

interface

FORCE MEASUREMENT SOLUTIONS.

CASE STUDY

Measurement Data Powers Manufacturing Robotics Intelligence

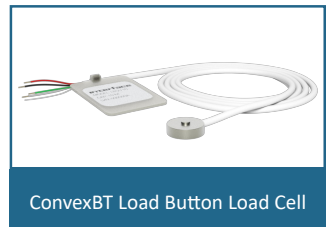


About

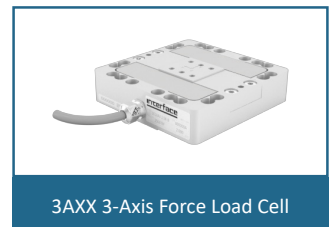
Manufacturing is accelerating past rigid, fixed automation toward adaptable, intelligent production environments powered by collaborative robots, robotic arms, AI vision systems, and humanoids. While vision and machine learning guide path planning, true operational intelligence depends on deterministic physical feedback. In high-mix, close-tolerance production lines facing ongoing skilled labor constraints, next-generation robotics require continuous force and torque measurement to verify seating, regulate contact pressure, and ensure safety. High-accuracy sensor data bridges the gap between digital AI models and physical execution, transforming automated machinery into truly responsive, self-correcting intelligent robotics.

Challenge

Deploying next-generation cobots, articulated arms, and humanoids into dynamic manufacturing cells introduces physical control hurdles that path planning and machine vision cannot solve alone. Ensuring collision safety alongside human teams demands deterministic, low-latency sensory feedback to arrest motion before peak contact forces cause injury or tooling damage. Delicate assembly operations require end-of-arm tooling to resolve minuscule tactile forces while enduring continuous multi-axis moments and off-axis overloads. Engineers face the dual challenge of integrating high-accuracy sensors for data fidelity without sacrificing mechanical performance, overload protection, or long-term fatigue life under high-cycle production rates.



ConvexBT Load Button Load Cell



3AXX 3-Axis Force Load Cell



6A40 6-Axis Standard Capacity Load Cells



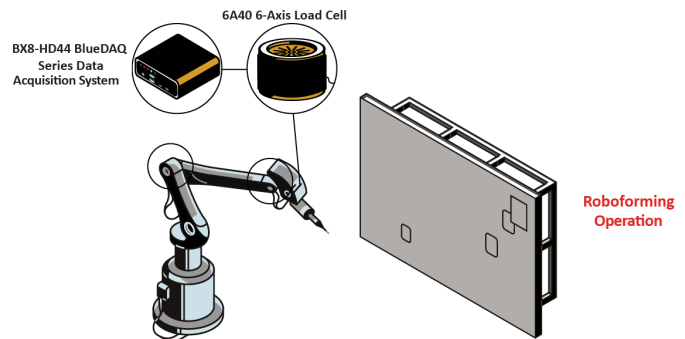
BX8-HD44 Data Acquisition System

Interface Solutions

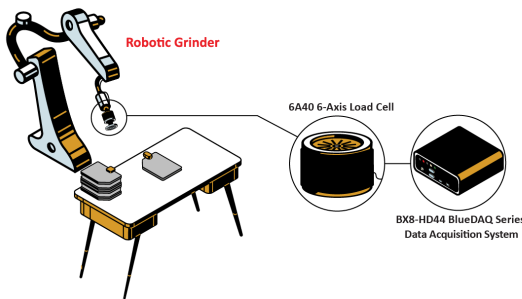
To overcome these engineering and intelligent robotics design hurdles, manufacturers integrate Interface's load cells, multi-axis sensors, and torque transducers directly into robotic architectures, enabling real-time physical feedback and control via wireless telemetry and digital instrumentation.

Roboforming

Robotic Incremental Sheet Forming (RISF) uses a multi-axis arm to progressively shape sheet metal without dedicated dies. To control dynamic tool pressures and prevent sheet tearing or tooling deflection, an Interface 6A40A 6-Axis Load Cell is mounted directly between the robot flange and forming tool. Connected to the BX8-HD44 Data Acquisition System and BlueDAQ software, the system feeds continuous force and moment data to the controller to dynamically regulate downforce and protect robot joints.



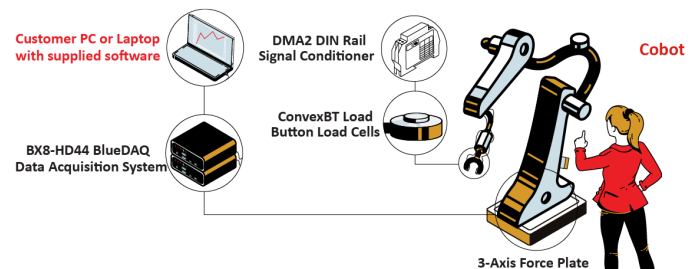
Robot Grinding and Polishing



Automated surface finishing requires consistent contact force across complex contours, compensating for part tolerances and abrasive disc wear. An Interface 6A40A 6-Axis Load Cell is installed at the end-of-arm tooling interface behind the grinding spindle, measuring real-time normal and tangential loads. Using the BX8-HD44 DAQ and BlueDAQ, the setup delivers low-latency feedback for active force compensation, eliminating part gouging and ensuring a uniform surface finish.

Cobot Safety Programming

Collaborative workstations require deterministic physical feedback to enforce human-safe operation. A multi-point sensing architecture combines four Interface 3-Axis Load Cells arranged as a base reaction force plate with two ConvexBT Load Button Load Cells embedded inside the gripper jaws. If anomalous impact forces are detected at the base or grip thresholds are exceeded, the system triggers an immediate safety stop to prevent pinch and collision injuries.



Results

Integrating Interface's precision force and torque sensors turns robotic motion into deterministic execution. Microsecond feedback helps controllers enforce collaborative safety limits and reduce pinch and collision forces before they cause injury. In delicate assembly, continuous force profiling prevents component damage, lowering scrap and tolerance-related rejects. Embedding metrology-grade measurement directly into robotic joints provides the physical data needed for adaptive manufacturing without compromising cycle time or structural reliability. Contact Interface to explore your robotic measurement requirements and the solutions we offer.