College of Engineering
Department of Mechanical & Industrial Engineering

College of Engineering
School of Electrical Engineering & Computer Science

To Predict ▶ To Design ▶ To Perform

ME, ECE Capstone Design Programs

Team #28 2018 TigerRacing Aerodynamic Package

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TigerRacing Formula SAE

Background

- Largest Collegiate engineering competition
- Aero package is next step in being more competitive
- Team used Aero Sr. Design for load cases
- Team is currently ranked 82 of 556 world wide

Objective Statement

To design, manufacture, and test an aerodynamic package including front and rear wings for the 2018 LSU FSAE team leaving the team with a good foundation on manufacturing and aerodynamic design principals.

Engineering Specifications

Specification	Target	Tested
Downforce at 60mph	>212 lbs	330
Total system weight	<25 lbs	15.0 lbs
Deflection from 50 lb side load	<1”	0.31” rear 0.19” front
Dynamic airfoil ground clearance	>0.5”	1.7”
Center of Pressure location	48% front	52% front
Total time to remove	<5 min	3min 2sec

Safety Considerations

- Follow all SAE safety rules (leading edge radius, etc..)
- Wear proper PPE for manufacturing
- Wear full fireproof driver gear during dynamic testing
- Have proper fire extinguishers and safety gear
- Follow all shop guidelines on proper equipment use

Embodiment

Manufacturing

Water Jet mounts, and inner cores

Foam core with carbon spars

Carbon fiber wing lay up

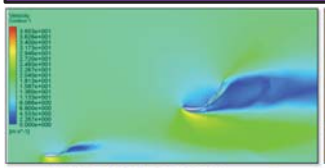
CNC milled wing molds

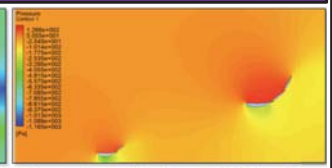
Testing

Initial front wing mount loading to failure

Sensors to data log shock travel

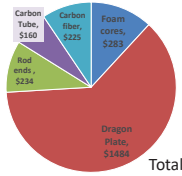
Aerodynamic Analysis





ANSYS FLUENT 2D MODEL	Main	Trailing #1	Trailing #2
Front Assembly: C_L = -3.5, $F_{60\ mph}$ = 92 lbf			
Profile	CH10	E-214	N/A
Chord Length (in)	12	5	N/A
Angle of Attack	6°	40°	N/A
Rear Assembly: C_L = -2.6, $F_{60\ mph}$ = 120 lbf			
Profile	CH10	E-214	E-214
Chord Length (in)	16	9	9
Angle of Attack	6°	40°	62.5°
Anticipated Total Down Force At 60 mph : 212 lbf (Goal is 190)			

Project Management



Total used $2386 of $4000

Concept Generation (August) → Concept Selection (September) → Analysis (October-December)

Build (January-March) → Test (April) → Competition (May 6th)

Sponsors: LSU TigerRacing Formula SAE

Advisers: Dr. Nikitopoulos