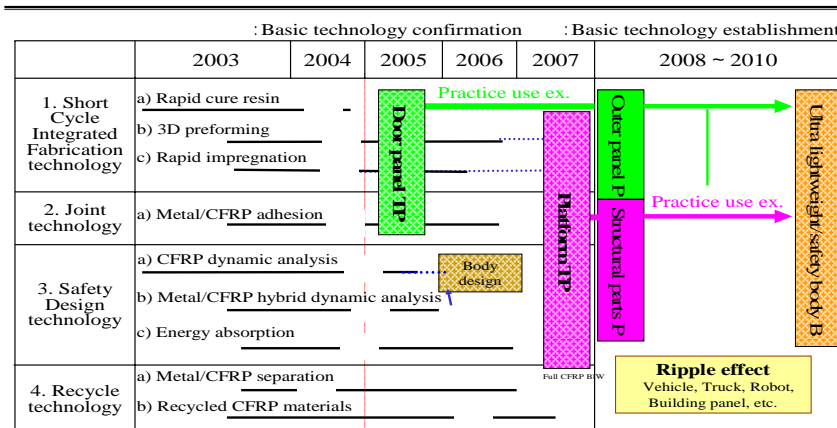


Fig.3 Mater Schedule of NEDO Project