A worker wearing a yellow hard hat and safety glasses is shown in profile, looking out over a vast, hazy landscape. The scene is dominated by a bright, low sun that creates a strong lens flare and casts a warm, golden glow over the entire scene. The worker's hand is visible, holding a tool or part of the equipment. The background shows rolling hills or a wide expanse of land under a bright sky.

Endevco

Corporate overview

MEGGITT
smart engineering for
extreme environments

Corporate overview

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Company profile

Founded in 1947, Endevco Corporation has grown from a small research and development firm to an international corporation, supporting customers with a global network of manufacturing, research facilities, sales offices and field engineers. At Endevco we lead the way, earning the highest reputation for quality and reliability.

Headquartered in San Juan Capistrano, California, Endevco is the world's leading designer and manufacturer of dynamic instrumentation for vibration, shock and pressure measurements. Endevco's product line includes piezoelectric, piezoresistive and variable capacitance accelerometers, integral electronic piezoelectric accelerometers and piezoresistive pressure transducers and related signal conditioners, measurement systems and accessories. Built for aerospace, automotive, defense, industrial, marine and medical applications where accurate and reliable data is vital. Endevco provides solutions in mission critical applications such as the NASA Space Shuttle monitoring, automotive safety testing, in-flight gas turbine vibration monitoring, and activity monitoring in pacemakers.

In November 1994, Endevco became ISO 9001 certified. Since then we have achieved ISO 14000 environmental standards certification, which demonstrates our commitment to raising quality standards in measurement technology.

Time after time customers have discovered that Endevco products mean reliable data. Endevco provides measurement solutions, based on advanced technology, superior performance and total customer support, worldwide, with quality and delivery to fit your schedule. Join forces with a company you can count on.

Research and development

Endevco has an enviable reputation as a company of notable firsts. These efforts continue today through research and development at our San Juan Capistrano, California headquarters and over 30 years of ongoing silicon micromachining research and fabrication at our state-of-the-art facility in Sunnyvale, California.

Endevco firsts:

- First shear design accelerometer
- First bulk silicon strain gauge used as the sensing element in piezoresistive accelerometers
- First micromachined sculpture silicon diaphragm for pressure transducers with higher resonance frequency and high sensitivity
- First annular shear, center-hole accelerometer to facilitate 360° mounting orientation
- First diffused silicon piezoresistive strain gauge transducers used in high radiation environments
- First piezoelectric accelerometers capable of continuous operation from cryogenic temperatures up to +752°F (+400°C)
- First computer programmable charge amplifiers
- First and only 200,000g accelerometer
- First commercial shock calibrator up to 200,000g
- First digital tracking filter for on-board monitoring of aircraft engines
- First commercially available accelerometers using a micromachined silicon variable capacitance microsensor and internal electronics
- First smart accelerometers (piezoresistive and piezoelectric)
- First fully automated calibration system operating from 1 Hz to 50 kHz
- First surface mount piezoelectric accelerometer for hybrid packages
- First monolithic silicon piezoresistive accelerometer

Endevco is one of the largest suppliers of dynamic measurement instrumentation in the field of research, development, test and evaluation. Whether you are measuring mode shapes of disk drive components, skin surface pressures of an experimental aircraft, shock response of a rocket stage separation or the vibration level of a superheated steam vessel, Endevco offers the most advanced line of transducers for your applications, based on the best sensor technology available.

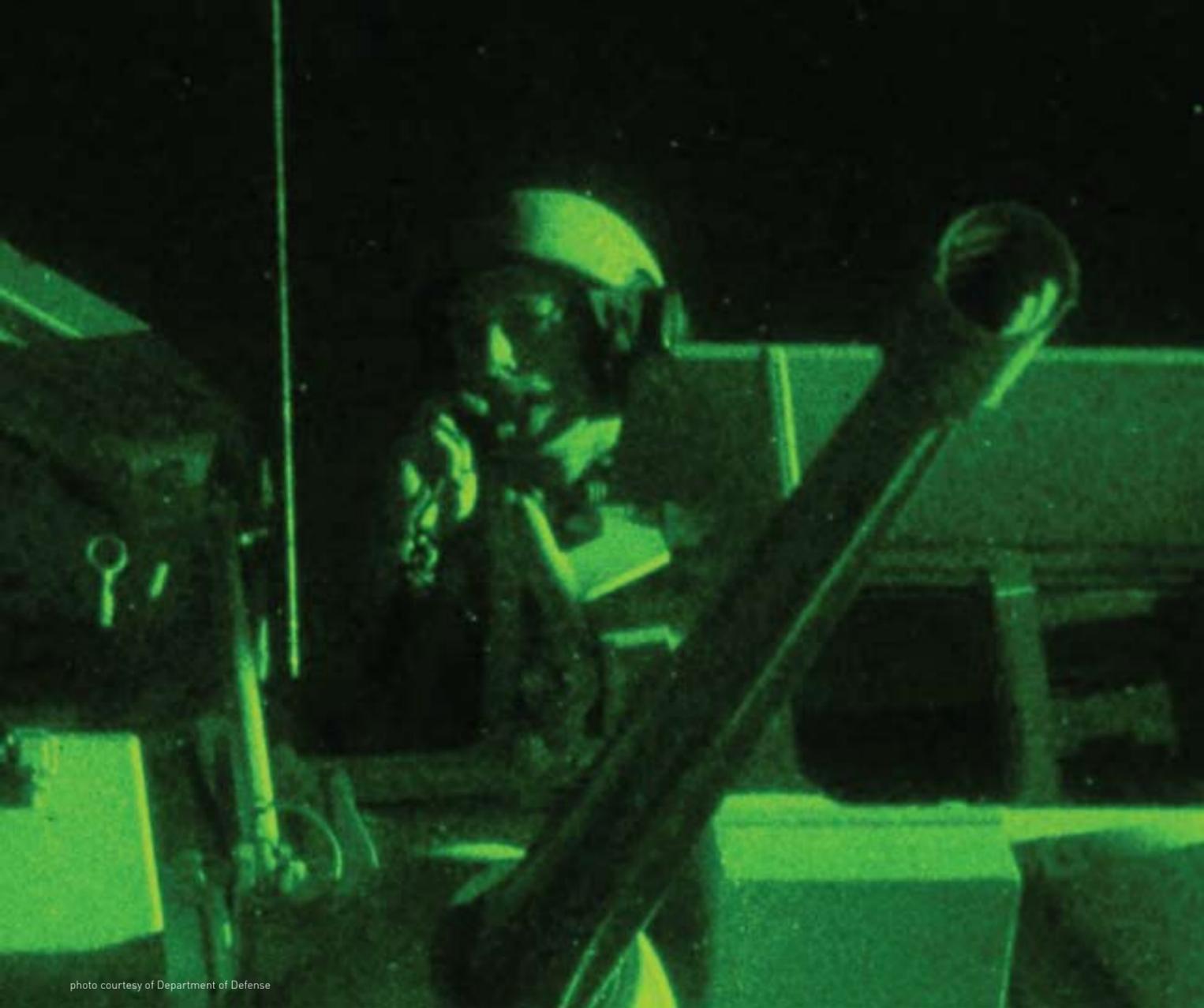


photo courtesy of Department of Defense



photo courtesy of Department of Defense

Military weapons systems

For over 20 years, Endevo has been the predominant supplier to the United States Navy of impact sensors used in ship-to-air and air-to-air missiles. Endevo products are also utilized in the fuzing system for torpedoes. Endevo has been the technology leader in providing sensors for penetration weapons used to neutralize heavily fortified targets. Our advanced micromachined accelerometers have advanced electronic 'safe and arm' devices. Endevo's accurate inertial measurement sensors have been used to guide advanced weapon systems.

Marine

Endevo's ultra low-noise, high sensitivity vibration sensing systems are used by naval services worldwide to ensure that surface ships and submarines develop and maintain the lowest noise signature necessary to evade today's search sonar. Endevo is a major supplier to leading manufacturers of gas turbine engines for shipboard applications. Accelerometers for shipboard monitoring provide early diagnosis of excessive vibration and pressure so that repairs can be performed on a routine and timely basis, preventing undue failures.

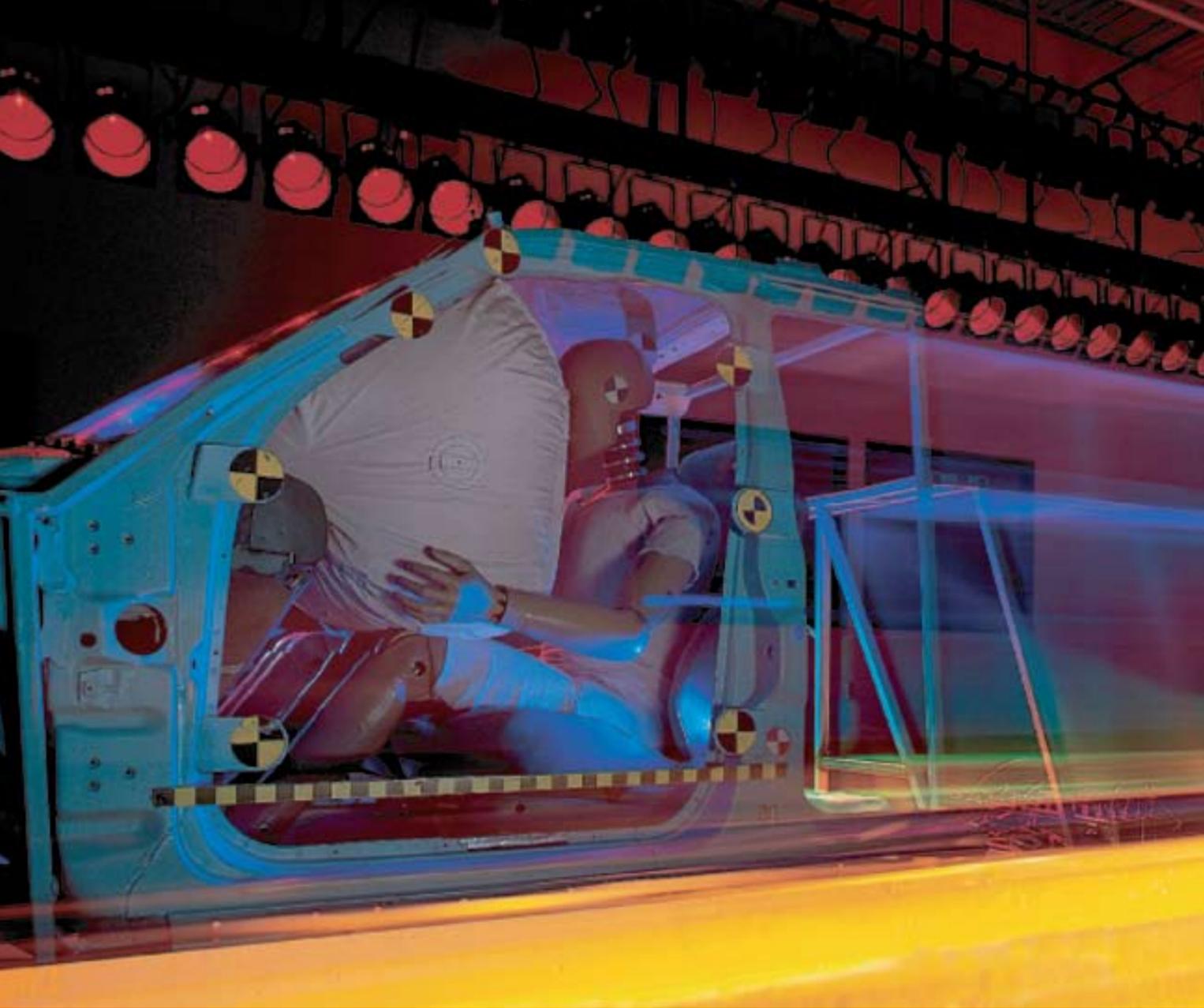


Industrial and power plant applications

For over 25 years, Endevco has supplied pressure, acceleration, vibration and shock sensors and signal conditioners for demanding applications. Our sensors find applications in high temperature, high shock and hostile environments such as nuclear power plants, gas turbines, directional drilling tools for oil and gas exploration. Utilizing Endevco's PIEZITE® type P-14 crystal material, our vibration monitoring transducers are capable of continuous operation temperatures up to 750°F (399°C) and radiation levels as high as 6.2×10^{10} rad without degraded performance. Dynamic pressure sensors monitor large gas turbine combustor pressure at temperatures up to 900°F (530°C) helping enhance fuel control and reduce emissions. To keep up with the increasingly demanding needs industry, Endevco continues to evolve new solutions and new technologies to monitor acceleration, shock, vibration, and pressure for the Energy Market.

Medical applications

Medical applications present unique design and performance criteria. The rate responsive heart pacemaker is a type of implantable pacemaker that utilizes an appropriate pacing rate proportional to the patient's level of physical activity. Versions of the Endevco model 12M1 PICOCHIP and Endevco MEMS variable capacitance accelerometers are used in a majority of pacing devices manufactured globally. Internal R&D advances in sensor manufacturing techniques and material properties have opened up several new markets for Endevco acceleration and pressure sensing devices, prosthetic motion monitoring, medical imaging, and external and implanted drug therapy systems. The ability to offer piezoelectric, self generating sensor solutions, and silicon-based MEMS sensor solutions, positions Endevco as a solution as new medical procedures evolve which require sensor enabled technologies.



Automotive

For 30 years, Endevco's piezoresistive accelerometers have been the industry standard for safety testing with use on vehicle barrier and sled testing and in anthropomorphic test dummies. Endevco piezoelectric, ISOTRON® and variable capacitance accelerometers are used in vehicle dynamic testing of engines, exhaust systems, components and suspension systems due to their micro-miniature size, high temperature performance and rugged construction. Endevco pressure transducers are used in the automotive testing systems such as Anti-lock Brake Systems, transmissions, fuel and oil systems and air bag inflators. Using advanced silicon micromachined sensors, these pressure transducers feature a wide frequency response and a high level of output in a miniature size, making it ideal for use in places traditionally inaccessible due to size.

Flight testing

From small, single-engine aircraft to the space shuttle, to the latest in flight aircraft, Endevco has supplied accelerometers and amplifiers for flight testing and inertial measurement of the most advanced aerospace vehicles. Pressure transducers and high intensity microphones are also supplied for vehicle dynamics studies. Designed and specified for the extremes of flight test environments, these dynamic instruments operate over a wide temperature range from cryogenic of -425°F (269°C) of the model 7722/7724 to the high temperature $+550^{\circ}\text{F}$ ($+288^{\circ}\text{C}$) capabilities of the 7704A. Whether flutter testing of low g and low frequencies, engine testing with wide frequency requirements, or aerodynamic pressures, Endevco offers a complete line of accelerometers, microphones, airborne amplifiers and pressure transducers for flight testing.



photo courtesy of Department of Defense



Helicopter monitoring

Endevco has played a major role since the initial development and incorporation of HUMS (Health Usage Monitoring Systems). Working closely with HUMS developers and the airframe manufacturers, Endevco has provided a variety of modified versions of our standard 7251 series ISOTRON® accelerometers. Applications such as rotor track and balance, where extremely low vibration levels at very low frequencies are to be detected, require a high-output, low-noise accelerometer. Gearbox bearings and shaft monitoring may require an accelerometer with high resonance frequency and linear response to 10 kHz and above. Small size and ease of mounting are important considerations for these applications. ISOTRON® designs with a variety of special customer demands are available to cover virtually all of these requirements. Our design experience through proven flight usage has made the ISOTRON® series a favorite choice for HUMS applications.

Engine vibration monitoring

Engine vibration monitoring in ground testing, helicopters, commercial, civil and military aircraft, marine vessels and industrial applications has been an established research, production and maintenance tool for over five decades. Engine vibration signatures have been used to develop and qualify new engine technologies. Endevco's computer-controlled amplifier systems serve as ground test equipment for engine test cell applications allowing the customer to create these signatures. Endevco offers a wide variety of accelerometers with very unique features such as built-in low pass filtering, +2.5 VDC output bias, and wide operating range that can be used to gain the information needed for these signatures. We also offer high-intensity microphones for measuring the acoustic signatures of missiles and rockets at take-off along with engine pressure studies. These sensors are capable of making vibra-acoustic measurements at levels up to 190 dB SPL and with our airborne amplifiers can readily interface with industry-standard telemetry systems.

Products and services

Accelerometers

Shock and vibration measurement: Measurement for shock and vibration is vital to the development, testing and operational monitoring of structures and machines in all fields of engineering. Accelerometers are the most commonly selected transducers to sense vibration motion, due to their high accuracy, wideband frequency and dynamic response, small size, light-weight and ease of installation. Endevco offers the industry's most comprehensive line of piezoelectric, ISOTRON®, piezoresistive, variable capacitance, and servo force balance accelerometers.

Inertial measurement: Endevco's research in micromachining sensors had led to the development of inertial measurement sensors which feature a small, light-weight and extremely rugged measurement device.

Pressure transducers

The precise measurement of pressure is one of the most challenging and active areas of transducer technology. Endevco has combined several state-of-the-art contributions in silicon and piezoelectric pressure sensing. Silicon pressure sensors offer small size and light-weight with high sensitivity, excellent frequency response, and, in some models, high temperature operation (500°F/260°C). Piezoelectric pressure sensors offer dynamic pressure sensing in hostile environments operating to 1100°F/538°C. Piezoelectric pressure sensors are rated *EEx nAII T1* for hazardous location application.

Microphones

Endevco piezoresistive and piezoelectric microphones measure high-intensity acoustic energy in boundary layer measurements in flight test or wind tunnels, and on engine inlets of launch vehicles and other aerospace applications. These rugged, miniature transducers are operational in temperatures up to +500°F (+260°C) and to >180 dB SPL.



Electronic instrumentation

Endevco provides a complete family of high performance electronic instruments, from simple signal conditioners to computer-controlled laboratory quality instruments that measure vibration, shock and pressure. The electronic instrument product lines are designed to support piezoelectric, piezoresistive, ISOTRON®, variable capacitance and voltage output type transducers. Variations of signal conditioners are available to condition a wide range of sensor types to amplify and filter output and display the signal. A variety of features and functions are available in all sizes on instruments from portable single channel units to rack-mounted systems.

Cable

The cable assembly connecting the transducer to the signal conditioner represents the critical link in the data acquisition system. For more than 30 years, Endevco has been manufacturing high-quality, low noise coaxial and shielded multi-conductor cable for use with our transducers and electronics. Endevco has long been recognized as a superior manufacturer and supplier of raw cable and cable assemblies for use in critical applications.

Calibration systems

Endevco offers a range of dynamic calibration equipment including primary standard accelerometers, amplifiers, shakers and systems for vibration and shock calibration. From the battery-powered model 28959D, incorporating a reference standard in a portable system, to the fully automated accelerometer calibration system for vibration calibrations, to the model 2925 Pneumatically Operated Projectile (POP) and the model 2973 Shock Motion Accelerometer Calibrator (SMAC) Hopkins Bar system for shock calibration. Our calibration systems cover the range of frequencies from less than 1 Hz to 50 kHz and shock pulses from 1g to 100,000g.



Calibration services

Endevco provides calibration services for accelerometers, pressure transducers, electronics and systems in:

- ✔ Comprehensive sensitivity calibrations
- ✔ Supplemental calibrations
- ✔ Environmental calibrations

Periodic recalibration is recommended for all instruments to verify proper function, quality and calibration.

The methods used by Endevco are in accordance with approved standards, specifications and procedures of the Instrument Society of America, the American National Standards Institute in accordance with MIL-STD-45662A, the National Institute of Standards Technology, and the United States Department of Defense.

Quality assurance

Endevco's quality assurance programs have been surveyed, audited and approved by major aerospace companies domestically and internationally. In November 1994, Endevco became ISO 9001 certified. This certification was developed by 91 countries throughout the world to consolidate various Quality Management Systems [QMS] that existed in various forms. ISO 9000 is recognized as the international benchmark for quality assurance.

Product support

Endevco's organization is structured to provide extensive product support to the aircraft industry. This includes the development of manuals per Air Transport Association (ATA) standards, maintaining a 24-hour emergency spare parts service, an export control administration group, and repair stations with FAR/JAR 145 approvals secured from the Federal Aviation Administration and the European Joint Airworthiness Authority.



Certifications

ISO 9000
ISO 9001
ISO 14000
AS 9100

FAA Repair Station Accessory
Rating Class 2 and 3

JAR 145 approved

ISO/IEC 17025-200
ANSI/NCSL 2540-1994

A2LA Accreditation

Corporate overview

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