

The Right Direction



SOUTHWEST
OILFIELD PRODUCTS

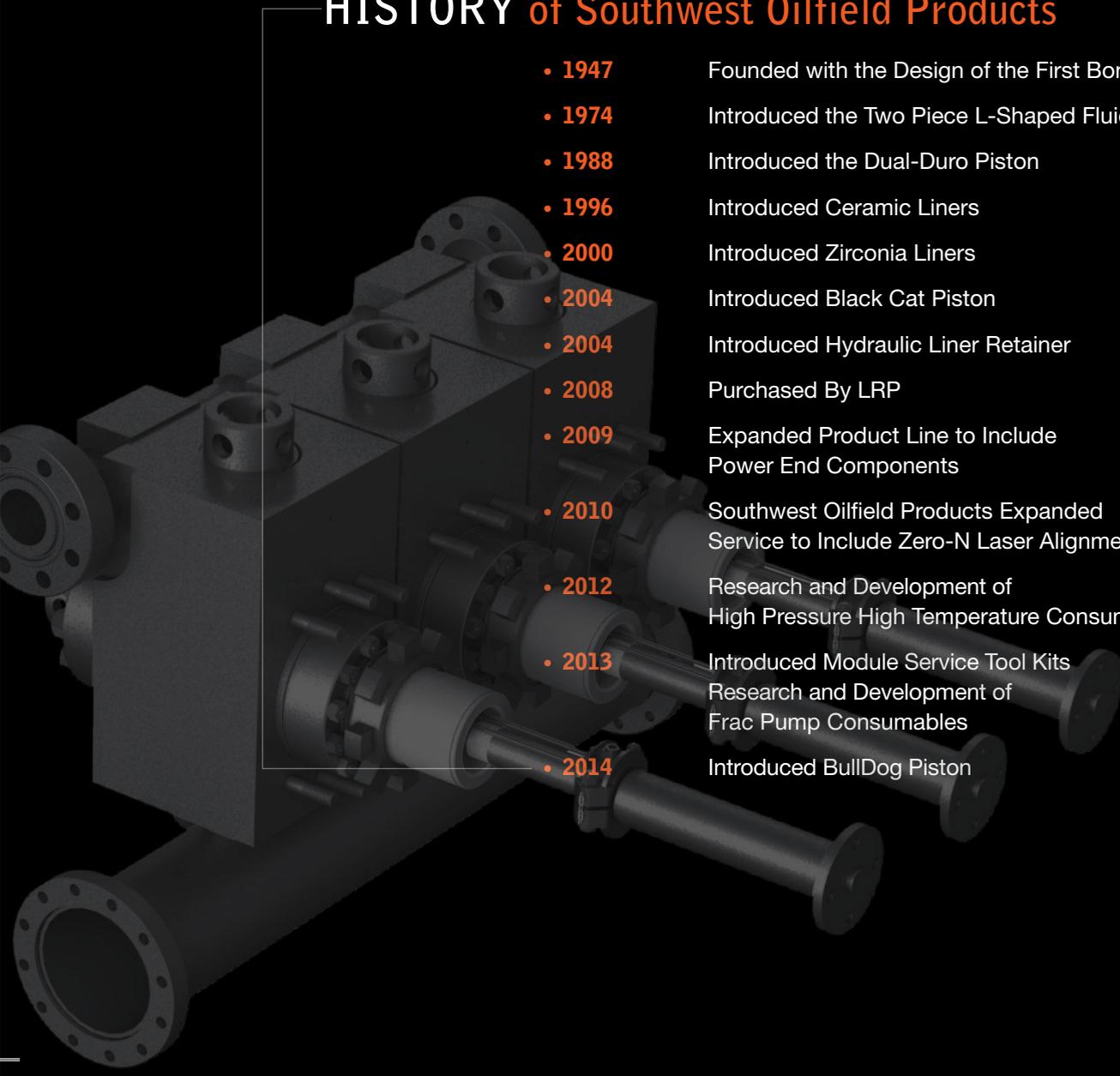
An **American Block** Company



Our Mission

“Southwest Oilfield Products (SWOP) is committed to delivering the highest quality products, on time, and creating positive significant impacts on our customers’ projects. We strive to maintain our innovative stance in the industry while partnering with our customers to share the focus on generating solutions.”

HISTORY of Southwest Oilfield Products

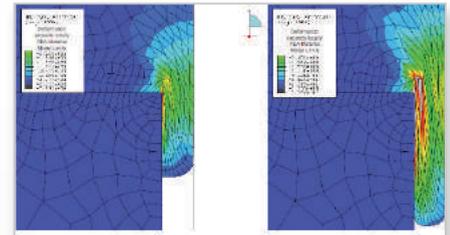
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- 1947 Founded with the Design of the First Bonded Piston
 - 1974 Introduced the Two Piece L-Shaped Fluid-End
 - 1988 Introduced the Dual-Duro Piston
 - 1996 Introduced Ceramic Liners
 - 2000 Introduced Zirconia Liners
 - 2004 Introduced Black Cat Piston
 - 2004 Introduced Hydraulic Liner Retainer
 - 2008 Purchased By LRP
 - 2009 Expanded Product Line to Include Power End Components
 - 2010 Southwest Oilfield Products Expanded Service to Include Zero-N Laser Alignment Systems
 - 2012 Research and Development of High Pressure High Temperature Consumables
 - 2013 Introduced Module Service Tool Kits
Research and Development of Frac Pump Consumables
 - 2014 Introduced BullDog Piston

INNOVATIVE ENGINEERING

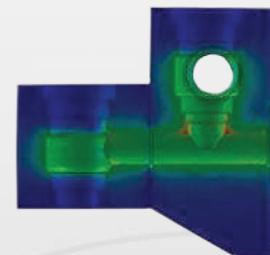
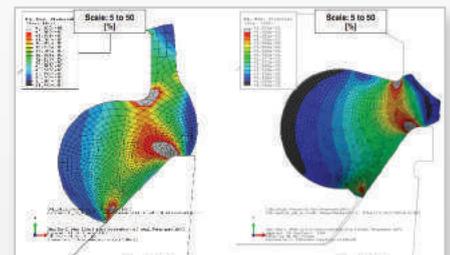
Improvements in material technology, failure analysis, machining tolerances, surface finishes, heat treating techniques, surface coatings, forging technology, welding practices and assembly techniques are constantly pursued by our engineering staff for integration into our products. This pursuit combined with over 65 years of manufacturing expertise places SWOP at the leading edge in mud pump fluid-end and expendables design.

Southwest Oilfield Products utilizes the latest engineering design tools available to employ technological advances into our time-proven product designs. Our engineering staff utilizes SolidWorks Premium for 3D CAD and SolidWorks Simulation Premium for finite element analysis. We have strengthened our non-destructive testing techniques and manufacturing methods through involving our engineers in the hands-on inspection and evaluation of our products.

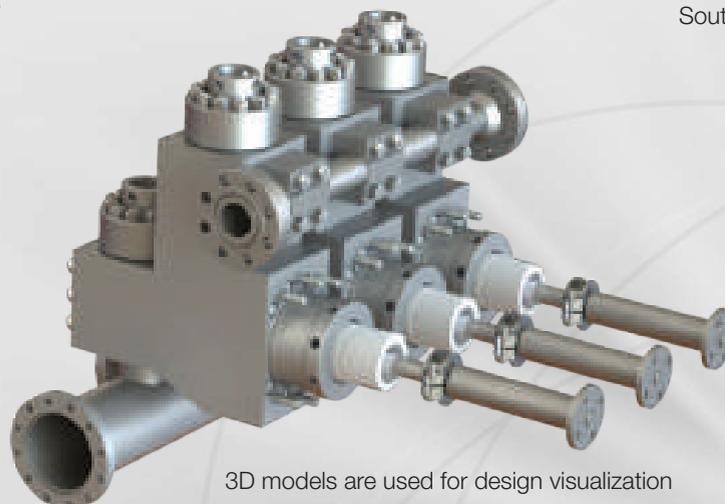
We emphasize a seamless interface between our Design Engineering Department and our Manufacturing Engineering Department. Our design engineers are frequently involved in the shop floor activity. Similarly, our machine programmers play a prominent role in product improvements and the development of new products.



Various Stress Point Analysis



Finite element analysis of a Southwest Genuine Fluid-End

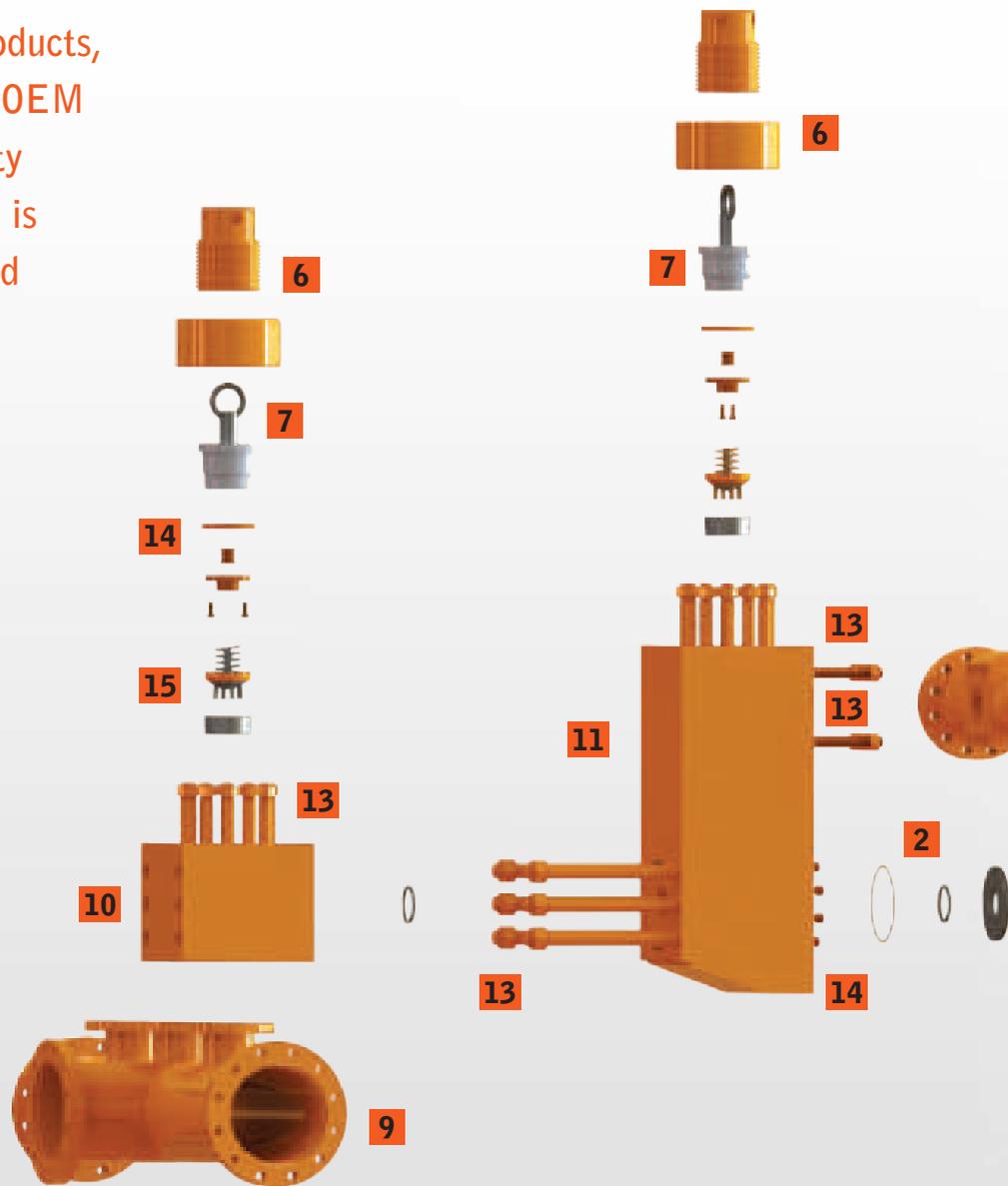


3D models are used for design visualization and production working drawings



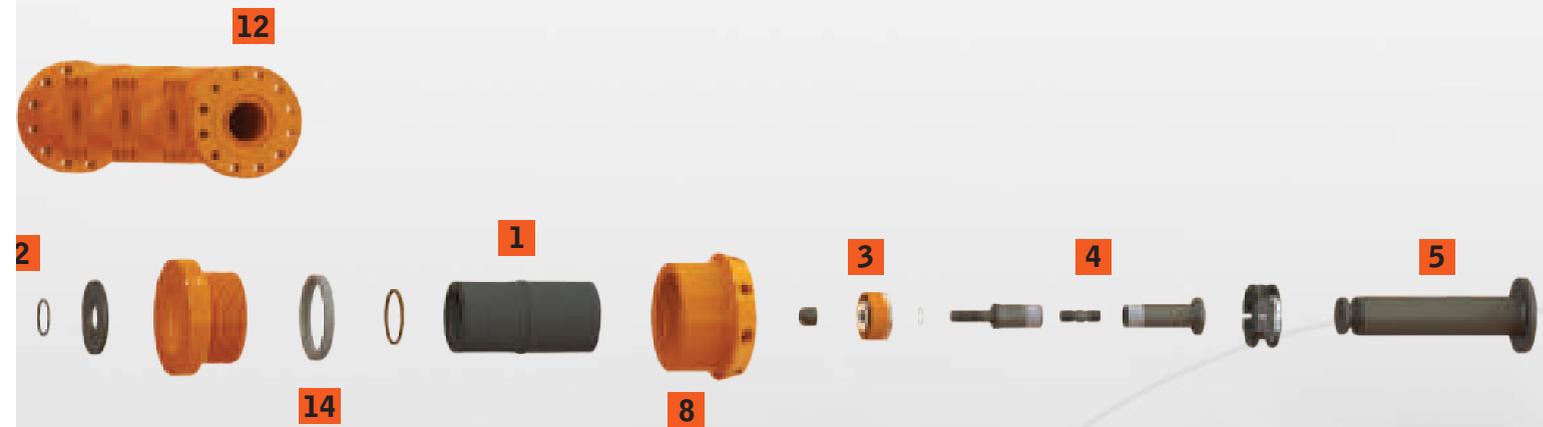
HIGH QUALITY FLUID-END COMPONENTS

Since 1947, Southwest Oilfield Products, "SWOP" has been an independent OEM manufacturer and supplier of quality fluid-end replacement parts. Below is an illustration of a typical Fluid-End component offering from SWOP.



- 1 Liners
- 2 Wear Plates and Module Seals
- 3 Pistons
- 4 Piston Rods
- 5 Pony Rods
- 6 Valve Cover Components
- 7 Valve Cover Plugs
- 8 Liner Retainers
- 9 Suction Manifolds
- 10 Suction Modules

Southwest Oilfield Products, has been a pillar in the Oilfield Industry since 1947. From our Houston based manufacturing facility, we strive to maintain our legacy by offering the highest quality parts & service the industry deserves.



- 11** Discharge Modules
- 12** High Pressure Discharge Manifolds
- 13** Studs and Nuts
- 14** Gaskets and Seals
- 15** Valve Assembly



THE ORIGINAL "L" SHAPED FLUID-END

Often Imitated But Never Duplicated, Southwest Oilfield Product's 2-Piece "L"-Shaped Fluid-Ends Have Become The Recognized Standard.

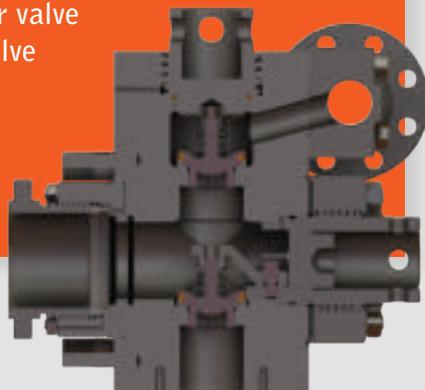
The "L"-shaped two piece fluid-end was adopted into the market over 35 years ago because it was an obvious improvement over OEM style (valve-over-valve) modules. Since the suction module is separate from the discharge module, it is possible to replace the suction module when it wears out instead of replacing the entire fluid-end.

SWOP's "L" Shaped Fluid-End Is Manufactured From Heat-Treated 4130 Forgings And Equipped With Our Quick-Change Valve Cover System, Our "L"-Shaped Modules Offers Unmatched Performance.

Southwest's second-to-none manufacturing is backed by the best warranty on the market.

OEM (Valve-Over-Valve) Style Fluid-End

- More expensive to maintain
- When wear occurs, entire fluid-end must be replaced
- Difficult to change valves
- Stress point analysis reveals design is susceptible to cracking
- Must remove lower valve guide to change valve



Valve-Over-Valve Fluid-End

Advantages of L-Shaped Fluid-End

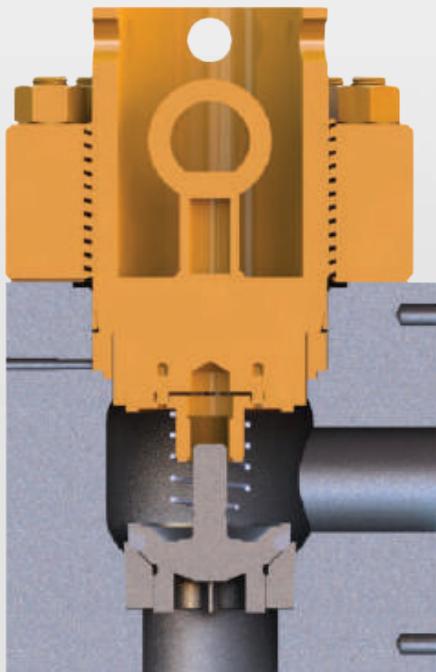
- More metal to support internal pressures
- Designed to run with liner wear plates
- No lower valve guide needed
- Only module that offers a 4 year warranty against cracking
- Comes with HP Quick-Change Valve Cover assembly



Southwest L-Shaped Fluid-End

HP QUICK-CHANGE VALVE COVER

- Southwest Oilfield's HP Quick-Change Valve Covers eliminate the need to replace or repair the expensive parts of your valve cover assembly.
- Only Southwest Oilfield's HP Quick-Change Valve Covers provide true steel-to-steel tightening and has the best valve cover seal on the market.
- Most pumps require no modification to convert to our Quick-Change product. Simply remove all component parts of the old valve cover including studs. Southwest's assembly kit includes everything needed for the changeout.



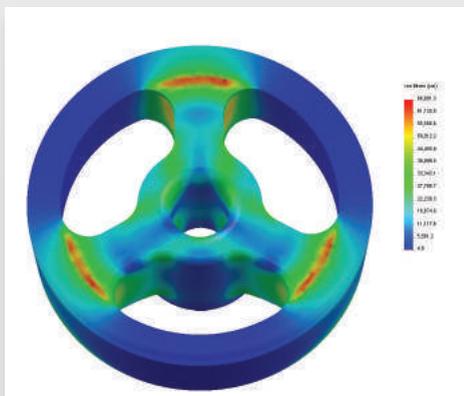
Southwest Oilfield Products Valve Cover Arrangement With Full Steel To Steel Retainment



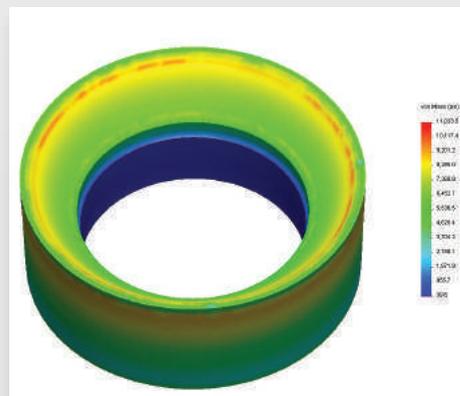
BONDED VALVE AND FULL OPEN SEAT

Southwest Oilfield Products' full open valve with bonded insert has replaced the slip-on insert valves. This design is permanently bonded to the valve body; it reduces the tendency for fluids to penetrate between the polyurethane insert and the valve body, thus preventing premature failure. The full open design of the valve seat is far superior to webbed style seats for many reasons:

- **Increased throughput**
- **Reduced wear and tear on fluid-end seat deck**
- **Even loaded surface compared to a webbed valve seat**
- **Reduced fluid turbulence**
- **Available in API and non API sizes**



Webbed – Uneven seat loading can result in premature module failure. Notice red areas are under extreme stress (66,000psi).

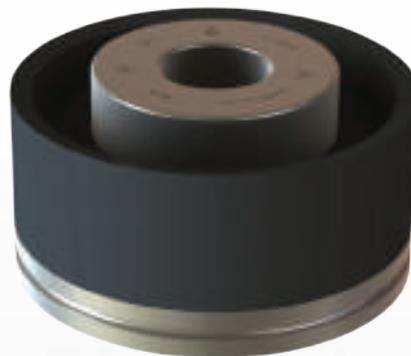


Full open – Not only is the full open seat more evenly loaded but the full open design results in less stress transferred to the module overall. Notice even the highest stress areas are much lower (11,000) than the webbed seat.

BONDED PISTONS

Fail-Safe Piston

In 1947, our first bonded piston was introduced into the market. Since then, the Fail-Safe Piston has remained virtually unchanged. The One-Piece Bonded Piston Design eliminates leakage points and is resistant to Abrasive Fluids. This Fail-Safe Piston seals off to greater diameters as the liner wears.



Dual-Duro Piston

This Premium Piston Has Been In Service Since 1985, Providing Unmatched Performance Under Extreme Drilling Conditions. It performs well with exotic drilling fluids and high temperatures.

Made of Dual-Durometer Polyurethane, this piston is designed to resist extrusion thus extending the life of the piston.

Full traceability is provided with all products sold, including pistons. Traceability markings include: Operators ID, Packers ID, Date of Urethane Pour, Part Number of Piston, Work order number, Made in USA brand, and SW logo.

BullDog Piston

Introduced in 2014, the BullDog piston is engineered for high temperature and pressure service (300°F / 7500 PSI). The BullDog piston is suitable for a wide variety of drilling muds including oil, synthetic and water-based. Along with its rugged and reliable design, a special blend of lubricating agents enhances the running life of this piston. Reducing operating costs in extreme drilling environments is a key benefit of the BullDog piston.



DUAL DURO PISTON

PROVEN PERFORMANCE, UNMATCHED DURABILITY...

Southwest's Dual-Duro® piston has provided unmatched performance in extreme drilling conditions since 1985.

Made of Dual-Durometer Polyurethane, this triplex pump piston is designed to resist extrusion which ultimately extends the life of the piston. Drilling operators worldwide trust the superior performance and unmatched durability of the Dual-Duro® piston.



Key Features Include:

- ✓ Excellent liner wear characteristics
- ✓ Maximum working temperature up to 180°F
- ✓ High resistance to chemical breakdown, tearing and abrasion
- ✓ Recommended for use in oil-based drilling mud but can also be used in water-based

<i>Part Number</i>	<i>Size / Description</i>
76BDD	4" Dual-Duro® Piston
78BDD	4 ½" Dual-Duro® Piston
81BDD	5" Dual-Duro® Piston
83BDD	5 ½" Dual-Duro® Piston
85BDD	6" Dual-Duro® Piston
87BDD	6 ½" Dual-Duro® Piston
89BDD	7" Dual-Duro® Piston

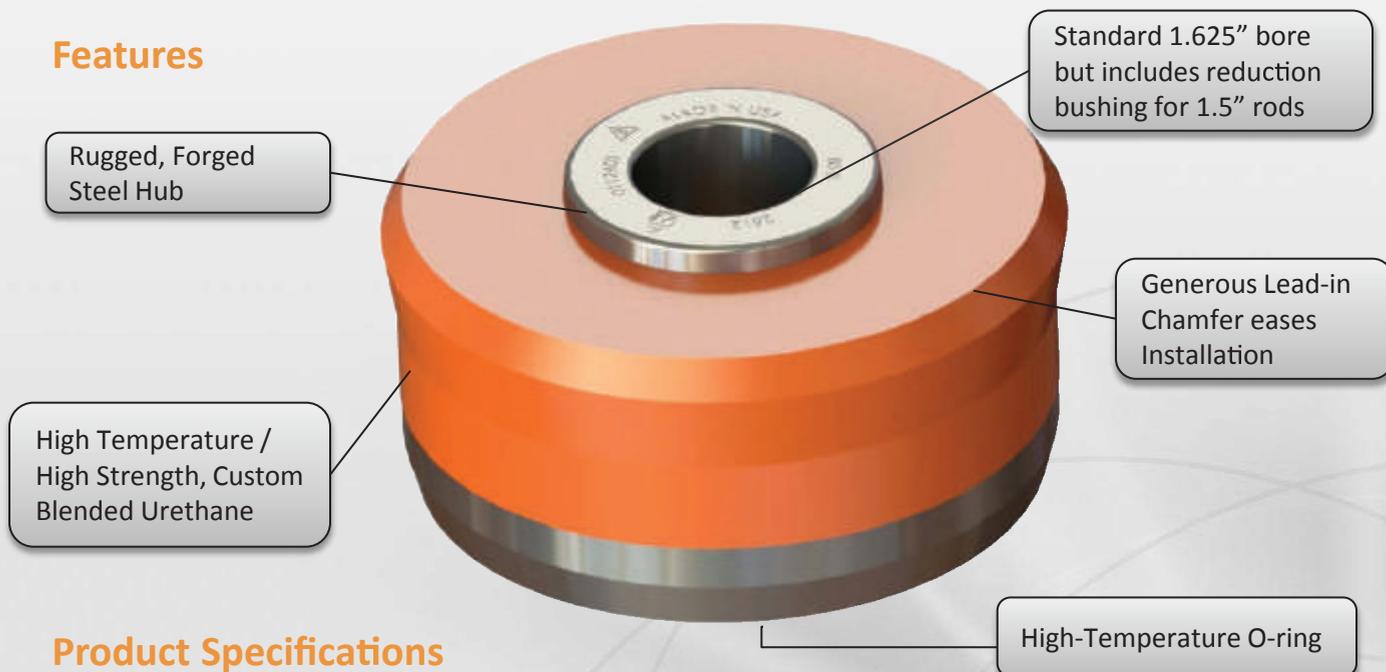
BULLDOG PISTON

Over 60 years ago, Southwest Oilfield Products was founded on mud pump piston innovation and today we continue to carry this legacy forward with the introduction of our Bulldog piston. This rugged piston is engineered for high temperature and demanding environments and will improve pump availability while reducing HSE risks.

Key Benefits

- ❑ Designed for High Temperature & Pressure Service (300°F / 7500 PSI)
- ❑ Suitable for Oil, Synthetic or Water-based Muds
- ❑ Excellent Chemical and Abrasion Resistance in the Most Demanding Well Conditions
- ❑ Enhanced Piston Running Life with a Proprietary Blend of Lubricating Agents
- ❑ Reduced Operating Costs in Challenging Operating Environments

Features



Product Specifications

Piston Diameter / Part #					
4.5"	5.0"	5.5"	6.0"	6.5"	7.0"
78BDB	81BDB	83BDB	85BDB	87BDB	89BDB



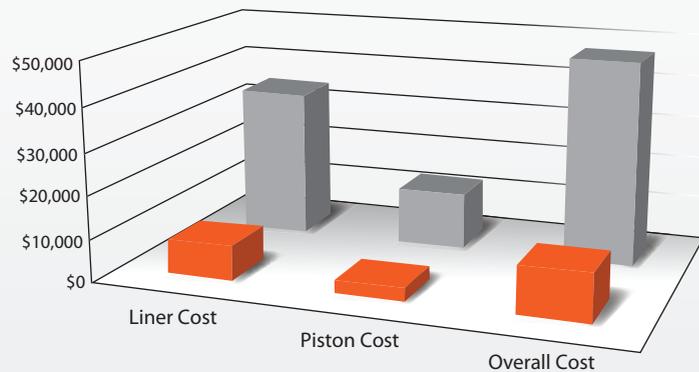
LINERS

Zirconia Liners

Our advanced Zirconia Liners are significantly harder than hardened steel liners, and tougher than any other ceramic available. The ceramic used in these liners is extremely resistant to corrosion and heat. Traditional liner hourly cost is approximately \$1.05 per hour, while Zirconia Liners are approximately \$.23 per hour.



Expendables Cost



Triplex Steel Liners

For use in today's higher pressure and faster stroking triplex pumps, Grayloy® and "Orange" series liners are made of high quality alloy steel. They are manufactured to provide maximum runs at minimal cost.



Southwest Quick-Change Hydraulic Liner Retainer

Increased safety and faster change-outs is the hallmark of Southwest Oilfield's Quick-Change Hydraulic Liner Retention System. Our patented design eliminates the need for hammers and wrenches without compromising sealing or alignment of the liner.



HIGH QUALITY CONSUMABLES

Southwest Washpipe And Packing

Our premium washpipes are manufactured for all swivels to precise tolerance with the same superior wear-resistant surface as the Grayloy piston rod.

High-quality fabric and rubber molded wash pipe packing is also available.

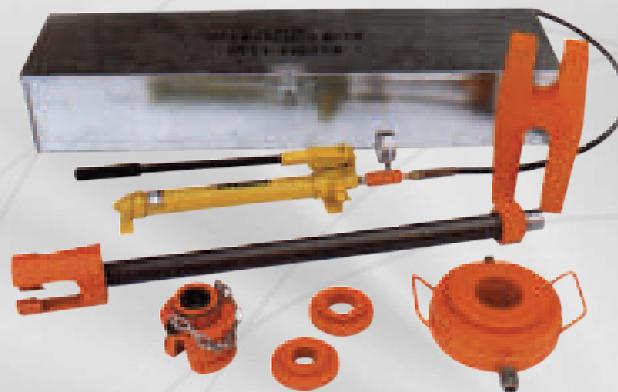


Packing And Gaskets For Triplex And Duplex Pumps

Southwest Oilfield Products offers a wide range of gaskets and packing materials for use in drilling pumps. Gaskets are made of various elastomers and rubbers depending on the application. New high temperature elastomers are now available.

Hydraulic Seat Pullers And Kits

- Pulls seat safely, quickly, and efficiently with no chance of damage to seat deck
- A complete line of puller heads for any brand seat
- Split-jaw heads for full-open seats; "j" hook heads for stem guided seats
- Available in API and Non-API



PISTON RODS AND CLAMPS

Piston Rods

The SWOP piston rod incorporates the Grayloy longer-wearing surface to provide the best piston rod for your triplex or duplex pump.



Rod Clamp With Integral Spray System

A cooling spray system is built into the clamp itself. The spray pipe is placed directly behind the piston. This volume provides an adequate spray to flush the liner and cool the piston.

Southwest Duplex Bonded Fail-Safe Piston

This duplex piston gives excellent service in both oil and water base muds. The fail-safe fluid expanded lip is not damaged by high pressure and fast pump strokes.

Southwest Duplex Grayloy Piston Rods

High quality Grayloy material is used on all Southwest duplex piston rods. This corrosion-resistant, high density, long-wearing surface results in fewer packing changes and longer life for gland bushings and junk rings.



GLOBAL SERVICE SOLUTIONS

Onsite Service Solutions Offered (Domestic & International)

Our SWOP Field Service Team is committed to providing customers with highly trained personnel who can thoroughly inspect fluid-ends and troubleshoot mud pump fluid-end issues. Our services are designed to provide customers with valuable information about the state of their fluid-ends and fluid-end components including:

- Installation of fluid-end modules
- Hydraulic liner retainer system installations
- Valve cover quick change conversion installations
- Non-Destructive, Fluid-end & Pump Inspections
- Dye penetrant inspection of fluid-ends
- Lapping seat decks
- Inspections for 5000 psi to 7500 psi upgrades

Laser Alignment System

As part as Southwest Oilfield's Service and repair department the Zero-N Laser Alignment System is utilized to provide the most accurate fluid-end alignment service available. The Zero-N Laser is accurate to within 0.001" in both the X and Y axes with a digital readout for consistent, repeatable measurements. The system is lightweight and suitcase portable, eliminating difficult transportation issues. Alignment inspections can be performed worldwide by our team of trained service technicians.

F550 Service Truck

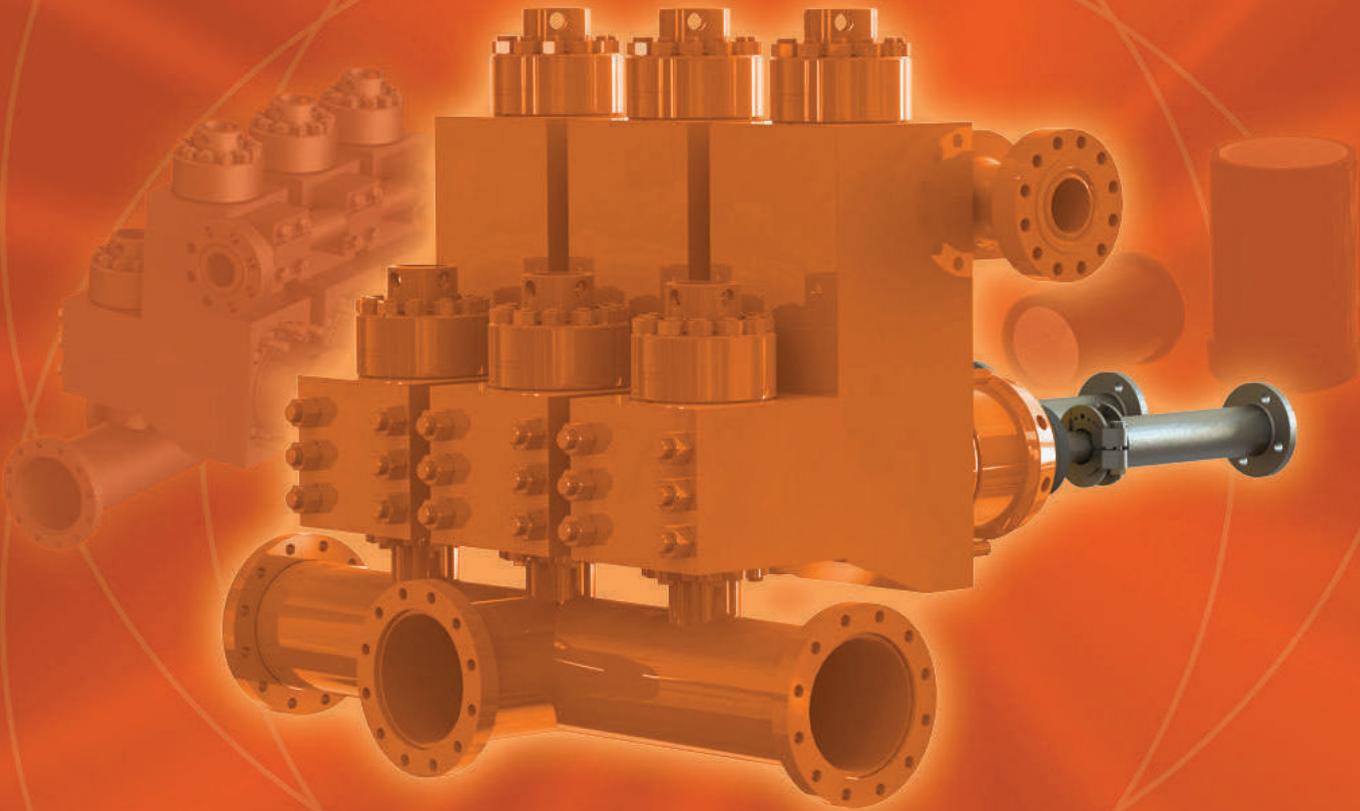
With the addition of a fully-tooled, heavy-duty service truck, our Southwest service offerings continue to grow!

With a 6,000 lb. lift capacity, onboard welding unit and pneumatic tool system this vehicle is equipped to handle even the most challenging, on-site fluid-end projects.



Manufacturer of Mud Pump Fluid Ends & Expendables

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