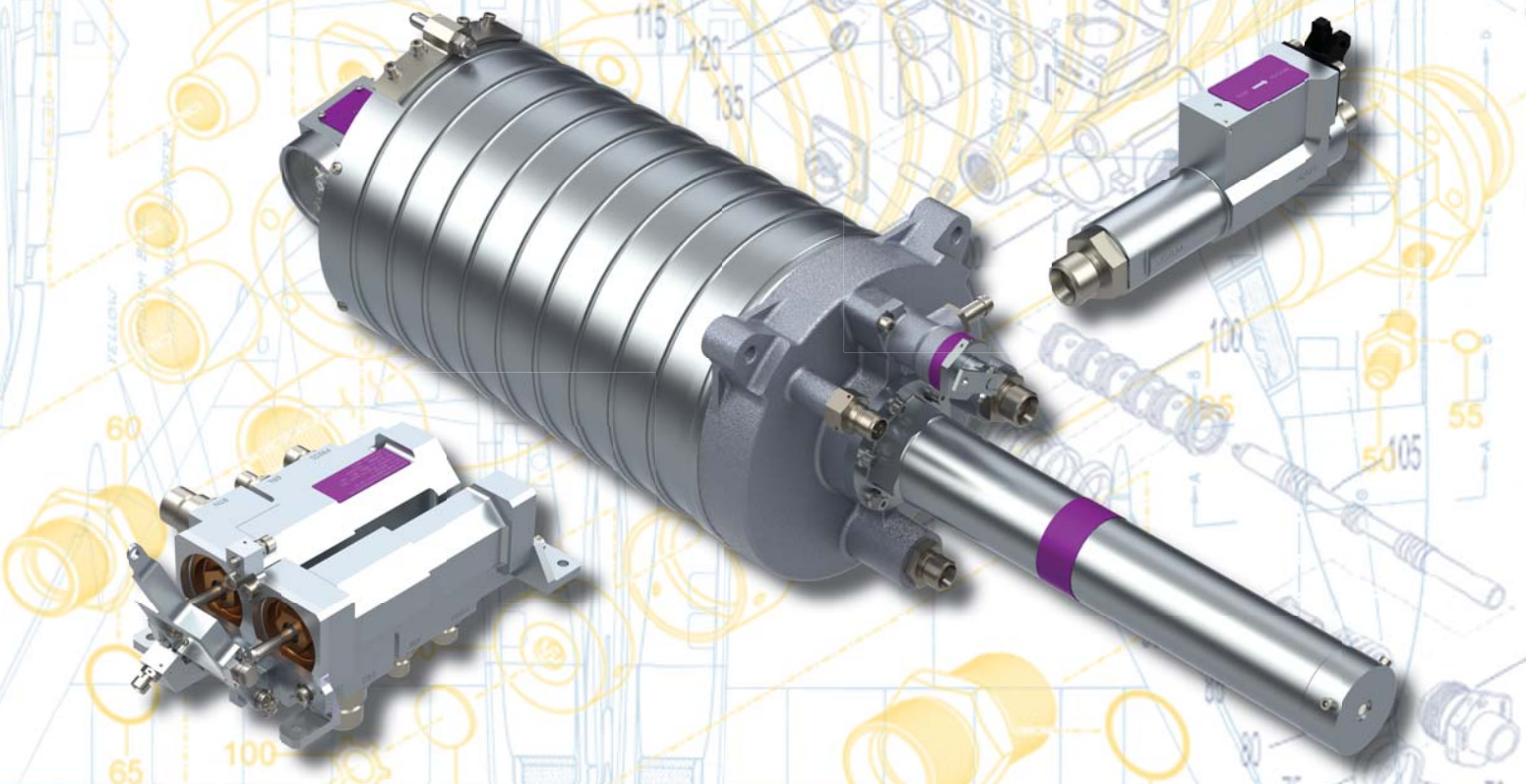
PneuDraulics, Inc.

PDI

Engineering Tomorrow's Solutions



Who We Are

Since the mid-1950s PneuDraulics has been a designer and manufacturer of precision hydraulic components and subsystems for airframe manufacturers and the system integrators serving them for both commercial and military applications. PneuDraulics' products can be found on aircraft in all commercial segments of market from VLJs to large air transport category aircraft. PneuDraulics provides products for both fixed-wing and rotary-wing as well as UAVs and space applications. PneuDraulics also provides aftermarket spares sales and repair services to the various airlines, operators and other users of its products. Since 1982 the company has been located in Rancho Cucamonga, California, USA. PneuDraulics is a non-unionized and privately held corporation.

What We Do

Our mission is to design, manufacture, and service hydraulic components and subsystems that meet or exceed our customer's expectations for performance, quality, reliability, delivery, and value.

All disciplines, from conceptualization of design and developmental engineering to state-of-the-art manufacturing under rigid quality standards, are performed in our facility. The result is a fully and vertically integrated operation that produces the best value hydraulic components and subsystems available to the aerospace industry today.

Who We Work For

PneuDraulics built its name and reputation largely with domestic sales when the industry was centric to North America, but beginning in the Twenty-First Century has increasingly emphasized marketing efforts in the international arenas in recognition of the true global nature of today's aerospace industry. Numerous sales and engineering contacts have been developed in Canada, Brazil, Israel, UK, Germany, Italy, Spain, and France in order to broaden the customer base, insulate the company from regional downturns, and to participate in and support the overall expansion of the aircraft industry around the world.

PneuDraulics participates in seven distinctly different market segments, each with their own characteristics:

- Military
- General Aviation
- Business Jets
- Commuter
- Air Transport
- Helicopters
- Spacecraft

Although each of the seven segments has some distinct differences, there are certain expectations common to all aerospace customers:

- Competitive pricing
- Ever-shorter lead times
- Consistent conformance to technical requirements
- Agile response to emergencies (AOGs, unexpected or sudden requirements, etc.)

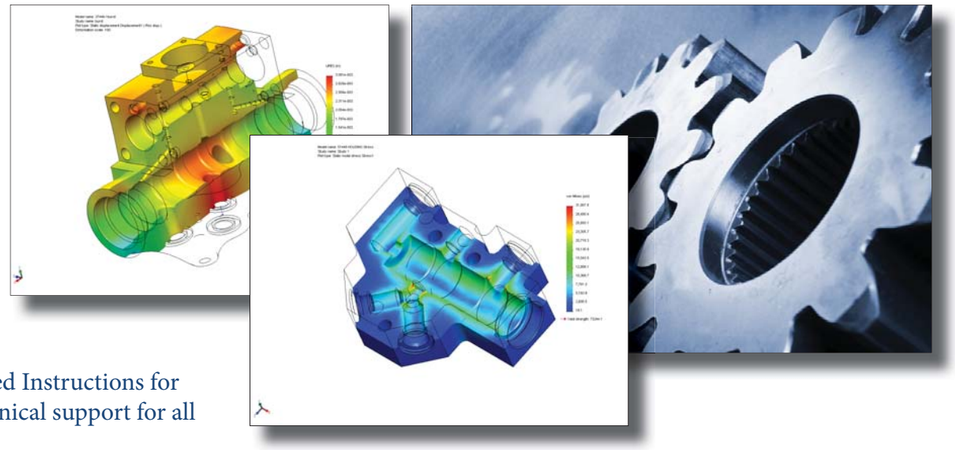
It Begins With an Idea...

The PneuDraulics engineering department utilizes the latest computer-aided design and analysis software available. Solid models are developed for all new products utilizing SolidWorks. Finite element analysis of the solid models is performed using COSMOSWorks in conjunction with SolidWorks.

One of the competitive advantages enjoyed by PneuDraulics' customers is the reduced development cost and short development lead times available because of our vast library of previously qualified hydraulic components and subsystems.

All PneuDraulics designs undergo a rigorous design validation and verification process through our AS9100 Quality Management System, including FMEAs, creation of any required Instructions for Continued Airworthiness, qualification testing, and complete technical support for all national aviation authority certification activities.

The engineering laboratory is fully equipped and capable of performing virtually all developmental and qualification testing. Six environmental chambers capable of -80 to +300 degrees Fahrenheit are used for both fluid and ambient temperature testing. Test fluids are phosphate-ester (Skydrol), red oil (MIL-PRF-5606, MIL-PRF-83282, and MIL-PRF-87287) and Stoddard solvent. Recent additions include a state-of-the-art computer-controlled vibration table and the National Instruments LabView 5.1 and PXI measurement and automation computer to automate qualification testing and aid production testing. All specialized testing such as electromagnetic interference is outsourced to an approved laboratory.



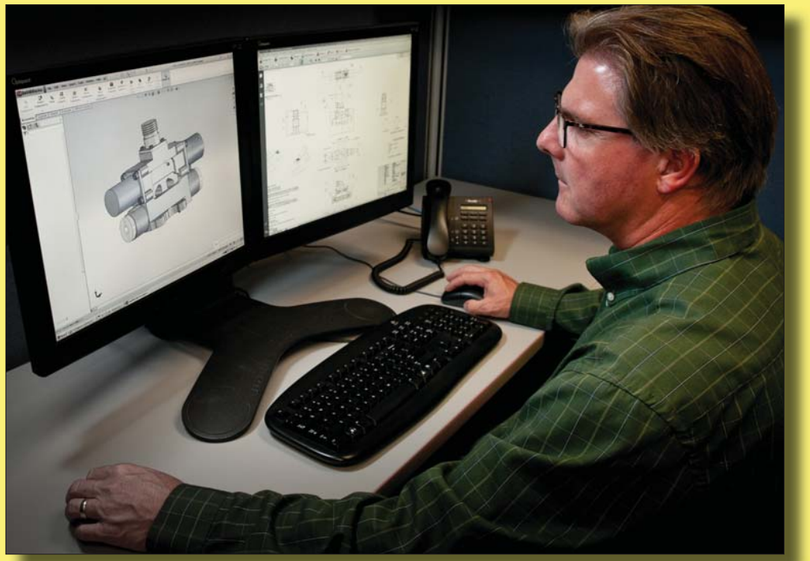
Modern technology in the hands of dedicated employees produces phenomenal results

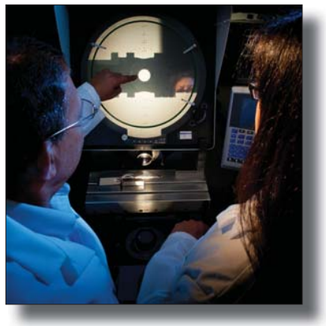
...and Quickly Turns Into Reality

Operations can be broadly grouped into three basic categories: detail part fabrication, assembly and test, and servicing. Each of the three plays a key role in achieving the calculated success of our products over the span of their lifetimes. The PneuDraulics manufacturing system integrates data from every facet of production, providing synchronized production procedures and schedules. The visibility provided by this system ensures on-time delivery of all PneuDraulics products.

Comprehensive in-house machining capabilities include the latest in computer numerically-controlled, multi-axis machining centers, ID and OD grinding equipment, manual and automated deburring, and precision honing and lapping to ensure conformance to rigid dimensional tolerances. Spool and sleeve assemblies are fitted to diametrical clearances of less than ten-millionths of an inch. Continual equipment upgrades allow PneuDraulics to maintain maximum manufacturing efficiency as machine and cutting tool technologies advance.

Each assembly shipped from PneuDraulics undergoes rigorous hydraulic performance testing following comprehensive protocols coordinated with the original aircraft system designers. Test results are shipped with each unit along with the certification package to document completely the performance of the product and to assure the customer of its conformity.



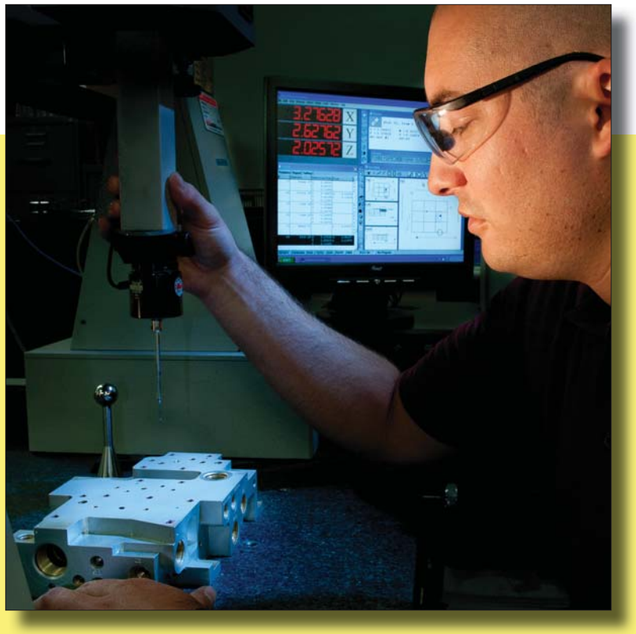


Quality is Integrated Into Each Step

Our quality is assured by an AS9100 Quality Management System (QMS) that encompasses all phases of product activity, beginning with design, through detail part fabrication, assembly and test, final inspection, delivery, and service. Our full line of hydraulic and pneumatic components meets or exceeds the most stringent industry quality requirements. Inspection of all products during fabrication, assembly, and testing is accomplished using the most modern equipment. We are an approved supplier to all major airframe manufacturers and system integrators in addition to the armed forces and virtually all major foreign and domestic airlines.

In addition to conducting company-sponsored audit activities, PneuDraulics coordinates regular independent auditing of the entire QMS in order to assure our customers that the planned verification activities are working properly to confirm product and service conformity with all customer and regulatory requirements, and to enhance customer satisfaction and ensure continual improvement of the QMS itself.

PDI's reliable products make you a star in the eyes of your customers



Basic Product Families...

PneuDraulics manufactures individual components as hydraulic system building blocks and for individual sale. PneuDraulics then combines complementary components into an integrated subsystem component group, such as a thrust reverser actuation system. PneuDraulics also has certain main aircraft systems where our products are best suited and/or primarily used.

- Accumulators
- Reservoirs
- Solenoid Operated Valves
  - *Shutoff Valves*
  - *Isolation Valves*
  - *Piloted*
  - *Direct Drive*
  - *Fuel*
  - *Hydraulic*
- Hydraulic Fuses
- Shuttle Valves
- Priority Valves
- Actuators
  - *Utility*
  - *Landing Gear*
- Relief Valves
  - *Thermal*
  - *Pressure*
- Restrictor Valves
- Compensator Valves
- Brake Metering Valves
- Emergency Park Brake Valves
- Lavatory Drain Valves
- Spool/Sleeve Valves

...Build Up Into Component Sub-Systems...

- Thrust Reverser Actuation Systems
- Hydraulic Control Manifolds
- Landing Gear Control and Actuation

...Supporting Major Aircraft Systems

- Landing Gear Systems
- Brake Systems
- Primary Hydraulic Systems
- Secondary Hydraulic Systems

Solenoid Operated Valves

Direct-acting and piloted versions with flow rates from below 1 GPM through 40 GPM available. Low leak rates, pressure to open and close, and normally open or closed SOVs come in either single or dual coil designs with wiring or connectors.

Accumulators

Uses pressurized nitrogen to maintain adequate pressure in the hydraulic system. Often useful for maintaining reserve system pressure levels during short-term system shutdowns.

Fuses

Devices that shut fluid flow off when a hydraulic line fails, thereby protecting essential hydraulic capabilities and reducing the potential for system pressure loss and fire.

Shuttle Valves

Hydromechanical devices which allows two hydraulic sources to independently supply downstream hydraulic components. Provides complete separation between the pressure sources for increased system reliability.

Actuators

Dual acting hydraulic actuators may have flow control devices in ports to limit speed and may incorporate snubbing mechanisms to slow velocity at the end of the stroke, and extend and/or retract locking features.

Priority Valves

High pressure device that opens flow to a sub-system regardless of downstream pressure. Also referred to as a balanced relief valve, they assure the availability of critical systems.

Bootstrap Reservoirs

Maintains return system (low pressure) charge by using system (high) pressure to prevent pump cavitation as various hydraulic functions are activated. Accommodates system volume changes as different system components are activated and use system fluid.

Brake Metering Valves

Brake metering valves port system pressure to the aircraft brakes based on manual handle input for primary and emergency braking. Sets park brake pressure in fully actuated position with minimal leakage.

Thrust Reversers

Systems that use hydraulic actuators to force “buckets” or “petals” into the engine’s thrust stream and divert the force forward to increase deceleration. This in turn reduces wear on the brakes and enables shorter landing distances.

Hydraulic Distribution

The presence of external leaks is influenced by the number of junctions in the system. The more junctions or joints, the greater the potential for leaks. Manifolds that combine components into one area can reduce the number of junctions, thereby increasing system reliability.

Brakes

PneuDraulics fuses and shuttle valves are used on every platform from large jets to regional jets, and down to business jets. Brake metering applications and accumulators are other components for which PDI has developed a strong reputation.

Landing Gears

PDI has a large library of landing gear components, such as actuators with snubbing and locking features, uplock assemblies, landing gear and door control valves, emergency dump valves, and other essential components.

Boeing 787

This aircraft relies on a PneuDraulics solenoid operated valve, handpump, nose landing gear isolation valve, cartridge bypass valve, reserve steering isolation valve, and high lift and main landing gear priority valves.

Learjet 85

PneuDraulics supplies nose landing gear retract and release actuators, accumulator and its charging manifold, hydraulic fuse, emergency park brake valve, three uplock assemblies, and the landing gear control manifold.

Gulfstream G650

PDI hydraulic components include main and nose landing gear control manifolds, an unloading relief valve, shuttle valve, reservoir relief valve, repeater valve, hydraulic fuse, dump/thermal relief valve, door control valve, brake shut-off valve, and two accumulators.

Sukhoi Superjet

The aircraft design incorporates PDI’s accumulator, two bootstrap reservoirs, a hydraulic flow regulator, PTU select valve, hydraulic system relief valve, and a hydraulic bleed/relief valve. The aircraft has three independent hydraulic systems powering the flight control, landing gear, braking, and thrust reverser systems.

PneuDraulics—Preferred Provider for Today's Programs

- Airbus A350
- Airbus A400M
- Boeing 787
- Boeing 747-8
- Boeing E-6 Mercury
- Bombardier C-Series
- Bombardier CRJ-NextGen
- Bombardier Global 7000/8000
- Cessna Citation Longitude
- Cessna Citation X
- Comac ARJ21
- Comac C919
- Embraer Legacy 450/500
- Gulfstream G280
- Gulfstream G650
- Learjet 85
- Mitsubishi Regional Jet
- Sukhoi Superjet 100
- Many, *many* others...

Expertise? We're loaded with it. Just ask these folks...

Local contacts in *your* neighborhood

- UK
- Germany
- France
- Russia
- Canada
- Brazil
- Israel
- Italy
- India
- Spain
- South America

It's a big world out there—let PDI help guide you in our specialty...

MRO Support Your Customers Can Rely Upon

PneuDraulics is an approved FAA and EASA Repair Station (certificate numbers PD6R469J and EASA.145.4753 respectively), with the capability to perform overhaul, repair, modification/alteration (upgrades), or inspection of all PneuDraulics products. Additionally, selected parts may be rebuilt (meeting all the original requirements of a new part). All work is performed in accordance with the latest FAA-approved technical data.

PneuDraulics is your best-value option for replacement parts, maintenance, repair, and overhaul services for your aircraft hydraulic components. As the OEM for all these products, PneuDraulics is the preferred choice for keeping your aircraft reliably running the way it was designed. And with our aggressive pricing programs and quick turnaround commitments, your "up time" and controlled costs will help to keep you profitable in today's competitive industry.

Since its beginning in 1955 PneuDraulics has been providing cost-effective solutions to the aerospace industry, and our products are used in aircraft on every continent around the world, in all categories of aerospace: military, commercial, cargo, general aviation, regional, helicopters, business jets, and spacecraft.

Benefits to Entrusting Your MRO Work to PDI...

- OEM-leveraged overhaul pricing
- Work performed to latest OEM data
- Factory trained OEM technicians
- Only OEM parts are used
- Can offer extended warranties
- Parts restored to "as new" performance