TEXAS STATE UNIVERSITY

The rising STAR *of Texas*

M1 – Formula SAE Fairing Components

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Society of Automotive Engineers, Texas State Chapter

Racing

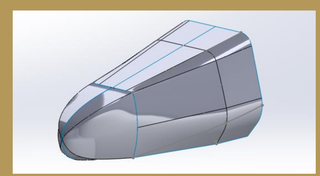
- **Customer Need** - Bobcat Racing competes in a national FSAE competition where teams build a racecar. A fairing that protects the driver from debris is required by the rules of the competition.

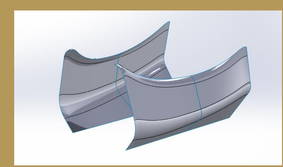
- **Project Scope** – Design and Manufacture body components for the FSAE Bobcat Racing team's racecar. Components must interface with exiting frame design. Body components include:
  - -Nose Cone
  - -Side covers
  - -Skid Plate

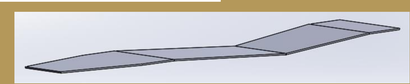
- **FSAE Requirements**
  - Nose cone must surround SAE impact attenuator with no modifications
  - No parts more than 27.6" in front of front tires
  - No exposed sharp edges (minimum 1.5" radius)

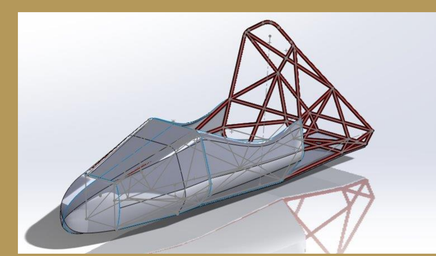
- **Target Specifications**
  - Parts must be aerodynamic (coefficient of drag less than 0.40)
  - Parts must encapsulate entirety of cockpit, from main roll hoop, forward
  - Parts made from strong/lightweight material preferred.

Final Design



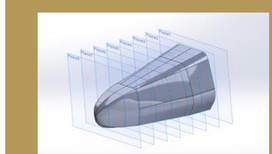






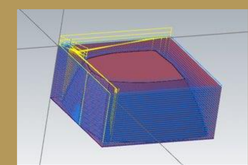
Manufacturing Process

Slice 3-D Model

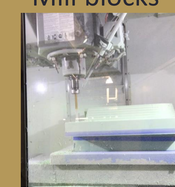


Cut out Blocks

Create toolpaths for CNC

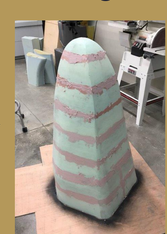


Mill blocks



Glue blocks together

Sand for final geometry



Cut sheets of carbon fiber

Vacuum Bagging

Final Product

Failure Modes and Effects Analysis		
Possible Failure	**Effect**	**Ways to prevent**
Fairing too small	Does not fit existing frame	Build slightly oversized
Mounting points fail	Fairing comes off	Minimize stress
Material breaks	Does not protect driver	Materiel selection is critical
Delamination of composite material	Weakens material, deformation of parts	Do not speed up cure time with heat

Material Selection

-**Carbon Fiber Composite**

-Strong enough to protect driver from debris at speeds of 60mph

-Lightweight enough so that it does not negatively impact performance of car

CFD Analysis

Drag Coefficient = **0.36**