

HYDRAULIC PUMPING SYSTEMS

Hydraulic Jet Pumps

Typical Jet Pump Applications

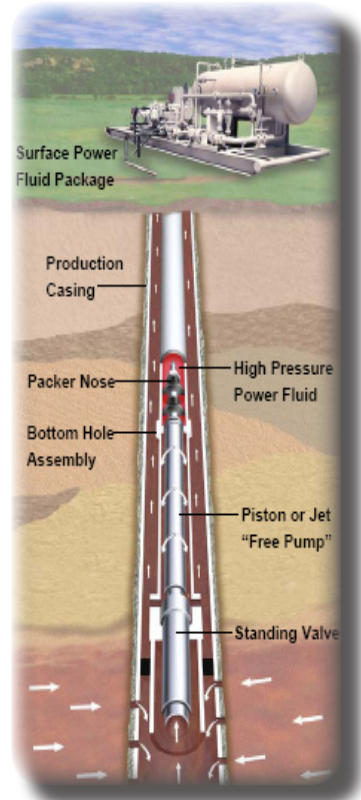
- Permanent Production
- Well Productivity Evaluation
- Well Clean-ups and Unloading Gas Well Dewatering
- Drill Stem Testing

Hydraulic Jet Lift System Advantages

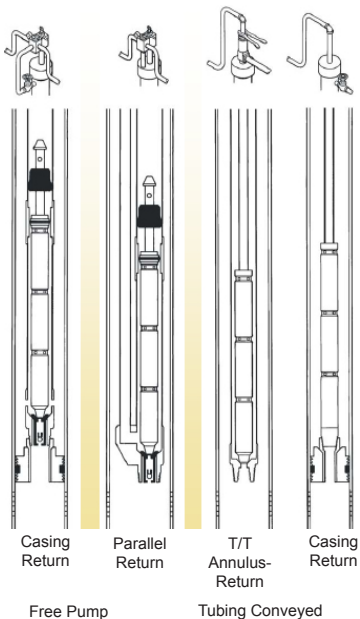
- No Moving Parts
- High Volume Capability
- “Free” Pump
- Deviated Wells
- Multi-Well Production from Single Surface Package
- Low Pump Maintenance

Hydraulic Jet Lift System Limitations

- Producing Rate Relative to Bottomhole Pressure
- Some Require Specific Bottomhole Assemblies
- Lower Horsepower Efficiency
- High-Pressure Surface Line Requirements



Basic downhole installations - Open Power Fluid configurations



Hydraulic Jet Lift Application Considerations

	Typical Range	Maximum*
Operating Depth	5,000 - 10,000 TVD	15,000 TVD
Operating Volume	300 - 1,000 BPD	15,000 BPD
Operating Temperature	100 - 250 F	500 F
Wellbore Deviation	0-20 deg Hole Angle	0-90 Deg Pump Placement - <24 deg/100 Build Angle
Corrosion Handling		Excellent
Gas Handling		Good
Solids Handling		Good
Fluid Gravity		>8 deg API
Servicing		Hydraulic or Wireline
Prime Mover Type		Multi-Cylinder or Electric
Offshore Application		Excellent
System Efficiency		10% - 30%

Surface Plunger Pumps



HYDRAULIC SURFACE UNITS

Hydraulic Lift Systems require surface equipment to clean, condition, and pressurize power fluid to operate down-hole hydraulic pumps. The well-produced oil or water is used as the power fluid.

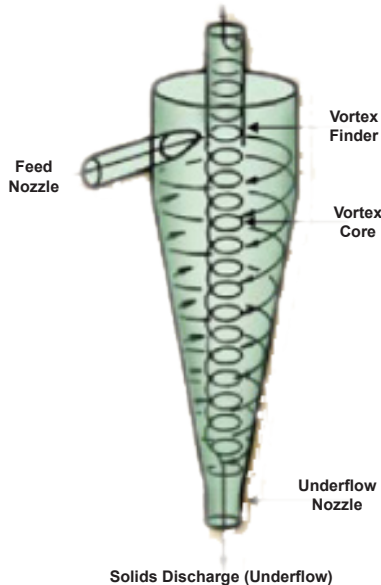
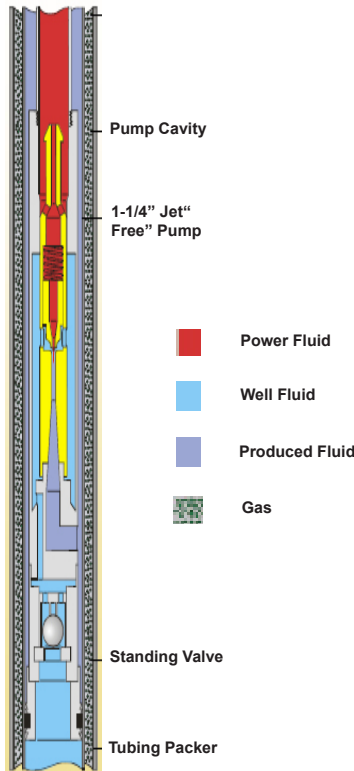
Rotating Right offers a complete line of power fluid surface units. These systems are oilfield skid-mounted, and specifically engineered to provide optimum performance under the most rigorous conditions. Most power fluid packages are comprised of a multiplex pump, a prime mover, a reservoir vessel, and various controls. If power fluid cleaning is required, cyclonic cleaners are included and all equipment is housed on an oilfield skid unit. A range of HP, commonly 30 to 300, is computer selected to match the required lift conditions of the well. Larger units, up to 625 horsepower, can be supplied for large volume wells.

Cleaning the power fluid is accomplished by the use of cyclone separators properly sized to remove solids over 20 microns. The fluid is pressurized by a multiplex pump to typical injection pressure of 2,000 to 4,000 psi. The pump can be driven by electric motor, multi-cylinder diesel or natural gas engine.

Return well fluid and exhaust power fluid is typically brought to a vessel unit for conditioning to allow an acceptable division of gas, oil, and water. Vessel design pressure is dependent on flowline pressure to the processing unit, typically in the ANSI 150 to 300 range. All vessels are built to the latest ABSA and ASME code and carry the ASME code stamp. In addition, the vessels are all internally coated for protection from corrosive well fluids.



1-1/4" Coiled Tubing Jet Pump



SUBSURFACE HYDRAULIC PUMPS

Rotating Right offers a complete line of jet pumps and reciprocating piston pumps to address various conditions and hydraulic lift applications. Both systems are normally installed as "Free Pumps" which allows them to be returned to the surface with fluid circulation. Additionally, both pumps operate very successfully in highly deviated wellbores.

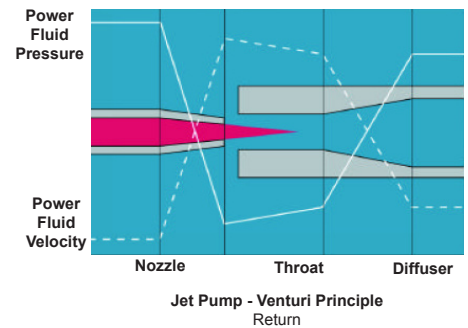
Reciprocating Piston Pumps

Effective in lifting from great depths, these pumps have the potential to operate to almost total well depletion and employ a simple design and operating principle. The engine is activated by power fluid controlled by the engine valve. The engine piston is fitted with a rod that connects to the pump piston. This positive displacement configuration allows the pump to operate at low bottomhole pressures.

Jet Pumps

With no moving parts, high alloy construction and abrasion resistant components, these pumps provide long run times, even in sandy or highly corrosive well environments. Jet pumps can be adapted to run in a wide variety of bottomhole cavities and downhole tools.

The actual working components of the jet pump are the nozzle, throat, and diffuser. These components are assembled in a variety of configurations and materials to suit the production requirements and downhole environment.



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