



DYNAMIC POWER™ HDD Rigs **500K, 750K and 1M**

Power Dynamics Innovations

Building 9166, Stennis Space Center

Mississippi, 39529

Telephone 228-689-8560

Email: sales@powerdynamicsllc.com



Power Dynamics Innovations LLC

Partners in Engineering and Manufacturing Solutions

POWER DYNAMICS INNOVATIONS LLC was established with the asset purchase of Power Dynamics LLC in June 2015 by Carl Liberty. For the past ten years Carl has been the Vice President of Operations for Power Dynamics LLC and has played an integral part in building PDI's position as an industry leader in the Fluid Power Industry.

Located within the **John C. Stennis Space Center** in **Southeast Mississippi**, a team of 56 full time employees provide worldwide **engineering and manufacturing solutions to the fluid power industry**.

FLUID POWER INDUSTRY LEADER

Power Dynamics Innovations **engineering and manufacturing expertise** is known and respected throughout the fluid power industry. Key to PDI's success has been our team of dedicated employees providing successful fluid power solutions for over thirty years. PDI stands today as a leader in the industry, engineering **Horizontal Directional Drilling Units (HDDs)**, as well as providing **Worldwide Repair and Maintenance Field Service**.

As aging equipment infrastructures deteriorate, the repair and/or rebuilding might be the best **“Cost Effective Solution”** extending the life cycle of the equipment. As PDI began modifying and repairing other Manufacture's HDD's in 2012, customers began to request new units that could be customized in a way that made them **Simple, Reliable and Easy to Maintain**.

PDI has since developed a line of **DYNAMIC POWER™ HDD Drilling Solutions** available from **500,000 to 1,000,000** pounds of pull-back. With PDI's on- site service and maintenance options, clients experience minimal equipment downtime.

Our expert team of engineers provides superior designs and our skilled craftsmen implement these designs. Utilizing up-to-date computer technology, engineering drawings and job files that are readily available, assures little interruption in production. PDI's integrated manufacturing system works to provide customers with **safety, high performance, and cost effectiveness**. Our full service **facility** encompasses **51,000 square feet** housing offices, warehouse, machine shop, fabrication, assembly and service areas.

From design to delivery, the Southeast Mississippi plant is designed to provide quality products to meet our customers' needs. For additional information please contact **PDI's Inland Pipeline Equipment Division Manager, John Holland** at
Main: 228-689-8560, Cell: 985-445-3214, Cell: 601-408-9812

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PDI - DYNAMIC POWER™ HDD 500 DRILLING RIG



DIMENSIONS (TRANSPORT)

Curb Weight: Approx 64,000 lbs.

Length: 45 FT.

Width: 8' 6"

Suspension: 60,000 lb dual axle

Drill Rack Angle: 8.2 - 13 degrees

OPERATIONAL

Max Thrust: 500,000 lbs

Max Pullback: 500,000 lbs

Max Spindle Torque: 50,000 FT-lbs

Max Spindle Speed: 68 rpm

Max Carriage Speed: 70 FT/min

FRONT BREAKOUT VISE

Max clamp torque: 678,000 FT-lbs.

Max rotating torque: 150,000 FT-lbs.

Three jaw clamp

Travel = 72"

REAR BREAKOUT VISE

Max clamp torque: 452,000 FT-lbs.



POWER SOURCE

Engine: Caterpillar C-27
Gross horsepower (max): 820 HP
Max Engine Speed: 2100 rpm
EPA Certification Family: Tier 2
Fuel Type: Diesel
Fuel Capacity: 1080 Gal
Weight: 30,700 lbs (No Fuel)
Weight: 38,800 lbs (Full Fuel)
Hydraulic Tank Capacity: 450 Gal
Length: 20 FT
Width: 6.33 FT
Height: 10 FT



HYDRAULIC SYSTEM

Pumps

2 Rotary Pumps
3 Travel pumps
1 Vise pump
1 Dedicated rotary flush pump
1 Dedicated kidney loop pump

Thrust/Pullback Circuit

Hydraulic pumps
3 - Sauer Danfoss Series 90

Travel motors

2 - Hagglunds CA-100

Planetary gears: 6" tall x 15" OD
Gearboxes: 2 - Seimens (Flender) P1HA14

Rotation Circuit

Hydraulic pumps: 2-Sunstrand 90
Hydraulic motor: 1-Hagglunds CA-210

Auxiliary Circuits

Vise pump (PFC-LS pump):
1-45 Series Sauer Danfoss

Hydraulic pump:

1-Dedicated kidney loop pump
1-Hydraulic Rotary Flush pump



Hydraulic Quick Disconnects Parker/Snap-ite

Heat Exchanger/Cooler
Cold oil 60 psi w/bypass &
w/variable speed fan

Hydraulic Reservoir
450 gal capacity
In-tank filtration
Hot-oil sump to separate hot and cool oil
3 suction strainers with shutoffs

Filtration Components
5—25 micron charge pump filters
10-10 micron high press filters
1-25 micron flush filter
1-25 micron vise high psi filter
1-25 micron vise return filter
1-25 micron kidney loop filter

BREAKOUT SYSTEM

UPPER VISE

Dual-cylinder design - 8 "
Integrated into carriage to
reduce breakout time

LOWER VISE

Three cylinder design - 8 "
8.75" insider diameter opening

Travel = 6 FT

DRILLING CONTROL CAB

Length: 10'

Width: 8'

Height: 8'4"

Weight: 5500 lbs.

Three windows with steel protective
panels

High-density foam insulation

Pressure Gauges: Push, Pull, & Vise
Makeup, 5000 psi ea.

Mud Gauge—2800 psi

Sundstrand Pump Controllers

Torque limiter adjustment for thrust,
pull back, rotary, & vise-makeup

Engine emergency shutdown switches &
joystick kill switches

5 bank Hawe Valve Body

4 bank Hawe Valve Body



RACK GEAR ASSEMBLY - Double I-beam construction
TRAILER - Double - axle

FRONT DEADMAN- LARGE
16 ' long x 5' wide x 2' high
2 - 14" spud openings

FRONT DEADMAN – SMALL
9'6" long x 5' wide x 8" high

REAR SUPPORT PAD
16' long x 7'10" wide x 8" high
Front to Rear Stabilizer Rods

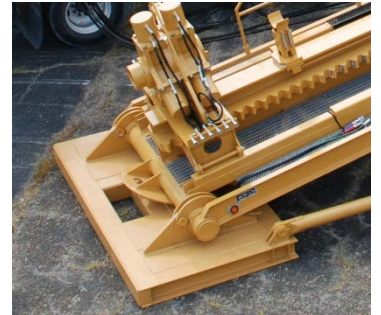
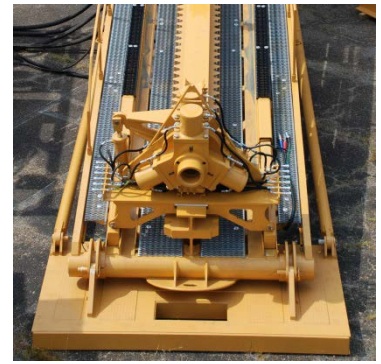


PDI continues to believe our client's success is paramount to our continuing business relationships and provides maintenance and repair services for our clients HDD Equipment, regardless of the manufacturer. Power Dynamics Innovations has thrived on decades of our client's continued desire to use PDI as an extension of their own capabilities in providing solutions for complex problems.

Upgraded Forward Vise for Vermeer Type Rig (D200x300) Navigator

Dual 6" clamp cyl. (3-1/2" rods)
5" – 8-1/2" pipe diameter clamping
6-1/2" travel between vises
At 2950 PSI the vise develops 57,947.38
Foot pounds of torque

We invite you to experience the PDI difference; call us today! We look forward to servicing your needs.



DYNAMIC POWER™ Engineered and Manufactured Products

PDI has the ability to custom fabricate equipment and systems to suit our client's needs. We have an experienced pool of fabricators, machinists and welders to complete jobs on time to meet critical deadlines. PDI specializes in providing high quality, close tolerance custom metal fabrication, certified welding and precision machining to a broad spectrum of industries. With diverse equipment and highly skilled, certified fabricators, Power Dynamics Innovations has the capability to produce anything from small machine parts to large weldments, using a variety of alloys.



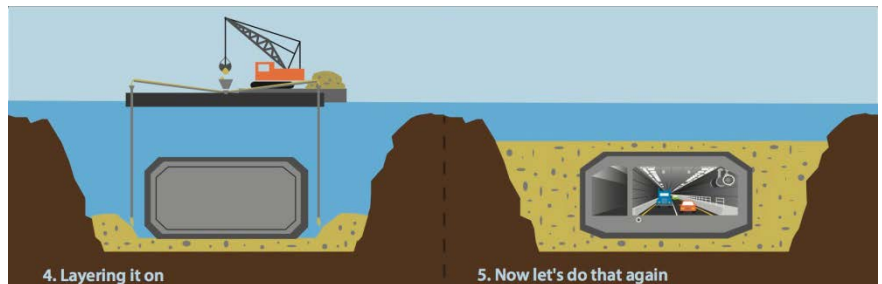
PDI's team of Fluid Power Engineers design our systems for precision and control utilizing SolidWorks, AutoCad, Nastran and other advanced art software programs. We incorporate state-of-the-art technology in our hydraulic systems with the latest in programmable controllers and input/output devices providing improved controllability, reliability, efficiency and safety. Our engineers are experts in comprehensive modeling, simulation and designing of hydraulic components and systems. We provide guidance for designing new or refurbishing existing hydraulic systems along with providing failure and contamination control analysis.



Power Dynamics Innovations DYNAMIC POWER™ Special Engineering and Construction Projects

SKW Constructors (a Skanska, Kiewit, and Weeks Marine Joint Venture) is the design-build contractor for the **Elizabeth River Tunnels (ERT) Project**. The Project is technically challenging and the new Midtown Tunnel must be built under an active waterway and federal channel. PDI was contracted by our Client SKW to provide Fluid Power Engineering and Design on key pieces of the Hydraulic Systems to meet these technical challenges. PDI was also contracted to manufacture these key system components.

The **Elizabeth River Tunnels (ERT) Project** was named the #1 Road Project in North America in 2014 by Roads & Bridges magazine. PDI provided key components including the Raker Pile Driving System, the Screed Barge and Backfill Barge Hydraulic and Control Systems and the Lay Barge Winch Refurbishment and New Control Systems. PDI also updated the Hydraulic Piping Systems and provided Containerized Climate Controlled Operation Control Structures.



For over Three Decades

PDI has been as a leader in the Fluid Power Industry. Making headlines early in PDI history was the contract award from Lockheed Martin for the “Straddle Carrier” for transporting the Space Shuttle Tanks and the United States Navy’s “Lighter Amphibious Re-Supply Cargo Vessel (LARC-V). Forty three of these vessels were re-manufactured by PDI and can travel on land as well in water. These same vessels were used to help victims of Hurricane “Super Storm Sandy”.

In 2012 PDI started repairing HDD products manufactured by Vermeer, American Auger and other manufacturers and found our clients wanted us to consider building new Maxi units. They wanted custom built HDD rigs that were simple, reliable and easy to maintain. Trenchless Technologies did an article announcing “There is a new player in the Horizontal Directional Drilling (HDD) industry.” PDI now manufactures Maxi Size HDD Rigs.



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