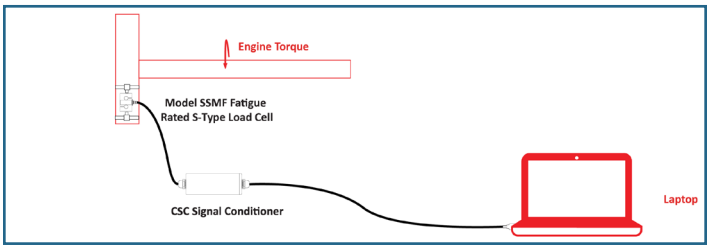
FORCE MEASUREMENT SOLUTIONS

CASE STUDY

Interface's Crucial Role in Vehicle and Urban Mobility Markets



About

Our sensor technologies, including precision load cells and torque transducers, have been used in the design and testing of hundreds of thousands of vehicles including major automotive manufacturers and their partners. This includes makers of vehicles of all sizes, EV cars to big rig trucks, and along with hundreds of motorized vehicle models. As the vehicle industry has evolved drastically over the past century, so has the innovative use cases and applications that require Interface force measurement solutions. If it moves, it likely needs force and torque testing. This is particularly true for the evolving trends in urban mobility. This market category includes a wide range of innovations designed to get people and things from point A to point B. It includes unmanned vehicles like drones, autonomous vehicles as well as the wide range of alternatively fueled and electric vehicles.

Customer Needs / Challenges

Customers of Interface buy our standard and custom products and services for one of two reasons: 1) they need to test the force and torque of certain components to confirm or improve a design, or 2) they need a force solution integrated into the design of their product to provide real-time data on a function in use an performance.

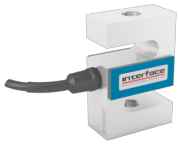
In vehicle and urban mobility industry, customer applications are for both types of test solutions and predominately safety is their number one concern. From the reliability of automotive features like brakes and seatbelts to the ability for a drone to firmly hold a package hundreds of feet in the air, testing the vehicle components is a necessary step in bringing it to market. Performance is also a key consideration for force measurement solutions in these industries. Load cells and torque transducers are used heavily to test engine design and performance.

Interface has a wide variety of off-shelf solutions that have been used for many years to test components including load cells, miniature load cells and load buttons, torque transducers, instrumentation, and accessories. As more digital requirements in testing become standard, wireless and Bluetooth solutions are common requirements, along with frequently requests for engineer-to-order and customization of our products.

BPL Pedal Load Cell

BTS-AM-1 Bluetooth® Telemetry System

WMC Sealed Stainless Steel Miniature Load Cell



SSMF Fatigue Rated S-Type Load Cell

Interface Solutions

There is a long and growing catalog of Interface solutions used in vehicle and urban mobility applications, from single load cells to entire force measurement systems.

Brake Pedal Testing

The first is the application of our **BPL-300-C Pedal Load Cell**, which was used to help a customer measure and refine brake pedal force during automobile testing. Automotive OEMs need to test brake pedals to ensure when a driver provides force on the brakes, the brake pads provide the correct corresponding force to slow down or stop an automobile at the desired speed. Interface's BPL-300-C was installed on a brake pedal and then connected to a **BTS-AM-1 Bluetooth Low Energy Strain Bridge Transmitter Module**, which collects and transmits data to our BTS Toolkit Mobile App. This solution allowed the customer to record and review data from a mobile device while out on a test track. The force data helped the customer refine and confirm the design of its brake pedal system.

Drone Delivery

The next application example can be categorized under the realm of urban mobility. Recently, Interface has received requests for force solutions related to drones and more specifically, drone package delivery. Drone delivery provides shipping and fulfillment companies with the capability to vastly improve delivery times for customers. This novel solution is being deployed within several large companies such as Amazon, which received a lot of media attention about its plans to implement more drone technology into its shipping processes. One of the key steps in this process is designing the drone to measure the weight of the package it's carrying so the propeller motors can compensate for weight shifting or uneven weight. In this application, Interface supplied four **WMC Sealed Stainless Miniature Load Cells** to measure the weight of the payload and detect in-motion weight shifting and uneven weight distribution. As the load cells detect this data, it will send a signal to the propeller to increase RPMs on the propellers and adjust balance and weight distribution.

Electric Vehicle

In the electric vehicle (EV) market, one of the most integral pieces of technology is the battery used to run every piece of hardware and software in the car. One of the critical tests performed on EV batteries is compression testing. As an EV battery is charged and stores more electrons, it swells. If the packaging housing the batteries is not intelligently designed to compensate for this swelling, you could have a major problem. For this challenge, Interface can supply a WMC miniature load cell. The load cell will measure compression force as a battery goes through charge cycles on a test stand to determine the force given off as the battery swells. This allows our customers to design the proper packaging for the batteries.

Engine Performance

The final application example is related to using force to measure engine performance. Force and torque sensors are often used in conjunction with a dynamometer, which isolates the engine's power output to help quantify its overall performance. The solution Interface helped develop included a precision **SSMF Fatigue Rated S-Type Load Cell** attached to a torque arm which "feels" the torque from an engine loading system. The fatigue rating on the load cell allows it to accurately measure performance for extended cycles. A signal conditioner is also attached from the load cell to a computer to ensure clear transmission of data. This solution allows the engine manufacturer to accurately measure torque being produced by the engine. This data helps engineers analyze power transfer and ultimately tune the engine performance to where it needs it to be.

Learn More

The vehicle, manned, unmanned, electric and alternative fuel testing is growing as the market solutions evolve. Age-old test processes are still critical, while innovation in vehicle technology and urban mobility have led to new ventures and new solutions. Through it all, force measurement remains a key component to accurate design and test of a wide variety of vehicle function to ensure performance, reliability, and safety.

Interface has grown alongside this industry and has been ahead of the force testing curve throughout history. Whether customers need an off-the-shelf sensor components, or a custom, engineered-to-order system, Interface will work directly with them to determine the right force measurement solution to meet their evolving needs.