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Mud Pump Construction

Consider the cooling system, lubrication and quality control in mud pump selection.

by Luigi Rebecchi, Drillmec Drilling Technologies

Mud pumps are the “heart” of a rig. They circulate mud and control well hydraulics. Piston types can be duplex (two double-acting cylinders) when flow/pressure is modest or triplex (three-acting cylinders) for large flow demands, typically for deeper drilling.

Triplex mud pumps can operate at rates from 300 horsepower to 2,200 horsepower for drilling and workover. Most are powered by diesel engines or DC/AC electric motors and can be mounted on an oilfield skid or a trailer. For safety, sound-proof shelters are available and suitable to all requirements. Mud pumps can handle a variety of drive arrangements.

Some triplex mud pumps have features that can improve performance and reduce maintenance. The fluid end may have triple interchangeable modular cylinders to reduce time loss and allow work to restart as soon as possible. The power and fluid ends should be manufactured with the latest cast iron technology. The power end should be fabricated by welded and stress-relieved frame construction, and the fluid end should be equipped with pulsation dampeners.

The crankshaft, constructed of cast alloy steel and pinion gears, should be mounted on bearings. The crosshead sliding faces should have a bronze overlay. The valves, manufactured to American Petroleum Institute (API) standards, should have springs and guides designed for resilient operation under high working pressure with abrasive fluids. Screw-type valve covers and pistons must be designed for easy disassembly and replacement.

The recommended materials of construction of the pinion and eccentric shafts are forged alloy steel, quenched and tempered, and mounted with tapered roller bearings. Liners, pistons, rods, valves and seats should be made from heat-treated alloy steel.

When selecting a mud pump consider the cooling system, the lubrication system and quality control. The cooling system of the mud pump should be a spray system, which includes a spray pump, cooling water box and spray pipe. The function is to cool and rinse the liners and pistons. The spray pipe should be mounted on the coupling between the extension rod and the piston rod and can be reciprocated with the piston. Nozzles should be near the piston ends so that the cooling, lubricating fluid can rinse the contact surface between the piston and liner at all times.

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Some mud pump power ends' lubricating systems can experience forced lubrication and splash lubrication. In other pumps, the oil is moved through a lubricating pipeline system to crossheads, extension rods, crosshead guides and all bearings. Use a gear oil pump within the oil box to realize the forced lubrication.

Mud pumps experience rough and hazardous conditions. Personnel and equipment safety are paramount. After final assembly, each mud pump should be retested. A test area should simulate the drilling conditions of the operating location.

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