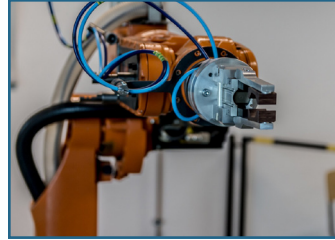


Interface

FORCE MEASUREMENT SOLUTIONS.

CASE STUDY

The Force Behind Accurate Center of Gravity Testing



About

An object's center of gravity (CoG) is the point where its weight is evenly distributed, functioning as a balancing point crucial for stability and performance. Accurate CoG measurement is essential for precision machinery, robotics, lifting devices, vehicle dynamics, and aerospace applications. In robotics, accurate CoG measurement allows for more precise movements and faster cycle times. For lifting devices, it ensures stability and prevents accidents, minimizing risk and liability.

Interface offers precision sensors and instruments for reliable CoG measurement. Our reliable force measurement devices are designed for demanding environments and ensure superior equipment performance while meeting rigorous safety standards required for this type of testing.

Challenge

In mission-critical applications, even the smallest imbalance can have catastrophic consequences. Accurate center of gravity (CoG) testing is paramount, but achieving the required precision presents significant challenges. CoG measurements are essential for ensuring stability and performance in everything from spacecraft design to advanced robotics. However, this task is often complex, requiring precise measurements for critical design and analysis assessments in confined spaces.

Minor deviations in CoG results can have a significant impact, leading to expensive flaws and, ultimately, failures. Testing often takes place in limited environments, demanding powerful yet miniaturized sensors that don't disrupt performance. Furthermore, ensuring consistent and accurate data acquisition is crucial. Inconsistent readings can lead to inconsistent CoG calculations and costly mistakes.

Solutions

Interface offers advanced force sensor solutions and instrumentation that together meet the mandatory needs for accurate and reliable CoG testing. From silos to humanoids, the range of applications requiring accurate center of gravity data are far reaching, have great impact in innovation, structural design decisions and advancements in product designs.



1200 Standard Precision LowProfile® Load Cell



3-Axis Multi-Axis Load Cell



A4200/A4600 Stainless Steel WeighCheck Load Cells

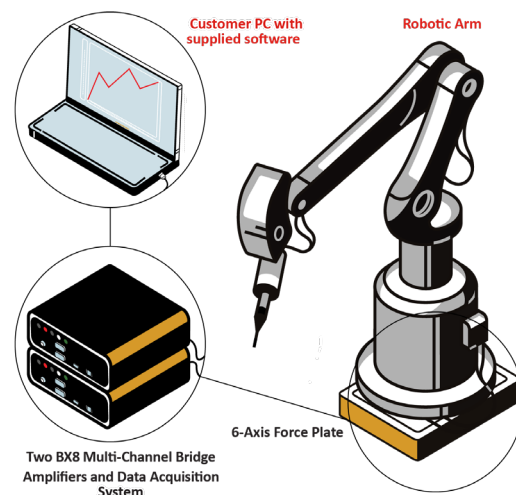


1280 Programmable Weight Indicator and Controller

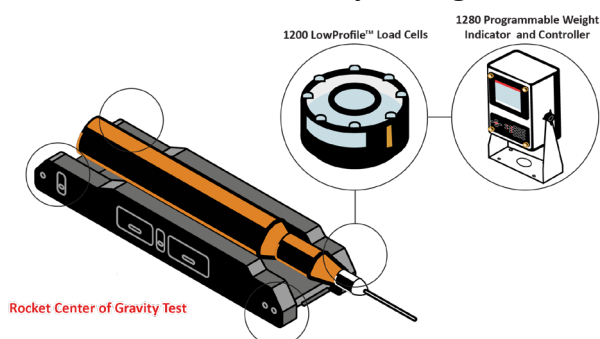
Testing Center of Gravity for Robotic Arm Design

The center of gravity (CoG) is the point at which the total weight of a robot is considered to act and respond. It determines a robot's stability and balance, particularly during dynamic operations. Ensuring accurate CoG measurement prevents tipping, optimizes performance, and enhances safety for human encounters and the robot.

For CoG robotic arm testing, Interface recommends using an advanced force plate solution, which involves installing four high-performance 3-Axis Force Load Cells between two Interface Force Plates. The assembly is then mounted at the base of the robotic arm, creating a single integrated 6-Axis Force Plate capable of measuring forces across all directions. The force data captured by the sensors is processed and visualized using two BX8 Multi-Channel Bridge Amplifier and Data Acquisition Systems. These systems transmit the data to a computer, providing actionable insights to monitor and adjust the robot's stability and CoG dynamically.



Rocket Center of Gravity Testing



Aerospace engineers need precise center of gravity (CoG) measurements to ensure stability, control, performance, and safety. Accurate CoG data is essential during the design, testing, and launch phases of rockets and spacecraft, to prevent tilting, optimize flight dynamics, and meet stringent design and regulatory standards.

Interface recommends a solution utilizing four 1200 Standard Precision LowProfile™ Load Cells, which are integrated into a rocket test frame. Once the rocket is securely placed onto the test setup, these load cells measure the weight distribution at multiple points, enabling precise CoG calculations. The data is processed by a 1280 Programmable Weight Indicator and Controller, allowing engineers to make necessary adjustments and verify compliance with performance and safety requirements.

Stable Tank Weighing Using Center of Gravity Measurement

When monitoring the material in a tank is decisive, determining both the weight and center of gravity (CoG) of the contents is essential. Accurate weight and CoG data help ensure stability during transport, optimize load distribution, and maintain quality and regulatory compliance.

Interface offers A4200 Zinc Plated Weigh-check Load Cells or A4600 Stainless Steel Weigh-check Load Cells as a solution. They are installed at key points beneath the tank to measure the weight distribution accurately. This enables actionable insights for load balancing and efficient material management, ensuring reliable operation and storage.

Interface's force measurement solutions simplify complex center of gravity (CoG) testing. Our precision sensors, load cells, and data acquisition tools deliver unmatched accuracy and reliability, resulting in improved performance, safety, and efficiency across diverse applications. From robotic arms to spacecraft, Interface empowers engineers with the data they need to innovate. To learn more about specific sensors, including our range of LowProfile and Mini Load Cells, Torque Transducers, Multi-Axis Sensors, Wireless Telemetry Systems, Instrumentation and Data Acquisition Systems ideal for CoG measurement projects, contact us today.

