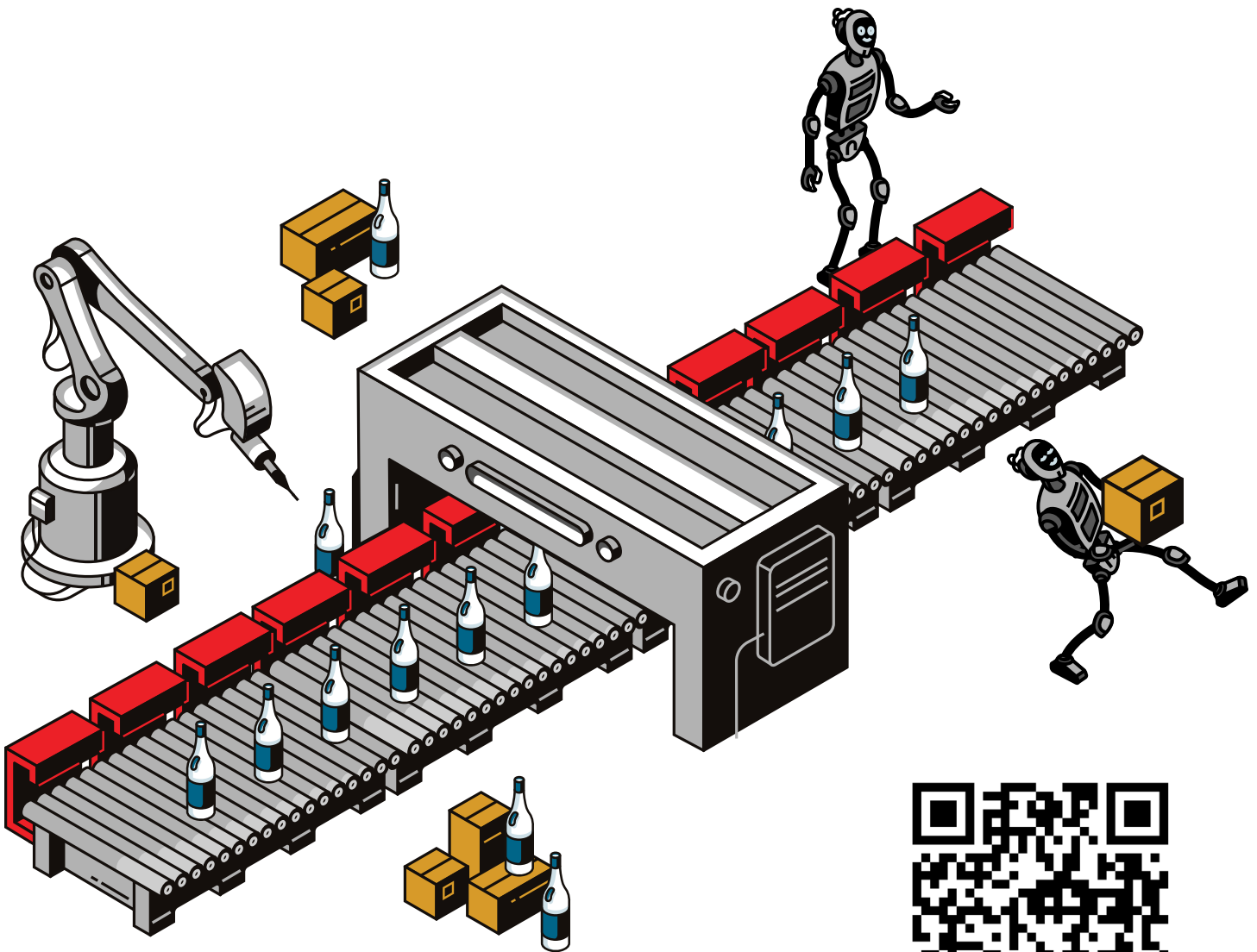


# Interface

## Robotics Solutions



Robotics Solutions v1.0



**In the rapidly growing robotics industry, force sensor technologies play a pivotal role in enhancing the capabilities and safety of robotic systems. Force sensors are integrated into robotic arms, grippers, and end-effectors to provide crucial tactile feedback, allowing robots to interact more intelligently with their environment.**

Force sensor technologies contribute to advancements in force-controlled automation, enabling robots to perform intricate tasks, such as assembly and manufacturing, with increased accuracy and adaptability. Robots and cobots are highly versatile and adaptable to changing production demands, offering enhanced efficiency and agility in manufacturing processes. As the field of robotics progresses, cobots are set to play a significant role in shaping the future of work, creating a harmonious synergy between humans and machines.

### **Robotic Grinding and Polishing**

Robotic grinding and polishing are commonly used in manufacturing for industrial applications. Robots and cobots are programmed to grind and polish on different materials and surfaces. A force measurement system needs to be implemented in order to monitor and control the amount of force exerted on to the grinding workpiece. Interface's Model 6A40A 6-Axis Load Cell can be installed between the flange and the grinding tool. When connected to the BX8-HD44 Data Acquisition, the customer can receive force and torque measurements when connected to their control system using BlueDAQ software.

### **Cobot Safety Programming**

Collaborative robots, or cobots, are offering more manufacturing operations in the industrial packaging industry. Protective cages or fences are no longer needed for safety purposes, but safety testing is still needed to ensure humans and robots can work alongside each other. Four 3-Axis Force Load Cells, creating one 6-Axis Force Plate, are installed between two metal plates at the base of the cobot. Interface suggests installing a 6-Axis force plate under the cobot, and also two ConvexBT Load Button Load Cells in the pinchers of the cobot. If a human were to knock into the cobot, or have a limb stuck in the pincher, the cobot would sense the amount of force measured from the load cells and be programmed to stop immediately.

### **Robot Surgery Force Feedback**

A biomechanical medical company wants to test the force, torque, and tactile feedback from their robotic arm for invasive surgery. The surgeon's movements are mirrored by the robotic arm during surgery, and it is essential all haptic force feedback is measured to ensure safety during invasive surgery. A number of Interface's force and torque measurement products have been used on this robotic arm. These include the ConvexBT Load Button Load Cell, SMTM Micro S-Type Load Cell, and the MRTP Miniature Overload Protected Flange Style Reaction Torque Transducer. Force and torque results can be collected when connected to the BX8 8-Channel Data Acquisition and Amplifier, and viewed when attached to a laptop.

# HIGHLIGHT: Cobot Arm

## Customer Need / Challenge

Robots and cobots are on the rise as they are more affordable, versatile, and user friendly within a range of different industries. However, as they are used to work alongside humans, the need for extensive safety measures need to be taken.

## Interface Solution

Interface's Model 6A40A 6-Axis Load Cell can be installed at the head of the cobot to understand the amount of force and torque being applied during interactions with humans. These results can be logged, displayed, and measured when connected to Interface's BX8-HD44 BlueDAQ Series Data Acquisition System with included BlueDAQ software.

## Results

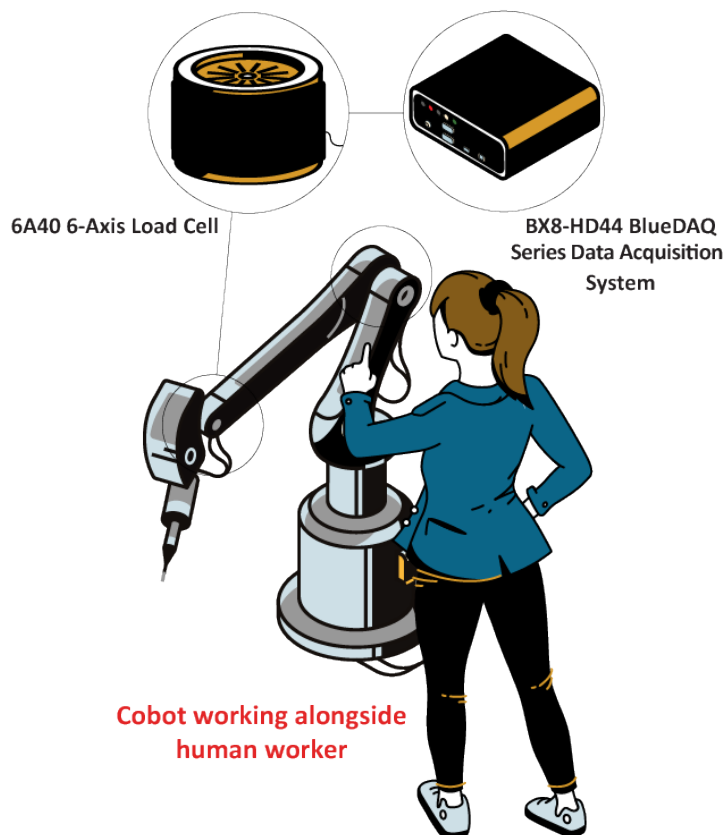
The ability to ensure safety and improve efficiencies had a positive impact in production and output.

## Materials

- 6A40 6-Axis Load Cell
- BX8-HD44 BlueDAQ Series Data Acquisition System with included BlueDAQ Software
- Customer's Robotic Arm and Control System

## How it Works

The 6A40 6-Axis Load Cell is installed at the head of the cobot. For data collection of force and torque measurements, the 6A40 6-Axis Load Cell interfaces with the BX8-HD44 BlueDAQ Series Data Acquisition System. The customer connected the BX8's analog outputs to their control system. As a result, the customer is able to log, display, and graph the measurements. The results are sent to the customer's control system via the selected analog or digital output options.



## Multi-Axis



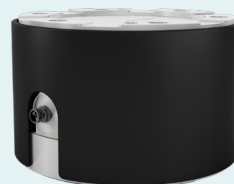
### 3A Series 3-Axis Force Load Cell

Force: 4.5 lbf to 112K lbf  
Force: 10 N to 500 kN



### 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



### 6ADF Series 6-Axis DIN Flange-Type Load Cells

Force: 4.5 to 269 lbf  
Torque: 8.85 to 531 lb-in  
Force: 20 N to 1.2 kN  
Torque: 1 Nm to 60 Nm

## Interface Mini™



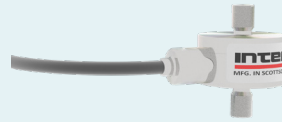
### LBS Miniature Compression Load Button Load Cell

5 to 1K lbf  
0.02 to 4.45 kN



### SMTM Micro S-Type Load Cell

5 lbf to 50 lbf  
20 N to 200 N



### WMC Sealed Stainless Miniature Steel Load Cell

5 lbf to 500 lbf  
22 N to 2,200 N



### ConvexBT Load Button Load Cell

5 lbf to 1,000 lbf  
22.24 N to 4.44 N

## Torque Transducers



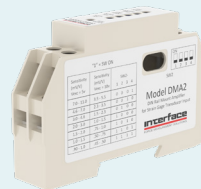
### MRTP Miniature Overload Protected Flange Style Reaction Torque Transducer

1.77 lbf-in  
0.2 Nm



### MRT2P Miniature Overload Protected Flange Style Reaction Torque Transducer

17.7 lbf-in to 17.7 lbf-in  
0.2 Nm to 2 Nm



### DMA2 DIN Rail Mount Signal Conditioner

± 10V, ± 5V, 4-20 mA  
10-28VDC Power



### SGA Signal Conditioner

1.7 lbf-in to 177 lbf-in  
0.2 Nm to 445 kN

## Instrumentation



### 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



### BSC4D Multi-Channel Bridge Amplifier And PC Interface Module

±10V and 4-20mA or USB outputs  
4 independent channels



### 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-HD44 BlueDAQ Series Data Acquisition System

±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-BS-1-HS Wireless Display for Single Transmitters

Simple operation  
Connection to single transmitter module



### BTS-AM-1 Bluetooth Telemetry System

"AA" Battery Powered Bluetooth  
Strain Gage Transmitter

## Advancements In Robotics

The field of robotics has witnessed remarkable advancements, revolutionizing various industries and transforming the way we live and work. Robots and cobots are usually equipped with sensors, actuators, and sophisticated algorithms to perceive and interact with their environment. Interface sensors are utilized in the design, testing and use of robotics. Engineers turn to Interface for load cells, torque transducers, multi-axis sensors, and instrumentation for testing, and to embed into robots for real-time feedback.

Robotics and collaborative robots, often referred to as cobots, have gained significant attention due to their ability to work alongside humans, enhancing productivity, safety, and efficiency in numerous applications. Cobots collaborate with humans in shared workspaces, and are designed to work alongside human operators, supporting them in various tasks. These robots are specifically built to be safe, easy to program, and capable of adapting to dynamic environments.

The use of Interface load cells and torque transducers in robotics offers several benefits. First, they can help to improve safety by detecting excessive forces or overloads. Second, they can help to optimize performance by providing feedback about the forces being applied by the robot. Third, they can enable more sophisticated control of robotic systems by providing real-time data about the forces and torques being generated. Our miniature load cells are commonly used by robotic OEMs to provide control and feedback.

## Partner with Interface for Robotic Solutions

Interface boasts an accomplished team of renowned specialists in force and torque measurement engineering, manufacturing and technology. Leveraging our extensive expertise and diverse capabilities across various industries, we deliver comprehensive solutions tailored to your exact specifications.

The use of artificial intelligence (AI), robotics, and other smart enabled technologies are at the heart of Industry 5.0. To further automate and optimize production processes, there is a strong emphasis on human-centricity, sustainability, and resilience. Interface is working with industry leaders, integrators, and innovators to provide advanced sensor technologies that will support the adoption of Industry 5.0 products, with all the benefits of optimization and reliability.

Whether it's crafting special transducers to meet your unique needs or creating fully customized sensor, instrumentation, and software systems, we collaborate closely as part of your team to ensure precision and satisfaction.

For sales, service, or support, visit [www.interfaceforce.com](http://www.interfaceforce.com) or call us directly at 480-948-5555 for immediate assistance.

# Robotics Solutions

- Load Cells
- Torque Transducers
- Wireless Telemetry Solutions
- Weighcheck Systems
- S-Type Load Cells
- Load Pins and Load Shackles
- Load Buttons
- Interface Mini™ Load Cells
- Signal Conditioners
- Instrumentation
- Multi-Axis Sensors
- Digital Instrumentation
- Calibration Equipment

*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.