

# THAPAR UNIVERSITY STEERS A COURSE TO SUCCESS

## Students Use Stratasys FDM to Compete in Formula SAE Autocross Racer Design Contest

*"Having parts produced on the Stratasys machine gave the team first-hand experience of the benefits of additive manufacturing."*

— Govind Adlakha, Technical Head of Team

Thapar University (TU) began life in 1956 as the Thapar Institute of Engineering and Technology. The University is situated in Patiala, approximately 250 kilometers from Delhi. It now offers post-graduate and undergraduate degrees in engineering, science, management and social sciences. In May, 2010 Stratasys worked with the university's Team Fateh on a global Formula SAE competition. The Formula SAE is a student design competition organized by SAE International (formerly the Society of Automotive Engineers) and begun in 1979. Team Fateh consists of a group of dynamic engineering students who aim to propel India to the top 20 Best Formula SAE teams in the world.

### Real Challenge

After a presentation on additive manufacturing (AM) and Fused Deposition Modeling (FDM) delivered at Thapar University, Stratasys was approached by an undergraduate about offering support for Team Fateh's entry to the annual Formula SAE competition. Team Fateh consists of members hailing from a number of disciplines across the university including mechanical engineering, industrial engineering, physics and electronics.

The concept of the formula SAE competition is to research, design and manufacture an open wheel style autocross racing car. The students are challenged with conceptualizing new ideas to compete with other universities. The teams work on the project for one year before presenting the finished car to a host institution.

The students must assume that they have been engaged by a manufacturing firm to produce a prototype car. The intended sales market is the non-professional weekend autocross racer. The car must perform highly on acceleration, braking and handling qualities. It must be low in cost, easy to maintain and reliable as well as being enhanced by factors such as aesthetics and comfort. The cars are judged in three different categories: static inspection and engineering design, solo performance trials and high performance and endurance trials.

### Real Solution

Stratasys offered the team free fabrication on its Fortus 400mc machine in order to prototype both the air intake manifold and steering wheel for the car. "We wanted to demonstrate to the students what AM and FDM were capable of and encouraged them to produce end-use parts using the machine," said Ashwin Deshpande of Stratasys. "The Fateh team was one of only a few teams worldwide that used additive manufacturing in the design process and it made a huge difference to the speed and accuracy of the design. The air intake manifold was fixed onto the engine and worked immediately."

### Real Benefits

The team was awarded Best Indian Team in 2010. It was also recognized as the only Indian team to complete endurance tests successfully and for its use of FDM for fabricating both



Team Fateh were the only Indian team to successfully compete in the Autocross Racer Design Contest.



The car was judged in three different categories: static inspection and engineering design, solo performance trials and high performance and endurance trials.



The Fateh team was one of only a few teams worldwide that used additive manufacturing in the design process.

the air intake manifold and the steering wheel. Using this process saved considerable time and money compared to the original plan to CNC machine the parts.

Besides working with Stratasys on the air intake manifold and steering wheel, the team used a number of other solutions in order to complete the project. These included a 600CC Kawasaki Ninja ZX6 carbureted engine and flow analysis performed on Fluent. Matlab, Optimum T was used to plot 3D graphs to compare various makes for maximum acceleration and to minimize lateral breaking and acceleration load transfers. Wingeo 3.0 was also used to decide suppression geometry, lateral load transfer, roll center migration both vertical and horizontal, and bumper and steering geometry. The chassis was a mild steel tubular cage designed on Solidworks to resist torsion. The car was eventually tested on a smooth, Formula One style track.

“Having parts produced on the Stratasys machine gave the team first-hand experience of the benefits of additive manufacturing which was something that the judging panel commended us on,” said Govind Adlakha, Technical Head of Team. “The air intake manifold needed to be produced to very tight specifications with an inlet velocity of 82.5m/s and four outlets with zero gauge pressure under an operating pressure of 101325 pascals or 1 Bar. It also had to withstand temperatures of 25-30°C. All of this was achieved easily on the Fortus machine, using the ULTEM\* 9085 industrial grade thermoplastic for the air intake manifold and ABS-M30 industrial grade thermoplastic for the steering wheel.”

“We hope that this is the beginning of a long and mutually beneficial relationship between our university and Stratasys. We look forward to working with the company in the future as they help us to shape India’s future engineers” concluded Sumeet Sharma, Assistant Professor, Mechanical Engineering Department of Thapar University.



Stratasys helped Team Fateh produce both the air intake manifold and steering wheel using Fortus 400mc.

For more information about Stratasys systems, materials and applications, call **888.480.3548** or visit [www.stratasys.com](http://www.stratasys.com)

**Stratasys Incorporated**  
7665 Commerce Way  
Eden Prairie, MN 55344  
+1 888 480 3548 (US Toll Free)  
+1 952 937 3000  
+1 952 937 0070 (Fax)  
[www.stratasys.com](http://www.stratasys.com)  
[info@stratasys.com](mailto:info@stratasys.com)

**Stratasys GmbH**  
Weismüllerstrasse 27  
60314 Frankfurt am Main  
Germany  
+49 69 420 994 30 (Tel)  
+49 69 420 994 333 (Fax)  
[www.stratasys.com](http://www.stratasys.com)  
[europe@stratasys.com](mailto:europe@stratasys.com)

©2010 Stratasys Inc. All rights reserved. Stratasys, FDM, Fortus, Dimension, and uPrint are registered trademarks and Real Parts, Fortus 360mc, Fortus 400mc, Fortus 900mc, Insight, Control Center and FDM TEAM are trademarks of Stratasys Inc., registered in the United States and other countries. \*ULTEM 9085 is a trademark of SABIC Innovative Plastics IP BV. All other trademarks are the property of their respective owners. Product specifications subject to change without notice. Printed in the USA. AP-THAPAR 11/10

