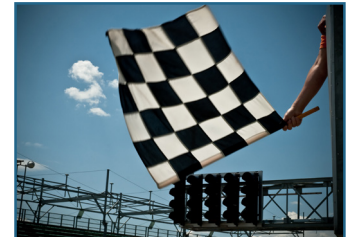


interface

FORCE MEASUREMENT SOLUTIONS.

CASE STUDY

Gopher Motorsports Takes Force Measurement Optimization to the Track



About

The automotive industry, especially in high-performance vehicles, is extremely detail-oriented, in which minor optimizations can go miles to make a positive difference in quality, reliability, and safety. For this reason, high-accuracy force measurement plays a vital role in the testing and monitoring many aspects of a vehicle's operation. For this reason, when Gopher Motorsports, a Formula SAE student group that designs and builds race cars at the University of Minnesota, needed a durable force measurement solution to optimize their car's track performance, they turned to Interface and our partner, Minnesota Measurement Engineering Inc.

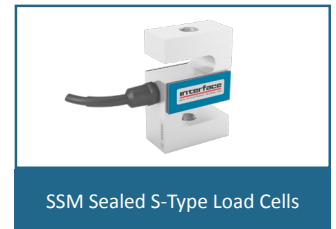
Each year, Gopher Motorsports designs and builds two vehicles, one internal combustion (ICE) and one electric (EV), to compete in the annual global Formula Society of Automotive Engineers (SAE) Series. The competition goal is to design, manufacture, market, and race an open-wheel, open-cockpit, and single-seat vehicle marketable to weekend drivers. In addition to being scored on their vehicle performance, teams are also scored on their business logic and engineering competency.

The University of Minnesota's Gopher Motorsports utilized several Interface force solutions to meet these competition criteria and build top-of-the-line vehicles for which they designed and tested their parts, components, and final cars.

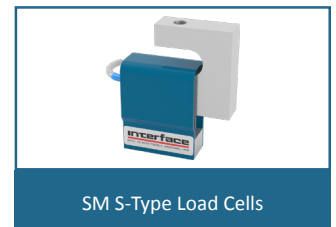
Challenge

In the racing world, cutting excess weight, reducing drag, and optimizing gas and brake pedal force are all essential to exceeding performance standards and winning. One of the most imperative areas of performance optimization is suspension, and it was the exact challenge that Gopher Motorsports needed force measurement technology. They contacted Interface and our affiliated engineering experts at Minnesota Measurement Engineering to solve their challenge.

Gopher Motorsports needed a solution to gather data on loads exerted on suspension linkages. Race suspension has two main roles. The first is to control the car's weight transfer laterally and longitudinally to improve cornering ability. The second design challenge is to control the impacts from bumps or curves to maintain constant contact between the tire and the road surface. The result of optimizing both elements is an increase in grip, which ultimately leads to better lap or stage times. Understanding and optimizing the load exerted on the suspension was critical to Gopher Motorsports' chances in the SAE Series.



SSM Sealed S-Type Load Cells



SM S-Type Load Cells

Interface Solutions

Interface offers a wide variety of load cells, torque transducers, multi-axis sensors, load pins and load shackles, as well as digital instrumentation to collect data, to improve the testing and monitoring process for robotics and automation. These devices are used to run various tests that help to refine the force used by manufacturing line machines and robotics.

This helps OEM's of this type of equipment design their products to the highest quality. In addition to testing, Interface force measurement products can also be installed on the machine or robotic equipment to monitor force or torque in real-time. This helps quality managers identify any issues with the machines prior to a disruption in the production line. By using Interface force measurement products for real-time monitoring, OEM factories can inch closer to the dream of a self-sufficient Industry 4.0 model.

Solution and Results

The auto industry has long relied on Interface products and services for accurate test and measurement programs. Whether using our standard or custom load cells, mini load cells, calibration systems, multi-axis sensors, or specialized torque transducers like AxialTQ, the applications using our quality sensor technologies are diverse in this sector. For Gopher Motorsports, we worked directly with the team to identify a solution to meet their suspension testing needs and improve the performance of their vehicles.

Interface builds small, diverse, and high-accuracy load cell sensors to meet the growing demands of the automotive and vehicle industry. Nearly every industry segment has numerous priorities as they compete to design, engineer, build, and supply new and innovative vehicles. In automotive racing, we see the results of those optimizations almost immediately, making Gopher Motorsports an inspiring customer.

Race car suspensions require fine-tuning for the best performance on various tracks. Simulation of bumps, banking, and other track conditions results in off-axis loading. Load cells allow a race team to measure forces during simulated laps and real-time track testing.

Gopher Motorsports used 12 Interface Mini Load Cells:

- 10 - SSM Sealed S-Type Load Cells
- 2 - SM S-Type Load Cells at 1,000 lbf capacity

The load cells were mounted in line with the suspension on their Go4-23c vehicle. The team performed the test by doing a long series of representative tests on the track, optimizing the performance based on the sensor's data.

Interface provides a discount to universities and educational programs. Gopher Motorsports is an excellent example of the power of force measurement used in automotive testing and investing in educational programs worldwide. We are proud to be their load cell supplier to the automotive industry, racing teams, race car testing tracks, and educational programs. To learn more about Interface solutions available for the automotive industry, racing, commercial, or consumer, please get in touch with Interface.

"Based on the data (from Interface's SM-1000 Load Cells), we will be able to update load cases through all the suspension components to more accurately simulate our system response to loading before the parts are ever manufactured, which will allow our parts to be lighter and stronger! Thanks to Interface for helping us with selection and for a discount on the load cells; you helped make testing like this possible."

**Gopher Motorsports, University of Minnesota
Jacob Henderson**

