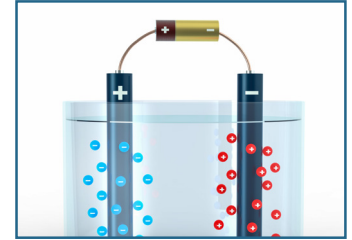


# interface

FORCE MEASUREMENT SOLUTIONS.

## CASE STUDY

### Interface Solutions for Growing Green Energy



#### About

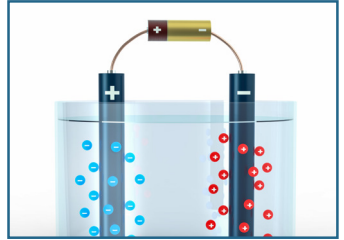
Green energy investment is driving demands in renewals and to address climate change. Billions of dollars of infrastructure for alternative energies and innovations dependent on alternate sources like electric vehicles to reduce their carbon footprints. As renewable and green technologies grow in demand, so does the testing equipment used to design and validate new products.

#### Challenge

New technologies in energy drives the critical need to monitor, test and validate concepts and designs. In the energy industry, many of the alternative source technologies are inventive, newer and need custom measurement solutions to take on the challenges. For instance, in the electric vehicle industry, the batteries used to power these vehicles need to be optimized for performance and have gone through many iterations involving a ton of testing. Energy regulations also mean that there are very strict requirements. Any testing equipment must provide exceptional accuracy and thorough reporting. Alternative energies in their infancy are very cost prohibitive. Therefore, it is important that cost effective testing solutions are provided to help engineers and manufacturers minimize total costs. Interface force testing solutions can help to solve and lessen the burden on each of these challenges.

#### Interface Solutions

Interface provides the industry's most accurate and reliable force sensors, and we have been working with organizations in the energy industry, both traditional and alternative. We understand the unique requirements of green energy and have developed a widening line of products uniquely suited for these innovations. We've recently worked with multiple types of components for electric vehicles including batteries, engines and more, as well as with alternative energy sources like wind, solar, and hydrogen power. Interface brings the accuracy and reliability, in addition to having an expert engineering team that can quickly develop customized solutions.



LWHP14 Precision Load Washer Load Cells



T2 Ultra Precision Shaft Style Torque Transducer



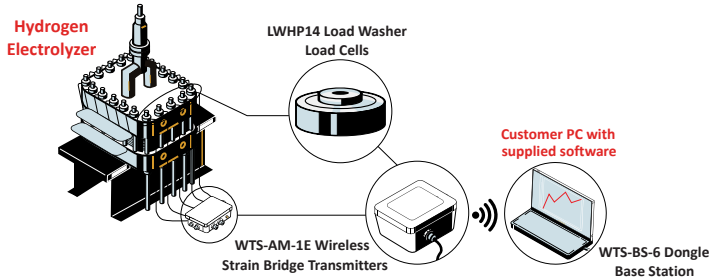
SSB Sealed Beam Load Cells



WTS-AM-1E Wireless Strain Bridge Transmitter Module

Interface solutions are cost effective and can often end up saving critical dollars in the long run. Take for example a recent case study we developed in which we outlined our role in harnessing hydrogen power using an electrolyzer. In this case, force sensors were used to significantly reduce downtime by creating an automated monitoring system that replaced regularly scheduled maintenance that was often unneeded but caused downtimes. And with that process came significant losses in energy and money. Interface helped to create an autonomous monitoring system that reduced downtime and ultimately estimated the customer would break even on their investment on the force monitoring system in one year.

## Electrolyzer and Fuel Cell Tie Rod Monitoring

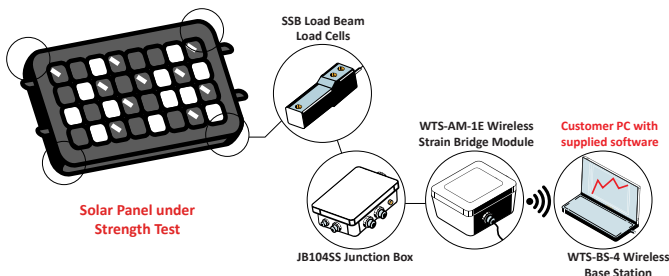
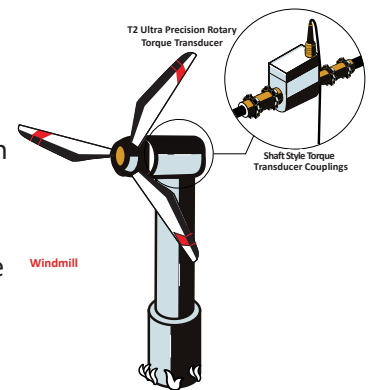


Converting to renewable energy is one of the primary tools to fight climate change. Storage of energy is critical to make renewables work, and hydrogen, or its derivatives are a promising way to store power. Electrolyzers convert power to hydrogen, and fuel cells convert the hydrogen back to electricity. They are both made by stacking multiple anode and cathode plates and a membrane between each, and tie-rods hold them in place. A real-time monitoring system is needed to measure the tension of the tie rods in order to avoid costly preventive and unplanned maintenance shutdowns.

Interface suggested installing LWHP Precision Load Washer Load Cells connected to WTS-AM-1E Wireless Strain Bridge Transmitter Modules, under the bolts of the tightened tie rods. The WTS-AM-1E's are encased in a junction box enclosure. The LWHP's measure the tension between the plates from the tie rods, and the real-time results are transmitted wirelessly from the WTS-AM-1E's to the WTS-BS-6 Wireless Telemetry Dongle Base Station when connected to the customer's PC. Interface's load cell monitoring system successfully monitored the tie-rods tension in real time, thus preventing unnecessary costly preventive maintenance and unplanned shutdowns of the electrolyzer.

## Windmill Energy

A customer wanted to improve the performance of a windmill by adjusting the blade pitch and measure the torque generated as power ramps are studied. Interface provided a T2 Ultra Precision Shaft Style Rotary Torque Transducer coupled between the windmill blade propeller and electric generator. Information was sent to customer's Data Acquisition System (DAQ). Using this solution, the customer was able to use torque data to determine the optimal blade pitch for the windmill and the windmill will generate more power and with less stress on the bearings



## Solar Panel Strength Testing

A solar panel manufacturer wanted to test the strength and durability of their solar panels. Solar panels should be able to withstand objects and other debris flying 50 mph during storms and other kinds of weather. Interface suggested installing four SSB Load Beam Load Cells to the bottom four corners of the customer's solar panels, connected to a JB104SS Junction Box and a WTS-AM-1E Wireless Strain Bridge Transmitter Module. Drop tests of items with different weights are conducted, and the maximum load capacity was reached, the results

were displayed, graphed, and recorded with the WTS-BS-4 Wireless Base Station connected to the customer's PC. Interface's SSB Load Beam Load Cells successfully measured the amounts of force their customer's solar panels were able to take during their drop test.

## Learn More

Clean energy is in high demand and the investments in this technology are growing. Interface has the solutions, or can create custom solutions, to navigate the challenges of innovation within the space. Contact to learn more.