

# PCB PIEZOTRONICS

Manufacturer and global supplier of sensing instrumentation for condition monitoring, research and development, and custom OEM applications

## DELIVERING **TOTAL CUSTOMER SATISFACTION**

to engineers and maintenance professionals worldwide.

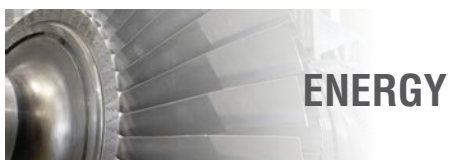
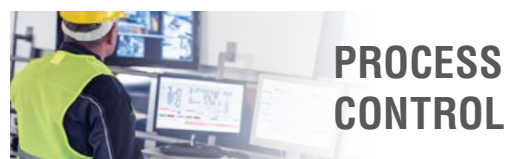


In 1967, PCB Piezotronics revolutionized the sensor industry with our integrated circuit piezoelectric (ICP®) technology, setting the tempo for innovation in sensor design for years to come. PCB's commitment to excellence reached new heights with the acquisition of **Endevco** in 2019, significantly enhancing our ability to meet evolving industry trends in the many markets we serve. As our product portfolio continues to grow, our unwavering dedication remains—empowering you to make dynamic measurements in more reliable, simple, and cost-effective ways.

### **PCB by the Numbers:**

- 1500+ employees worldwide
- 21 domestic and international sales offices
- 105 distributors in 130 countries
- Product mix of over 28,000 models
- AS9100:2016 QMS Certified by DQS, Inc.
- ISO 9001:2015 QMS Certified by DQS, Inc.
- ISO 17025 Accredited

# MAJOR MARKETS SERVED



# AEROSPACE & DEFENSE



## BLAST TESTING

- Peak pressure and total impulse
- Shock wave velocity
- Time-of-arrival measurements

## SHOCK TESTING

- Blast loading and mitigation
- Seat and occupant measurements
- Metal-to-metal impacts

## BALLISTIC TESTING

- Internal ballistic pressure
- Conformal and case mount measurements
- Time-to-peak (TTP) measurements

 indicates Endevco product.

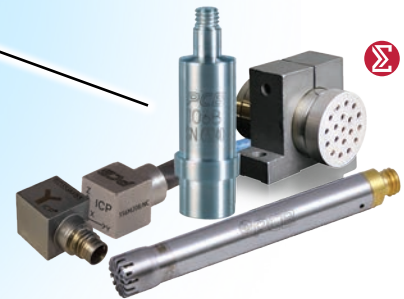
PCB Piezotronics' aerospace and defense sensors are built for extreme conditions, measuring up to 200,000 G's and functioning from -452 to 1400 °F. This portfolio showcases unmatched reliability in the face of extreme temperatures, vacuum, shock, vibration, and acoustic stress. Supporting both commercial and military applications, we offer custom options to meet environmental standards and requirements, including program design requirements to RTCA-DO-160 and MIL-STD-810.

### Popular Aerospace & Defense Applications:

- Armored vehicle testing
- Maritime testing
- Ship Shock (MIL-S-901) testing
- Explosive and gun pressure measurements
- Commercial and military aircraft
- Rockets, payloads, and satellites

## STAGE SEPARATION

- High-G shock measurements



## PAYLOAD PROTECTION

- Vibro-acoustic stress testing
- Vibration qualification

## ENGINE PERFORMANCE

- High-temp and cryogenic pressure and vibration measurements

 indicates Endevco product.

### PCB SENSORS IN ACTION - Rocket Launcher Development

**CHALLENGE** During early stages of their H3G (Hot & Green Gas Gun) project, engineers at Thiot Ingénierie sought to develop a test bench for laboratory launchers. This new generation of combustion launchers, powered only by a light, hot gas, would match the energy output of traditional pyrotechnic models while minimizing environmental impact.

**SOLUTION** PCB Model M119B12 was chosen for its microsecond rise time and ability to measure several thousand bars of pressure at temperature around 3632 °F (2000 °C). Development time was considerably shortened, both for dimensioning of the prototype and performance optimization.

# AUTOMOTIVE & RAIL

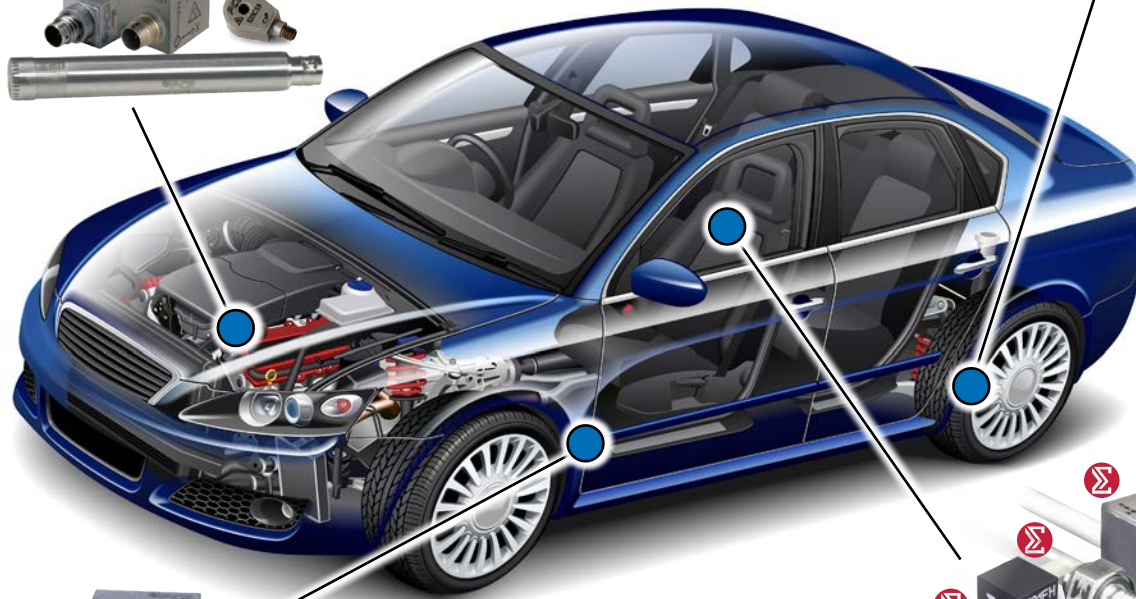
## POWERTRAIN DEVELOPMENT

- Improvement of performance, fuel economy, and gear efficiency
- Powertrain NVH
- Thermal and lubrication surveys
- Friction studies



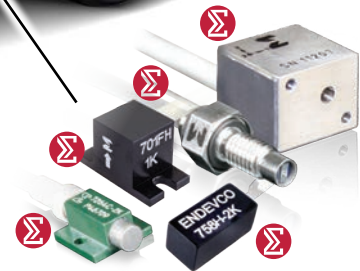
## ROAD LOAD DATA ACQUISITION (RLDA)

- Spindle force and motion testing
- Fluid pressure testing
- Ride and handling




## NOISE, VIBRATION AND HARSHNESS TESTING (NVH)

- Noise source identification
- Dynamic system simulations
- Competitor benchmarking



## CRASH TESTING

- Anthropomorphic test devices (ATD)
- Frontal, rear and side impact
- Regulatory compliance testing

 indicates Endevco product.

With the strategic addition of Endevco's crash-testing sensor line, PCB has solidified its commitment to helping automotive and rail engineers meet evolving demands for connectivity, electrification, safety, and performance. Our journey into rail sensor design began in 1998, driven by a customer request for a high-speed train accelerometer. Today, PCB sensors support high-speed rail systems worldwide with on-board monitoring, reduced maintenance costs, and enhanced passenger comfort and safety.

## Popular Automotive & Rail Applications:

- ICE and electric vehicles
- HVOR vehicles
- Motorsports
- Bogie stability
- Track geometry
- Dynamic pressure testing
- Pedestrian safety testing
- Sled testing



## RIDE COMFORT

- NVH
- Regulatory compliance
- Dynamic testing

## AERODYNAMIC TESTING


- Wind Tunnel testing
- Turbulence measurements
- Entering and exiting tunnels, stations and platforms



## RAILROAD MAINTENANCE AND SAFETY

- Derailment monitoring
- Condition monitoring
- Ride control



 indicates Endevco product.

### PCB SENSORS IN ACTION - Detection of Track Deformation

**CHALLENGE** SNCF Réseau, entrusted with the management, maintenance, and advancement of the French national rail network, required resilient sensors to facilitate real-time monitoring of rail track deformation while ensuring uninterrupted train schedules.

**SOLUTION** PCB Series 3741F MEMS accelerometers were prized for their reliability and shock resistance. In early 2021, the first sensor-fitted trains rolled out, enabling constant monitoring. Now, maintenance teams swiftly address emerging issues, ensuring smooth and safe railways.

# CONDITION MONITORING

## PRESSURE STABILITY MONITORING

- Pressure monitoring and regulation
- Fault diagnostics
- Part fatigue analysis



## MOTOR VIBRATION MONITORING

- Fault diagnostics
- Part fatigue analysis



IMI Sensors, a division of PCB, delivers comprehensive preventative maintenance solutions for industrial and energy applications to enhance safety, prevent unplanned downtime, and avoid equipment failures. IMI's diverse portfolio includes sensors with digital and wireless output, specialized cabling for harsh environments, and self-contained calibration units. High-temperature accelerometers and pressure sensors for use on gas turbines meet rigorous design requirements and carry certifications such as ATEX and CSA to ensure safe and efficient operations.

### Popular Condition Monitoring Applications:

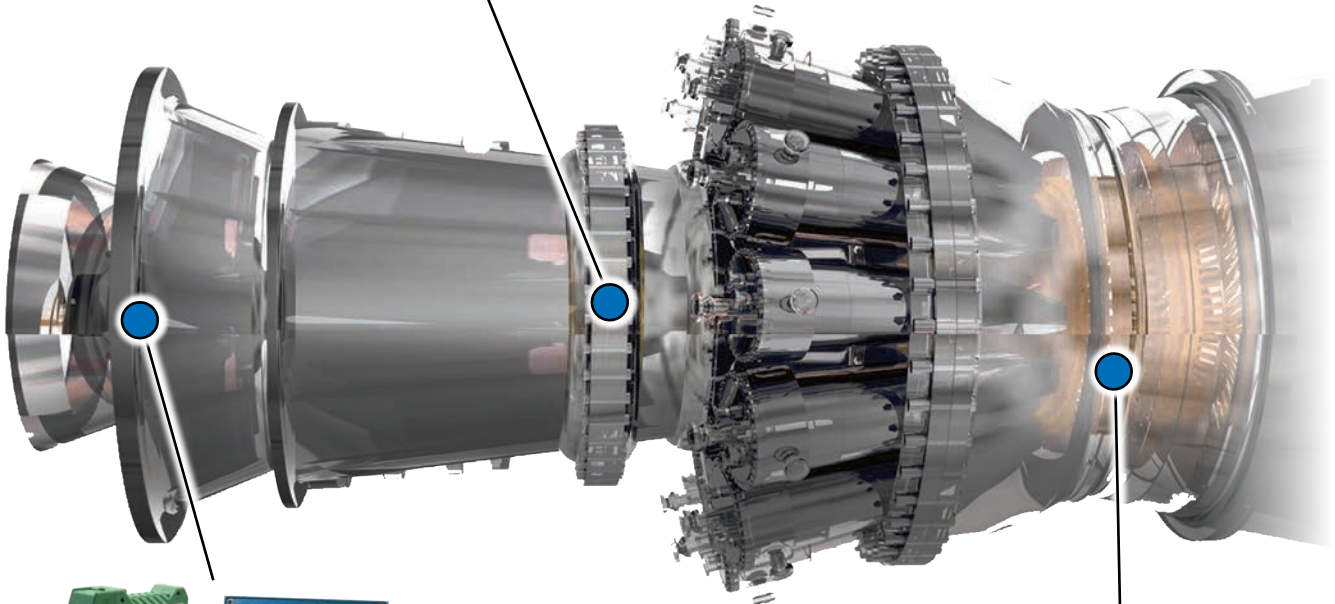
- Reciprocating machinery
- Pumps and submersibles
- Motor vibration
- Gearboxes
- Cooling towers and HVAC systems
- Oil & gas, nuclear, wind, and hydroelectric energy





## ENGINE VIBRATION MONITORING

- Fault diagnostics
- Part fatigue analysis



## MACHINE VIBRATION CONVERSION

- Fault diagnostics
- Part fatigue analysis

## COMBUSTION PRESSURE MONITORING

- Fault diagnostics
- Part fatigue analysis
- Emission monitoring and control



### IMI SENSORS IN ACTION - Cooling Tower Vibration Monitoring

#### CHALLENGE

Engineers at SPX Technologies sought to safeguard cooling towers against the risks of severe shock caused by imbalance or corrosion. The ideal solution would involve an immediate shutdown of equipment at the detection of suboptimal performance, eliminating the potential for catastrophic damage.

#### SOLUTION

PCB Model 685A Vibration Switch from IMI Sensors, known for its automatic shutdown feature and resilient, water-tight casing was a perfect solution. Easy setpoint adjustment and successful tests revealed immediate equipment shutdown when vibration levels surpassed safe limits, ensuring reliability and longevity.



# RESEARCH & DEVELOPMENT



## SEISMIC TESTING

- Foundation and floor vibration
- Security monitoring
- Earthquake detection
- Structural integrity verification

Engineers and scientists across the globe rely on PCB sensors for research, development, and product testing, ensuring optimal designs and faster time-to-market. PCB's seismic sensor technology plays a vital role in enhancing infrastructure safety by monitoring low-frequency vibrations in bridges, roads, and buildings, further highlighting the diverse research and development applications PCB products support.

## Popular Research & Development Applications:

- Test laboratories
- Consumer products
- Consumer electronics
- Acoustic testing
- Infrastructure testing and monitoring
- Semiconductor manufacturing

# PRODUCT TESTING

## ACOUSTIC TESTING

- Sound power measurements
- Sound quality measurements
- Noise source identification



## PRESSURE AND FORCE TESTING

- Force summing
- Drop testing
- Surface strain measurements



## VIBRATION AND SHOCK TESTING

- Product life cycle testing
- Impact testing
- Vibration source identification

 indicates Endeveco product.

### ENDEVCO SENSORS IN ACTION - Personal Protective Gear Development

**CHALLENGE** CRITT Sport Loisirs set out to develop test benches for motorcycle helmets in order to meet new ECE 22.6 standards for rotational acceleration and brain injury criteria. The sensors used for testing would have to account for high shock and accelerations from multiple angles.

**SOLUTION** Customer chose Endeveco's piezoresistive model 726CH-2KTZ-300 for impact testing, and angular rate MEMS model 7310A-12K-300 for multiaxis shock. The sensors enabled the straightforward construction of a repeatable testing setup, allowed for the measurement of high accelerations and shocks in various directions, and ultimately advanced designs for increased safety in personal protective gear.

# CUSTOM SENSORS FOR OEM INTEGRATION



When your sensor requirements are not met by a commercial off-the-shelf product, partner with a reliable, cost-effective supplier with a history of success. PCB's highly experienced program management team and full in-house manufacturing capabilities guarantee total peace of mind when it comes to quality, delivery times, or overall cost.

We support custom product development for original equipment manufacturers (OEM) in industries such as:

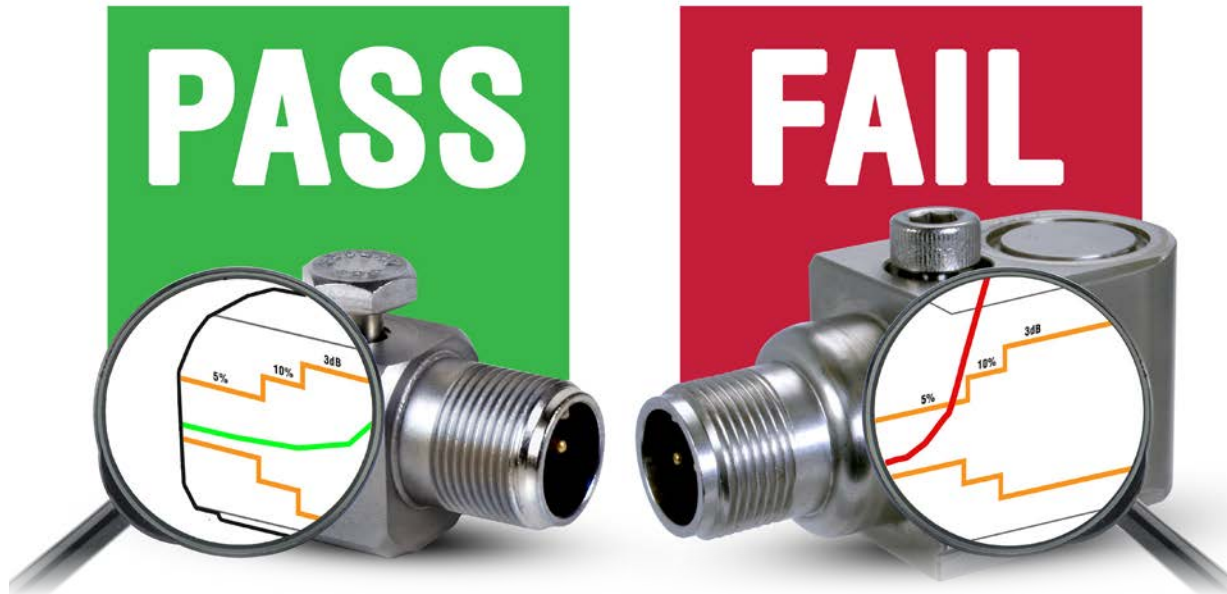
- Aerospace and defense
- Automotive and rail
- Automation
- Energy
- Medical instrumentation
- Consumer products

## PCB PROGRAMS - Satellite Development

In 2016, PCB collaborated with Lockheed Martin in the design and build phase of accelerometers for NOAA's GOES-16 weather satellite. The resulting Model 393M90 would play a crucial role in measuring the dynamic environment of instruments on the satellite, aiding in data interpretation. Throughout the program, PCB and Lockheed Martin engineers worked as a team to ensure that the accelerometer could withstand harsh environments during and after satellite launch. Today, the original sensors demonstrate exceptional reliability in challenging cosmic radiation conditions, and the satellite continues to support the detection of meteorological phenomena impacting public safety, property, and economic health and development.



# CALIBRATION, RENTALS & REPAIRS



## WHAT DO YOU DO FOR CALIBRATION?

With PCB calibration services, our highly trained technicians check the integrity of your measurements as frequently as needed, so you never waste time on faulty data. PCB's five accredited global service centers offer a variety of sensor and system calibration and repair capabilities.

- Calibration services for US calibration facilities hold A2LA accreditation to ISO/IEC 17025:2017.
- Our European-based calibration lab, located in our PCB Europe office, holds DAkkS accreditation to ISO/IEC 17025:2017.
- Expect rigorous specification testing on sensitivity, frequency response, transverse test, time constant, output bias, and more.



# WORLD-CLASS SERVICE



## TOTAL CUSTOMER SATISFACTION, GUARANTEED.

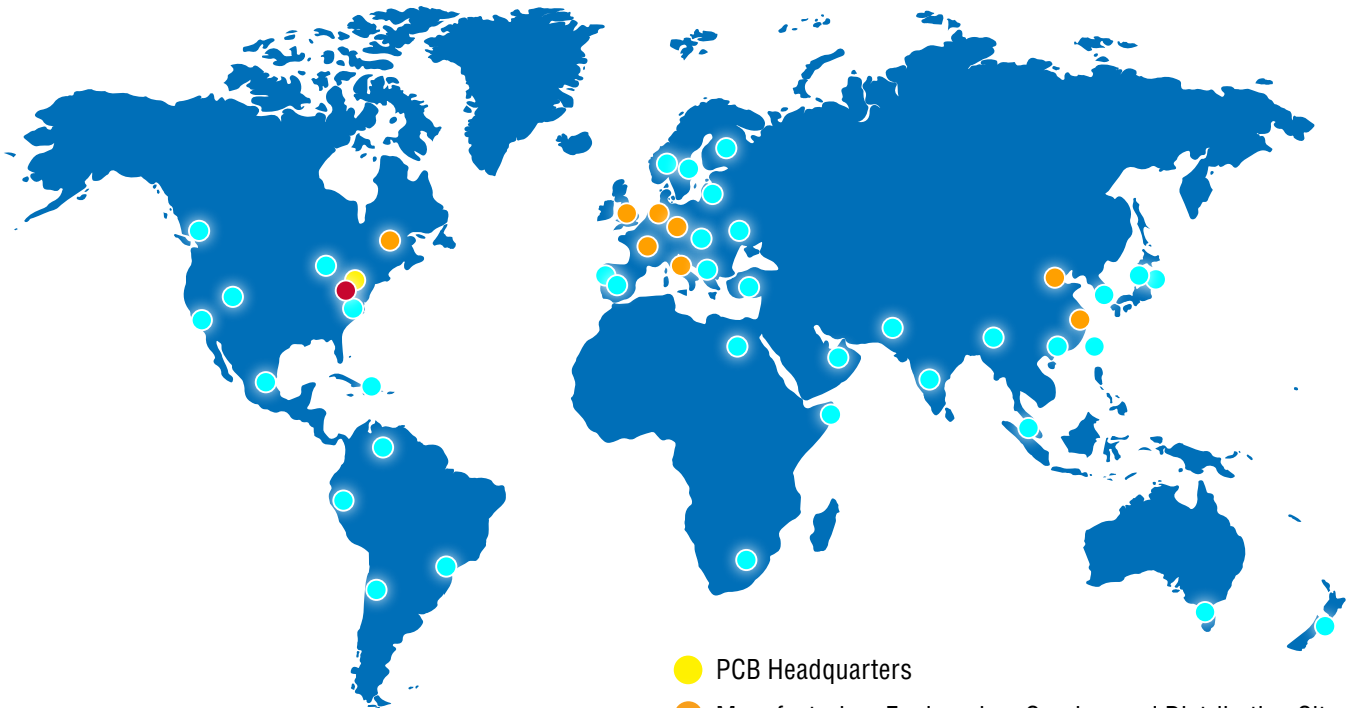
For more than 50 years, PCB Piezotronics has had the same central mission: to deliver better measurements through high quality, innovative instruments while providing the best customer support in the industry. We refer to this as Total Customer Satisfaction (TCS), and we always go the extra mile to achieve it.

When you choose PCB, you can count on:

- **Reasonably-priced, quality products, with the industry's best lead times.**
- **Technical application engineering support for sensor selection.**  
Our worldwide direct support teams offer high-touch service to ensure you receive the most appropriate solution to your need.
- **24/7 technical emergency hotline.**  
Troubleshoot your urgent testing or monitoring needs any time of day.
- **Best-in-class warranty and 'no-risk' policy.**  
If you're not satisfied, we will repair, replace, or refund your order of any stock sensor.



# LOCATIONS



- PCB Headquarters
- Manufacturing, Engineering, Service, and Distribution Sites
- Independent Distributors
- Amphenol Advanced Sensors Headquarters

PCB Piezotronics is a wholly-owned subsidiary of Amphenol Corporation.

## ADDITIONAL PCB BRANDS



The Modal Shop offers an extensive sound and vibration rental program, precision calibration systems, non-destructive test systems, digital sensors, and both modal and vibration shakers.



Larson Davis offers a full line of noise and vibration measurement instrumentation, including sound level meters, outdoor noise monitoring systems, personal noise dosimeters, and human vibration meters.



Accumetrics is a pioneer and global leader in rotor telemetry technology, offering digital systems that transmit sensor data from rotating structures using wireless techniques to measure torque, temperature or voltage, and advanced ground fault detection technology.



 **PCB PIEZOTRONICS**  
AN AMPHENOL COMPANY

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