Validation of Aerodynamic Downforce Using Micro-Measurements Strain Gages

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Strain gages from Micro-Measurements, a brand of Vishay Precision Group (VPG), are used by the University of Florida SAE Formula Team to validate that new airfoil designs are producing the downforce required to improve cornering. Higher downforce improves corner traction which results in higher g forces and therefore higher corner speeds and providesa competitive advantage.

Company/Institute: University of Florida, Society of Automotive Engineers (SAE) Formula Team

Industry/Application Area: Stress measurement

Products Used:

- Strain gages, CEA-06-250UN-350
- GAK-2-200 Gage Application Kit

The Challenge

The 2015 Formula SAE season will be a milestone for the University of Florida's team, marking the first time in team history that an aerodynamics package is implemented on its prototype vehicle. In simulations the addition of the aerodynamics package, which consists of front and rear airfoils, has been shown to improve cornering acceleration by over 10%. Before the May kick-off of the Formula SAE season in Michigan, the team needed to validate the forces generated by the addition of the aerodynamics package in order to improve the overall balance and performance of the suspension system.

The Solution

Strain gages provided by Micro-Measurements were attached to the rear wing supporting rods to measure the drag and lift forces created by the rear airfoil. Additional strain gages—used to measure the increase in the force provided by the tire—were fitted to the pull rods at each corner of the car.

The User Explains

The addition of the aerodynamics package is the single biggest improvement to our 2015 vehicle, and one that will help us achieve our goal of a top-five finish—out of 120—in Michigan. Using Micro-Measurements strain gages, we were able to get a clear picture of the forces occurring at each corner—a result of the increased loads from the aerodynamics package—as the car was testing. This allowed us to tune the vehicle to improve the overall balance and performance of the suspension system. Don’t miss this great video – click here.

“With Micro-Measurements strain gages, we were able to improve the overall balance and performance of the suspension”

Acknowledgement

Gator Motorsports not only takes pride in our vehicles, but also in the fact that we actively seek ways to share the fundamentals of engineering with the potential engineers of the future. Our organization diversifies its community outreach by hosting events and tours for a variety of university and after school K-12 STEM programs.

We feel it is absolutely crucial to expose children to engineering and higher education at the earliest age possible to foster an interest in science, problem solving and teamwork that will grow as they mature. In addition to our continued support of external programs we also put forth great effort to expand the knowledge base of our fellow Gators. Our program and vehicles are constantly present at various showcases, fairs, and tabling events. Our program consistently generates high levels of attention and interest from our peers.

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