Carbon Fibre Composites in Indian Racecar-PRV

Pravega Racing is the official Formula SAE (FSAE) team of VIT University. The team builds formula style racecar and takes part in the Formula Student competitions organised by Society of Automotive Engineers (SAE). 'Pravega Racing' recently took part in Formula Bharat, a National Level Formula Student Competition held at Coimbatore and achieved 1st Position Overall at the event and also won 8/11 trophies. Composites Today contacted the team to find out usage of composites in the racecar. Mr. Ayush Nahata, Composites Lead, Pravega Racing Team explains why and how the team is using carbon fibre composites in the racecar body structure.

Composites has been an essential path for development of the team. It gives us the opportunity to attain a lightweight body without compromising the strength- a boon for a Formula student team. The team constantly thrives to attain a lighter and more reliable car.

This year, the team has been working quite extensively towards the strength bearing components which include the A-arms of the suspension system, the wheel center for the rims and the intake for a lighter and better engine performance.

CFRP Arms

We designed a composite suspension system to support the

wheels. The CFRP tube was bonded with the isotropic (steel) A-arm plate using a strong adhesive. This was validated with physical tests to calculate the optimum bond gap and bond length. A range of adhesives were tested to choose the ones which meet our requirements

The tube was also selected by first performing FEA analysis. A model was developed in ANSYS Composites Pre-post to perform the analysis of isotropic and anisotropic material together.

Maintaining a uniform bond gap of the adhesive was really

important and hence a jig was prepared to do the same.

Wheel Center

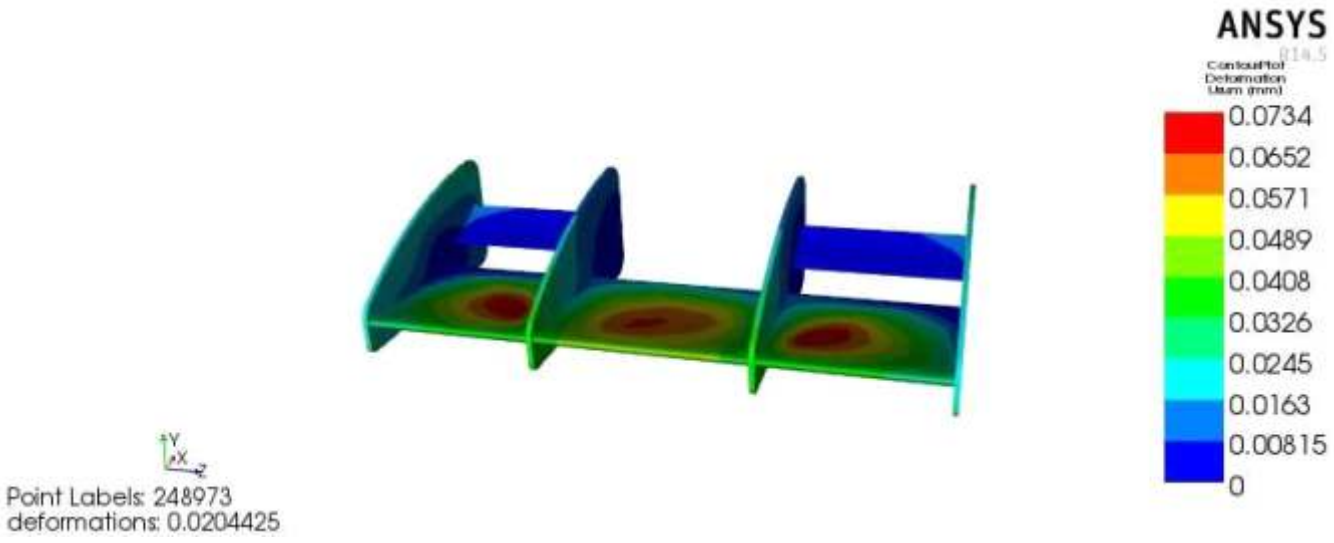
The wheel center attaches the hub to the rim. It is the maximum load bearing component of the wheel and hence its analysis and manufacturing was really important. FEA was used to optimise the layup and orientation of the plies. Pre-preg layup was used to manufacture the wheel center. Milling was performed on the cured laminate to machine the Pitch Circle Diameter.

CFRP Arms and Wheel Rim Center were successfully installed and tested on PRV.

Wings

Wings were also manufactured with keeping weight in mind. Pravega successfully manufactured the front and rear wing using carbon fibre by using female molds. Previous year wings were manufactured using Aluminum ribs as support. The wing was split into two halves and later on bonded.

Currently, the team has decided to use a spar. Rather than dividing the wing, the wing is split at one end and later on bonded. This will give a much better finished leading edge. We are the first Indian team to use front and rear wings at a Formula Student Competition.



Custom Seat

Custom seat is a necessity to prevent driver fatigue. Two-part foam is used to get the profile of all the drivers. This foam mold is then sent for 3D scanning to get required seat mold. The final mold was machined out and the wet lay-up layup was done onto the male mold.

Bodyworks

Aesthetics is followed by performance on a Race car, and composites is not far behind. The team designed and manufactured the nose, side pods and side panels, to envelope the driver in the chassis. MDF female molds were machined and the final wet-layup was done to get the carbon fibre finished product.The composites team is currently working extensively on the Intake and the fatigue analysis of composites to have a more learned approach towards the manufactured products. Pravega Composites department has and will focus on more engineered approach to achieve the ultimate aim- Weight saving with strength!

CFW Enterprises

CFW Enterprise, Delhi is associated with Pravega Racing, the official Formula SAE team of VIT UNIVERSITY, Vellore where students design and manufacture a Formula one prototype racecar. CFW Enterprise supported the team to manufacture carbon fibre parts for PRV, which won the 8 trophies and came out as overall first at the recently held Formula Bharat, a National Level Formula Student competition

CFW Enterprises is engaged in manufacturing of Carbon Fibre Reinforced Composites since 2014. Mohd. Fayyaz Khan, Founder has 20+ years of work experience in the filed as he was associated with various projects related to carbon fibre.

Mr. Fayyaz Khan says “CFW Enterprises is able to work from client's concept as well as from CAD drawings. Owing to these reasons, our range of products are widely appreciated in domestic market. We use have three different processes in manufacturing composites parts, hand lay process with room temperature curing, Vacuum process and Infusion process”