A Guide to Rotary Screw Pumps in Oil & Gas

Determine which type—single-, twin- or three-screw—is best for your application.

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Buyers of new industrial equipment are returning to their roots with the shift from centrifugal to screw pumps for their critical applications. Screw pumps, first introduced by Archimedes around 200 B.C., are positive displacement (PD) machines that offer extensive benefits for pumping fluids across a wide range of pressures and flow conditions.

Screw pump manufacturers have made it their mission to produce pumps offering significant advances in fluid handling reliability and energy efficiency. All PD pumps are volumetric fluid handling solutions that create flow and are flexible to dynamic system pressures. They are a widely adopted pump technology for reliable, continuous pumping of hydrocarbons with highly variable fluid properties and changing operating conditions.

Here is a guide for determining whether single-, twin- or three-screw pumps are the most suitable for your oil and gas application.

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### Single-Screw (Progressive Cavity) Pumps
- **Rotor (eccentric screw) surrounded by elastomeric or metallic stator**
- **Only one shaft seal and bearing**
- **Flow rates up to 1,980 gallons per minute (gpm) (450 cubic meters per hour [m3/h]) and pressures up to 350 pounds per square inch gauge (psig) (24 bar)**
- Generates consistent, pulsation-free flow with low turbulence and shear
- Material selection enables pumping of highly contaminated or high basic sediment and water fluids
- Handles fluctuating working pressures and variable fluid consistencies
- **Crude, condensates, produced water/emulsion transfer**
- **Cold heavy oil production with sands (CHOPS)**
- **Horizontal and vertical pumps for wet pits/waste pits/sumps**
- **Drilling mud conveyance**
- **Tank and pipeline stripping**

### Twin-Screw Pumps
- **Two intermeshing screws synchronized by timing gears**
- **No metal-to-metal contact due to geared link between screw shafts**
- **Double-suction casing design with balanced hydraulic axial loads**
- **Four shaft seals and bearings**
- **Flow rates to 18,000 gpm (4,000 m3/h) and pressures to 1,500 psig (100 bar)**
- Can handle corrosive materials, multiphase flows (> 97 percent gas volume fraction [GVF]), variable fluid consistencies, dry running
- Ultra-low net positive suction head (NPSH) and shear
- **Barge, tank, railcar loading/unloading**
- **Pipeline booster and mainline pumps**
- **Wellhead pressure control and gathering of multiphase flows**
- **Refinery fluid transfer (fuel, bitumen, asphalt, residuum of vacuum, distillation, desalter tanks)**
- **ROSE de-asphalting process**
- **Tank and pipeline stripping**

### Three-Screw Pumps
- **Hydraulically balanced single- or double-suction pumps with three screws**
- **Single-shaft seal and bearing (also available in seal-free designs)**
- **Central-drive rotor with two meshing idler rotors**
- **Flow rates to 3,300 gpm (900 m3/h) and pressures to 4,500 psig (310 bar)**
- Enhanced efficiencies with high fluid viscosities
- **Low noise, vibration and shear at high speeds**
- **Low mean time between failures (MTBF) and maintenance**
- **Heavy crude oil pipeline service**
- **Crude loading and unloading**
- **Refinery processes for high temperature and high viscosity products**
- **Lubricating oil pumping**