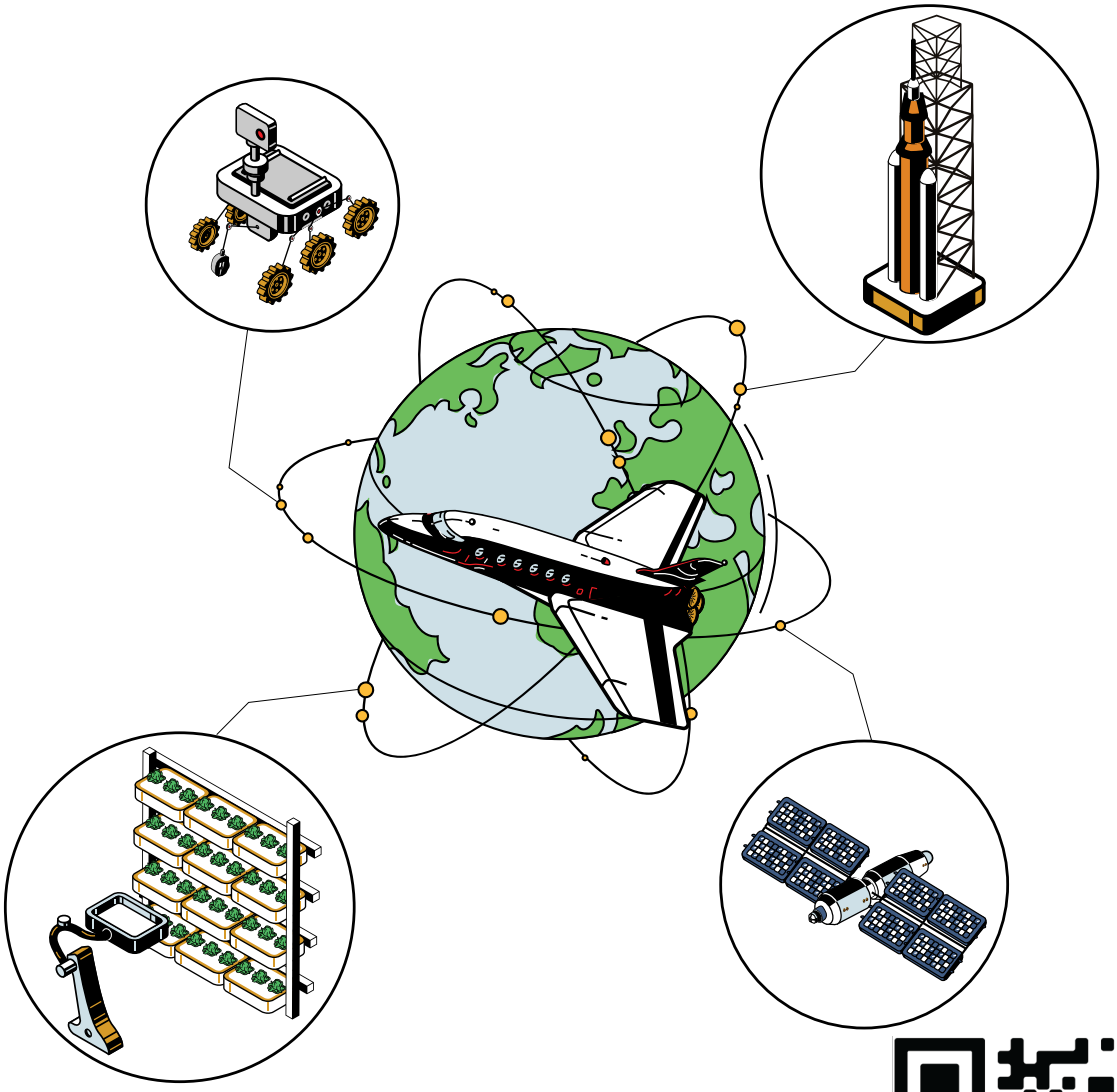
Interface

Space Economy Solutions



Space Economy Solutions v1.1

Space exploration and research is becoming one of the world's number one platforms for innovative research, technology, and global economics. From mining on the moon to deep space exploration, Interface provides sensor technologies used in the advancements that fuel the growth of the space economy.

There is a revolution happening when it comes to sustainability and growing digital technologies, the two largest economic transitions of our day and age. Interface plays a vital role in the future of the space economy, especially with scientific research and development (R&D), and deep space discoveries.

The Space Renaissance

The world is currently in a space renaissance: a time where there is a huge push towards technological innovations and possibilities in space. Interface continues to grow our precision measurement products and services, especially in the space sector. Our focus is to provide our force measurement technologies for use in space research, biotechnology, sustainability, and habitation in space.

Interface has always been involved with the creation of opportunities for economic growth, job creation, and technological advancements both on Earth and beyond. We offer a wide range of precision load cells, torque transducers, load pins, miniature load cells, digital instrumentation used for the space economy industry. Interface often creates custom solutions for unique and specific space applications, as detailed below.

Advancing Rover Landing Gear Capabilities

A space innovator needs to measure the cushioning effect of their interplanetary rover landing legs through a drop test. They need to know how much force the landing gear can absorb until failure. Using our INFRD Platform Scale, which has four shear beam load cells installed at the corners of the scale, a drop test is conducted at different heights. Results are summed using a JB104SS Junction Box built in the scale. The results are measured and logged on the provided SD card and can be viewed and logged using our 9330 instrument.

Space Dock Capture Ring Force Testing

An aerospace leader wants to test their spacecraft docking simulator by measuring the forces of the actuators used during the "lunge" when the soft capture ring is lunged forward to latch onto a space vehicle when it is mounted. The test needs to monitor it is working properly when engaged, and that it does not go past its over-load force limit. Interface suggests using multiple WTS 1200 Standard Precision LowProfile™ Wireless Load Cells to be installed to the actuators of the capture ring. Measurements are recorded through the WTS-AM1E Wire-less Strain Bridge Transmitter Module and transmitted to the WTS-HK-S Next-Generation Wirelesss Handheld or the WTS-BS-6 Wireless Telemetry Dongle Base Station to record, log, and graph on a computer.

Rocket Structure Testing

NASA's Space Launch System (SLS) core stage will be the largest ever built at 27 feet in diameter and 200+ feet tall. Core components including liquid hydrogen and oxygen tanks must withstand launch loads up to 9 million pounds force (lbf). Interface load cells attached to hydraulic cylinders at various locations along test stands to provide precise test forces. Strain gages bonded to rocket structure surface and connected to data acquisition system for stress analysis. Engineers are able to measure loads applied at various areas on the rocket structure, verifying the structural performance under simulated launch conditions.

LowProfile® Load Cells



1000 Fatigue Rated LowProfile™ Load Cell
250 lbf to 50K lbf 1.25 kN to 225 kN



1200 Standard Precision Low-Profile™ Load Cell
300 lbf to 100K lbf
1.33 kN to 445 **kN**



1100 Ultra Precision LowProfile™ Load Cell
300 lbf to 200K lbf
1.33 kN to 890 kN

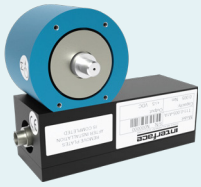


1200 High Capacity Standard Precision LowProfile™ Load Cells
200K lbf to 2,000K lbf
890 kN to 8,896 **kN**

Torque Transducers



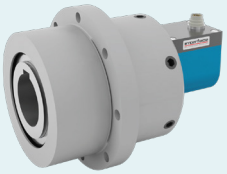
T2 Ultra Precision Shaft Style Rotary Torque Transducer
0.9 lbf-in to 177K lbf-in
0.1 Nm to 20K Nm



T11 Bearingless Low Capacity Shaft Style Rotary Torque Transducer
0.04 lbf-in to 1.33K lbf-in
0.005 Nm to 150 Nm



T7 Dual Range Pedestal Mount Shaft Style Rotart Torque Transducer 44.3/4.43 lbf-in to 885/88.5 lbf-in 5/0.5 Nm to 100/10 Nm



T22 Pulley Belt Style Rotary Torque Transducer
177 lbf-in to 44.3K lbf-in
20 Nm to 5K Nm

Muti-Axis



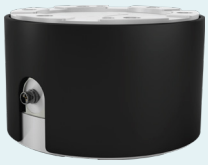
T25 High Speed Shaft Style Rotary Torque Transducer
0.885 lbf-in to 44.3K lbf-in 0.1 Nm to 5K Nm



5400 Series Flange Style Reaction Torque Transducer
1K lbf-in to 500K lbf-in
110 Nm to 55K Nm



6A Series 6-Axis Standard Capacity Load Cells
Force: 11.2 to 22.5K lbf
Torque: 8.85 to 88.5K lb-in
Force: 50 to 100K N
Torque: 1 to 10K Nm



6A Series 6-Axis High Capacity Load Cells
Force: 11.2K to 180K lbf
Torque: 88.5K to 354K lb-in
Force: 50K to 800K N
Torque: 10K to 40K Nm

Instrumentation



Wireless and Bluetooth
INF-USB3 Universal Serial Bus Single Channel PC Interface Module
±3 mV/V, ±4.5 mV/V ±5 VDC, ±10 VDC
4-20 mA, 12 ±8 mA and 5V TTL



9870 High Speed High Performance TEDS Ready Indicator
Nonlinearity 0.01% Full Scale
24 Bit A/D Converter



9894 Analog Input Process Indicator
0-20 mA, 4-20 mA, 0-5 V, 1-5 V, and ±10 V Inputs 0.03% Accuracy



BX8 8-Channel Data Acquisition System and Amplifier
±5V, ±10V, 4-20mA, and 0-20 mA Outputs
8-Channel Synchronized Sampling

Wireless Telemetry and Bluetooth® Telemetry Systems



WTS 1200 Standard Precision LowProfile™ Wireless Load Cell
300 lbf to 100K lbf
1.5 kN to 450 kN



WTS-BS-6 Wireless Telemetry Dongle Base Station
Compact & Portable Logging
Fast Configuration
500m Wireless Range



WTS-HK-S Next-Generation Wireless Handheld
Connect up to 12 transmitters
Provides summation of up to 12 transmitters



BTS-AM-1 Bluetooth Telemetry System
"AA" Battery Powered Bluetooth Strain Gage Transmitter

HIGHLIGHT: Vertical Farming Monitoring in Space

Customer Challenge

Vertical farming is the production of produce in a vertical manner using smart technology systems. In space, this is critical to sustainability and water preservation. To help in the space harvesting, automated mechanics are used to pick up and move the plants using less human involvement and reducing possible contamination. A wireless force measurement system is needed to monitor the robotics used in the space application.

Interface Solution

Interface suggests installing SPI Low Capacity Platform Scale Load Cells, along with WTS-AM-1E Wireless Strain Bridge Transmitter Modules withing a robotic lifting system manages the vegetation. The WTS-AM-1E's wirelessly transmit the data collected from the SPI's to the WTS-HK-S Next-Generation Wirelesss Handheld, and the WTS-BS-6 Wireless Telemetry Dongle Base Station for monitoring.

Results

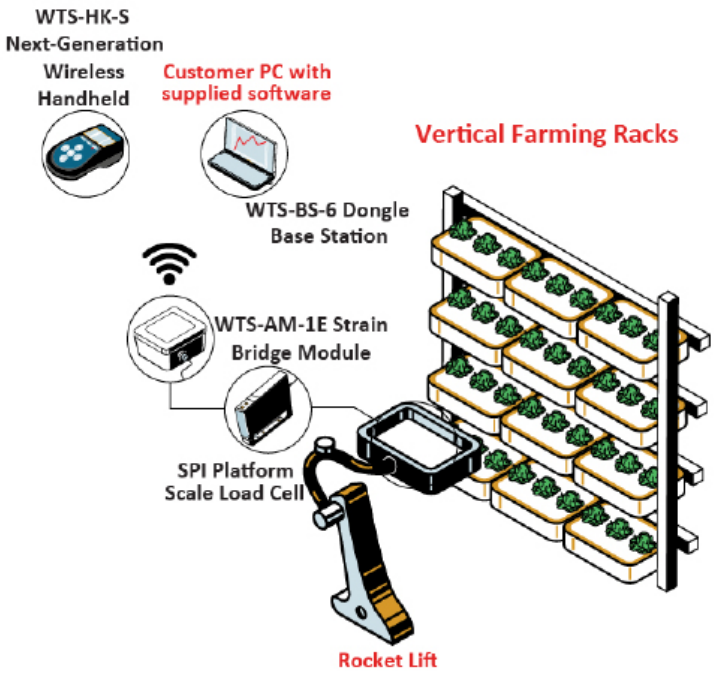
Interface's SPI Load cells and Wireless Telemetry System successfully detect and monitor the produce platform for their robotic lift system, and can now be navigated to the next step of their packaging line.

Materials

- SPI Low Capacity Platform Scale Load Cells
- WTS-AM-1E Wireless Strain Bridge Transmitter Modules
- WTS-BS-6 Wireless Telemetry Dongle Base Station with supplied Log100 software
- WTS-HK-S Next-Generation Wirelesss Handheld
- Customer PC or Laptop

How it Works

The SPI Low Capacity Platform Scale Load Cells and WTS-AM-1E Wireless Strain Bridge Transmitter Modules are installed in the center of the platform on the lifting mechanism. The produce is slid onto the lifting mechanism. The produce weight is detected by the SPI's, and the WTS-AM-1E's wirelessly transmit the data to both the WTS-HK-S Next-Generation Wirelesss Handheld and the WTS-BS-6 Wireless Telemetry Dongle Base Station with supplied Log100 software on the customer's PC. Data can be displayed, logged, and graphed.



A More Sustainable Future

This renewed interest in space exploration has created new technologies that still affect humans here on Earth, both impacting and improving life for humans on a daily basis. Different products such as camera phones, portable computers, and wireless gadgets are all in existence thanks to space exploration. As technology continues to advance, so does the reliance on custom sensors.

Interface Supported Space Economy Applications

Global aircraft, spacecraft, military, and defense companies rely on Interface load cells for thrust, wing, static, and fatigue testing. While structural test applications utilize many types of LowProfile™ load cells, Interface Load Pins, Load Shackles, Load Washers, Load Button Load Cells and Mini™ Load Cells are also used for standard for test, production, and control monitoring applications. With a range of models and capacities available, measuring tenths of a Newton to jumbo load cells with 2 million lbf capacity, Interface standard and custom solutions provide a range of possibilities for the space industry.

Before the air and spacecraft are even assembled, the components need to be manufactured and tested. There are hundreds of machines that are used on the production line for the hundreds of thousands of components needed to complete any of these specialized craft. Interface load cells and torque transducers are found on many of these production and test machines. Our products are used to provide a wealth of insight to guide manufacturers through research, development and final build. Because testing is so inherent for any of these parts, Interface products provide reliability and accuracy when there are no exceptions. Here are the types of applications using Interface products:

- Structural Testing
- Space and Flight Simulations
- Launch Vehicles and Spacecraft Tests
- Engine and Thrust Tests
- Spacewalks
- Robotics and Manipulators
- Space Habitats and Agriculture
- Planetary Exploration Vehicles
- Space Mining
- Space Vehicle Component Manufacturing
- Deep Space Exploration
- Space R&D
- Spacecraft Landing Gear Tests
- Rovers Vehicle Design and Testing
- Microgravity Tests

Space Economy

- High Capacity Load Cells
- LowProfile™ Load Cells
- Fatigue Rated Load Cells
- Torque Transducers
- Load Pins
- Multi-Axis
- Instrumentation
- Wireless Telemetry Solutions
- Interface Mini™ Load Cells
- Digital Instrumentation

If you know what you need and are ready to talk to our application engineers, email or call today!

To learn more about the Interface custom solutions provided call 480-948-5555.

Interface is the world's trusted leader in technology, design and manufacturing of force measurement solutions. Our clients include a "who's who" of the aerospace, automotive and vehicle, medical device, energy, industrial manufacturing, test and measurement industries.

Interface engineers around the world are empowered to create high-level tools and solutions that deliver consistent, high quality performance. These products include load cells, torque transducers, multi-axis sensors, wireless telemetry, instrumentation and calibration equipment.

Interface, Inc., was founded in 1968 and is a US-based, woman-owned technology manufacturing company headquartered in Scottsdale, Arizona.

interface
FORCE MEASUREMENT SOLUTIONS.

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