



VENTURI *Buckeye Bullet 2*

OSU Home | Links | Contact Us | News | Get Involved | Login
The Next Generation In Landspeed Racing

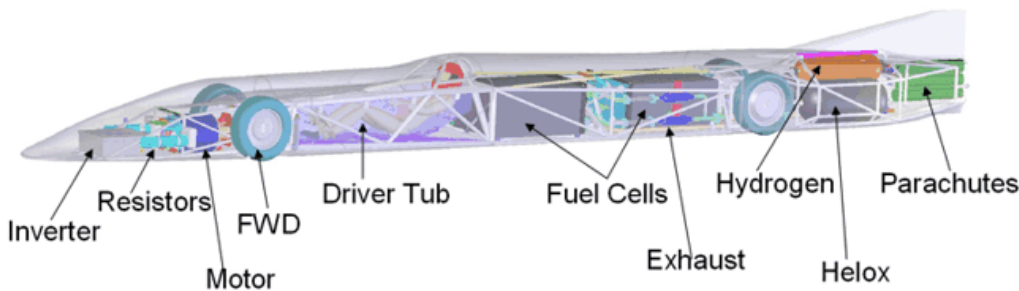
Home
The Vehicle
The Race
The Team
The History
Our Sponsors
Multimedia

venturi buckeye bullet [Version Française](#)

The Vehicle

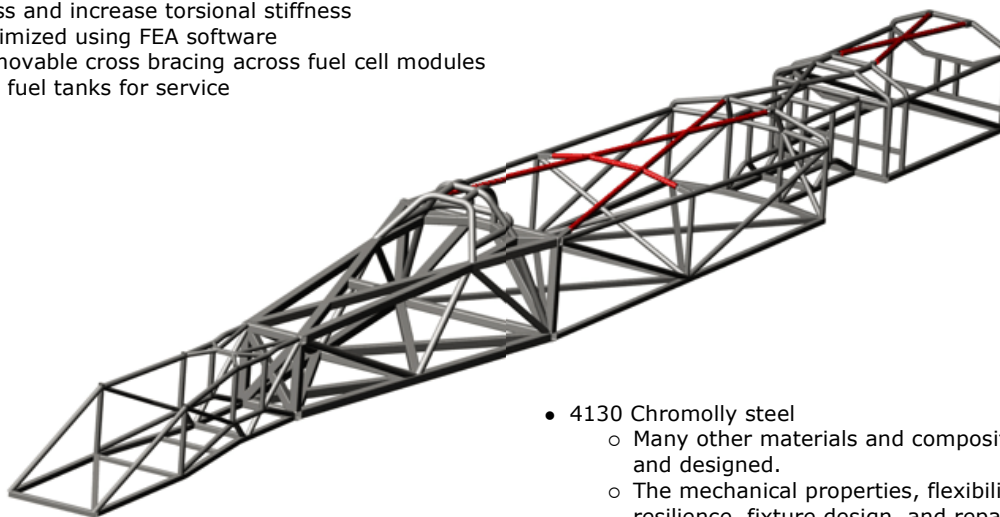
Overview

- Next generation of Landspeed Racing
- Worlds first hydrogen fuel cell streamliner
- Designed and built by engineering students at The Ohio State University
- Currently set to run in Bonneville's EIII Class at Speedweek 2009
- Driven by a custom 700+ HP electric motor
- Fueled by onboard Hydrogen and Oxygen
- Designed for safety from the ground up
- 50+ channel data acquisition system, wireless telemetry, and GPS locating system
- Test bed for research in many numerous areas



Chassis

- Designed using Solidworks CAD software to reduce mass and increase torsional stiffness
- Optimized using FEA software
- Removable cross bracing across fuel cell modules and fuel tanks for service



- 4130 Chromolly steel
 - Many other materials and composites were analyzed and designed.
 - The mechanical properties, flexibility in joining, resilience, fixture design, and reparability on the salt all lead to its' selection
- Range of cross sections (square, rectangular, round)

- Range of thicknesses (0.049" - 0.095")

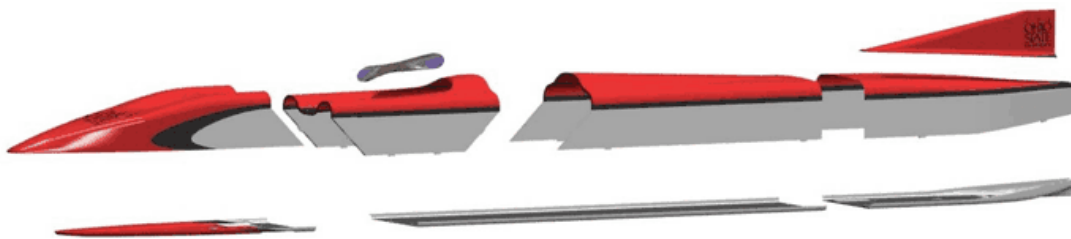
Aerodynamics

- Requirements & Considerations
 - Low drag
 - Low pitch sensitivity
 - Lateral/crosswind stability
 - Appropriate down force
- CFD
 - Computational Fluid Dynamics: the use of numerical methods and algorithms to solve the Navier-Stokes equations, which define single-phase fluid flow, on discretized geometry
 - CFD provides a virtual wind tunnel: body shapes can be aerodynamically simulated without manufacturing physical prototypes, design changes can be evaluated quickly, accurately, and economically
 - Models solved in parallel on 12 processors
- Wind tunnel
 - Critical for CFD validation
 - 1/3 scale model
 - Open test section wind tunnel
 - 64 static pressure measurements for CFD correlation
- For more information on high-performance, parallel computing, see <http://www.osc.edu>
- For more information on FLUENT, see <http://www.fluent.com>
- For more information on the Penske Technology Group wind tunnel, see <http://www.pensketechology.com>



Body

- Designed using Solidworks CAD software and optimized using CFD and windtunnel testing
- Carbon fiber skin
- Nomex honeycomb to increase stiffness and strength and reduce weight
- CNC machined molds for ultimate accuracy
- Multiple quick release panels to allow for easy access maintenance
- Interchangeable fin section to allow for future changes to vertical surface area.



Driveline

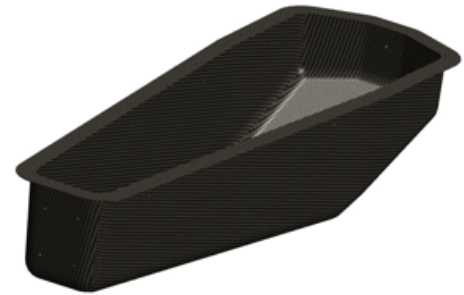
- Custom machined solid aluminum wheels and high speed Bonneville racing tires
- Semi-custom 6 speed transaxle (Transmission and Differential unit)
- Electrical Traction System
 - Custom built AC Induction Motor
 - 3 Phase
 - Lightweight design
 - 700+ Horse Power
 - High efficiency
- Motor Controller
 - Converts DC electricity to 3 phase AC to drive the motor
 - Very high efficiency



Safety

Driver tub

- Increase stiffness around driver
- Provide impact/ intrusion resistant wall between vehicle and driver
- Eliminate sharp edges and seams around driver
- Prepreg carbon fiber/ aluminum honeycomb composite tube
 - Six (three on either side) layer 3K carbon fiber and,
 - half inch aluminum honeycomb sandwich
- Integrated driver restraint points
 - Additional plies of carbon at driver restraint points
 - distributes loads
- Integrated molded beaded seat
- Mechanically fastened to chassis



Fuel Cell System (Power Plant)

- Combines onboard Hydrogen & Oxygen to create electricity
- Not all chemical energy can be transformed in to electricity (About 60-80%)
- By-products are heat & water
- The cells heat up just like an engine and need to be cooled
- A radiator would cause too much drag traveling at 300 mph, so an ice bath was chosen as the cooling strategy
- See www.ballard.com for more information.

Data Acquisition

- State-of-the-art Bosch Motorsport data acquisition system
- Fully integrated double-layer CAN communication system
- High range wireless telemetry for real-time monitoring of vehicle systems
- On-board diagnostics for real-time driver feedback
- High accuracy GPS-based position and speed logging
- Over 50 channels of data
-