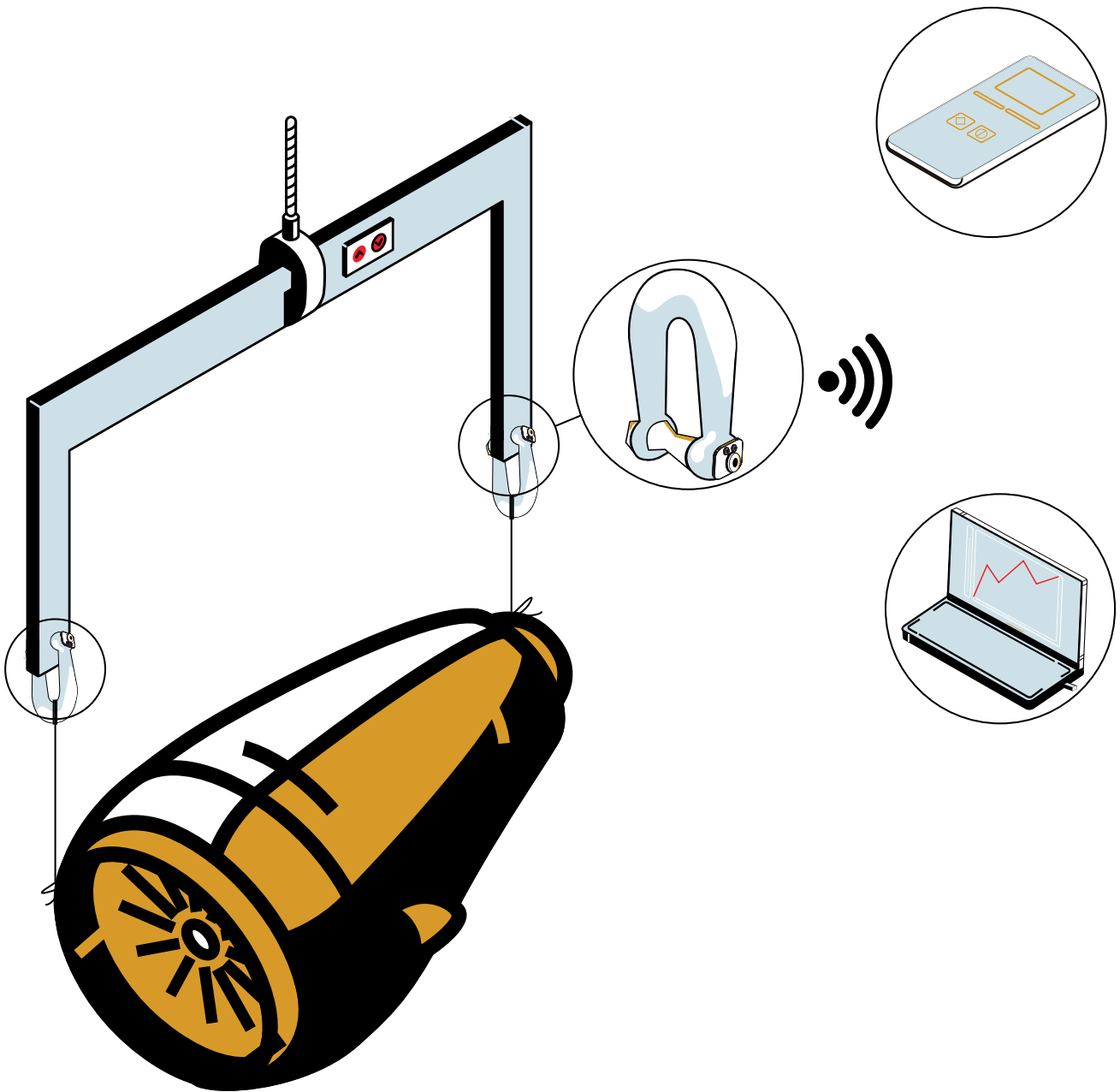


Interface

Aerospace Brochure



Aerospace Brochure v1.2

Interface
FORCE MEASUREMENT SOLUTIONS.

The World Leader in Force Measurement Solutions™

Aerospace Solutions

Interface provides more force and torque measurement solutions for structural, fatigue and static testing of aircraft and rockets than any other company in the world. Aerospace industry leaders and component suppliers depend on Interface's precision load cells, load pins, shackles, torque transducers, instrumentation and multi-axis sensors.



Aerospace

Interface is synonymous with high performance sensors used for all types of test and measurement applications. For more than five decades, aerospace innovators and industrial giants have relied upon Interface to provide precision products and services they can trust. Our recognized quality, reliability, and accuracy are standard for everything we engineer and manufacture. Our solutions are designed for use in aerospace as they must withstand extreme conditions, whether they are testing wings for commercial airplanes or used to measure the force of an intergalactic vessel launch.

The aerospace industry utilizes our standard load cells and sensor technologies, as well as engineered-to-order and completely custom solutions. We are known for our ability to meet the exact specifications in capacities, capabilities and use case requirements for testing and measuring performance in the design and manufacturing of all types of flight vehicles. Since 1968, we have partnered through the advancements and innovations to go above and beyond.

Industry Leading Quality

Interface is celebrated for meeting and exceeding the quality needs for our customers. Our products are built in accordance with A2LA, International Standard ISO/IEC 17025:2017 and ANSI/NCSL Z540-1-1994. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system.

Every Interface manufactured sensor goes through rigorous testing and calibration before it's released to our customers. We provide certificates with each device. Our technical services team provides expert inspection, repair and calibration for everything we make. You can rely on us.



Solution Capabilities

- Testing, production, and control monitoring applications
- Equipment for fatigue and performance testing
- Digital and wireless load cell and instrumentation
- Mobile testing solutions to take in the field and on remote locations
- Industry designed custom solutions
- Specialized sensors that range in sizes of miniatures to jumbos
- Products used by ancillary equipment and component manufacturers

Aerospace Solutions

Interface provides a variety of sensors and accessories, including load cells, reaction and rotary torque sensors, wireless instrumentation, and more for diverse aerospace commercial, industrial and military applications.

Aircraft Structural Testing Load Cells

Interface sensors have been used regularly in the engineering and testing of military aircraft, missiles, space, commercial airliners, and general aviation. One common use case of our force sensors, including load cells and load pins, is for structural testing. Interface LowProfile™ load cells are utilized for structural static and fatigue testing. Our moment and temperature compensated load cells use proprietary alloy strain gages for extreme accuracy and reliability. Using eight proprietary strain gages per sensor, our 4mV/V output well exceeds the performance. .

Load Cells for Data Acquisition and Control Requirements

Our LowProfile™ Load Cells are offered in single, dual, and triple bridge configurations for different data acquisition and control requirements in aerospace vehicle production. Interface 1200 Series Load Cells are frequently used in static testing while the Interface 1000 Series Load Cells are designed for fatigue testing up to 100M fully reversed cycles. The Interface 1700 Series Flange Load Cells are widely used to bolt the load cell directly to the actuator bolt circle. Our Calibration Gold Standard™ and Platinum Standard™ Load Cells are used in testing force sensors in hundreds of testing labs worldwide.

Aerospace Range of Solutions

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 Miniature Tension and Compression Load Cells for standard for test, production, and control monitoring applications. With a range of capabilities available from miniatures measuring tenths of a Newton to enormous load cells with 2 million lbf capacity, Interface's in-stock and custom application specific solutions provide a range of possibilities.

Aerospace Parts and Component Manufacturing

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.

Types of Aerospace Applications Using Interface Measurement Solutions

- Aircraft Wing Fatigue Testing
- Rocket Structural Testing
- Landing Gear Joint Testing
- Hoist Tests for Aircraft Engines
- Helicopter and Parachute Tests
- Vessel Launch Tests
- Wind Tunnel and Environmental Condition Testing
- Reduce Gravity Simulations

HIGHLIGHT: Aircraft Wing Fatigue Application

Customer Need / Challenge

Before any of the U.S. Navy's F/A-18 twin-engine supersonic fighter jets can be put into operation, the wings of the aircraft must undergo fatigue testing in a controlled environment to ensure that they are capable of withstanding the forces that will be encountered during real-world flight throughout the lifetime of the aircraft. Highly accurate measurements must be recorded in order to make sure that a near-exact replication of in-flight conditions are being achieved.

Interface Solution

During fatigue tests, Interface's 1248 Standard Precision Flange LowProfile™ Load Cells are installed in line with the hydraulic cylinders, which apply back-and-forth loading forces to the aircraft. This is carried out over the course of 18 months to simulate in-flight stresses and strains on the wings. Load cells are connected to indicators, which record output.

Results

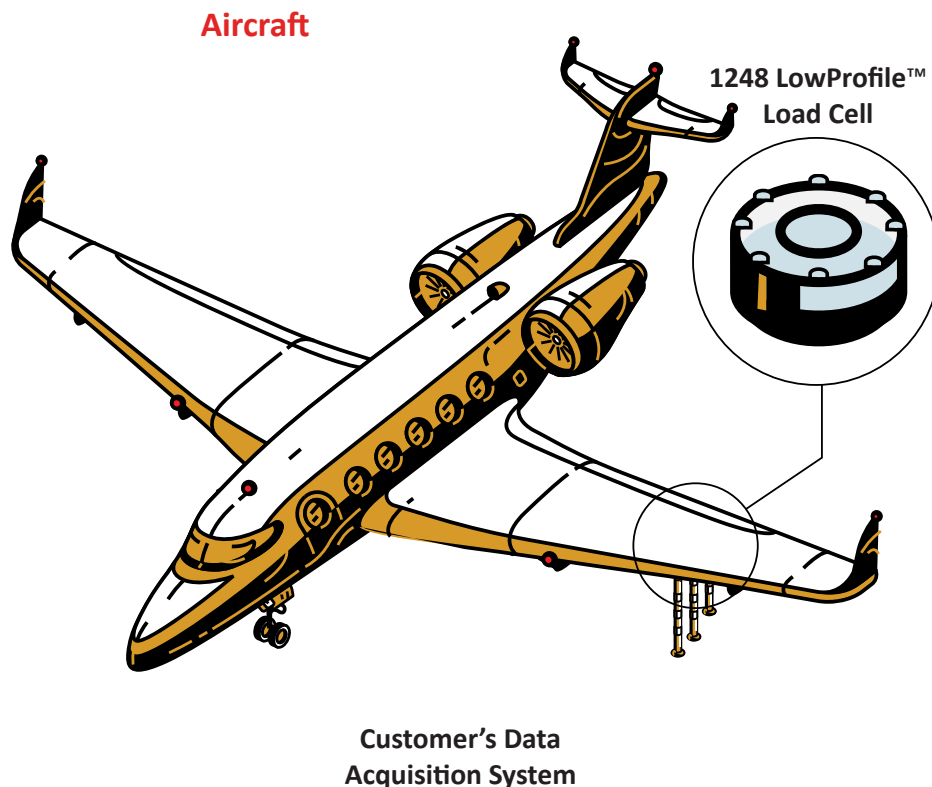
Capable of withstanding more than 100 million (1×10^8) fully reversible load cycles, Interface's LowProfile™ fatigue-rated load cells have performed flawlessly in F/A-18 wing testing – with zero recorded failures in the many years that testing facilities around the world have been using them.

Materials

- 1248 Standard Precision Flange LowProfile™ Load Cell in 500 kN capacity with dual bridge option
- Customer's data acquisition system
- Customer's hydraulic control system

How it Works

The F/A-18 is placed on a hydraulic testing bed where it is subjected to loading that simulates in-flight conditions. Interface's 1248 Standard Precision Flange LowProfile™ load cells are connected to each hydraulic cylinder that applies force to the wings and data is sent to the hydraulic control system. Customer's data acquisition system is then connected to each LowProfile™ Load Cell to record output. The testing facility analyzes the forces being created by hydraulic cylinders to ensure that they are representative of actual in-flight loading conditions.



Product Examples for Aerospace Solutions



1200 Standard Precision LowProfile™ Load Cell
300 lbf to 100K lbf
1.33 kN to 445 kN



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



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



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



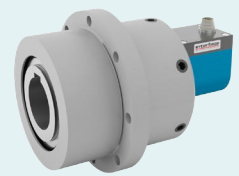
T2 Ultra Precision Shaft Style Rotary Torque Transducer
0.9 lbf-in to 177K lbf-in
0.1 Nm to 20K Nm



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 Rotary Torque Transducer
44.3/4.43 lbf-in to 885/88.5 lbf-in
5/0.5 Nm to 100/10 Nm



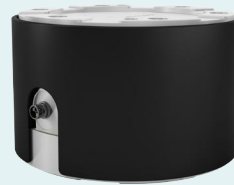
T22 Pulley Belt Style Rotary Torque Transducer
177 lbf-in to 44.3K lbf-in
20 Nm to 5K Nm



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



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



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



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



WTS Wireless Telemetry System
17.7 lbf-in to 44.3K lbf-in
2 Nm to 5K Nm

Exploring Aerospace Force Measurement Solutions

The aerospace industry is responsible for some of the greatest inventions and innovation in our global history. The engineering and manufacturing of a single rocket engine design, using handwritten calculations and with less computing power than a modern smartphone, took us to the moon.

The aerospace industry is an assembly of researchers, design houses, test labs and manufacturing companies that engineer and build vehicles to travel within and beyond Earth's atmosphere using Interface products. The range of aircraft and space vehicles that use Interface solutions include all types from unpowered gliders to commercial and military aircraft, as well as rockets, missiles, drones, launch vehicles, and spacecraft. These vehicles go through extensive and rigorous test and measurement programs and processes requiring the reliability and accuracy of Interface made products.

Aerospace Custom Sensors

As technology and invention pushes the aerospace and defense market forward, so does the reliance on custom sensors. Testing is more sophisticated as the move to big data becomes more prevalent. Interface is partnering with customers in creating custom solutions to address unique and rapidly changing challenges.

One of the biggest areas where we have seen a growing need for custom sensors is on test stands in thrust applications. Test stands are often used in field testing on rocket or airplane engines. In certain field applications, the test stand is outfitted with numerous load cells that must be custom designed with features like weatherization, multiple bridges, very-high precision, and more.

Interface has deep experience developing custom sensors for our aerospace and defense partners for decades. Ask NASA, as we have partnered with them since our early days as load cell experts. We understand the needs of aerospace. We know that by collaborating between our mutual engineering teams, we ensure the sensors are designed and built for the precise use case.

Exploring the Possibilities

If you're interested in learning more about Interface and our solutions for aerospace or need a product for your next project or test, we are here to help. Whether you need a single load cell or a completely customized jumbo load pin, we work as an extension to your team. Our experienced engineers are ready to provide the exact force measurement solutions to meet your requirements.

For sales, service, or support go to www.interfaceforce.com or call us for immediate help.

Aerospace Solutions

- High Capacity Load Cells
- LowProfile™ Load Cells
- Fatigue Rated Load Cells
- Torque Transducers
- Load Pins
- Load Shackles
- Multi-Axis
- Instrumentation
- Wireless Telemetry Solutions
- Load Buttons
- Load Washers
- Interface Mini™ Load Cells
- Gold Standard™ Calibration
- 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.



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