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What's new in artificial lift

Part 2—Advances in surface and downhole equipment/instrumentation for beam and progressive cavity type pumping

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In the first article of this two-part series, new developments were presented for electrical submersible pumps and accessories, gas lift, and controls and measurement. This concluding article extends the review of artificial lift innovations to include beam pumping and progressive cavity (PC) pumps.

Described here are improvements in beam pumping which include advanced

sucker rods and pumping units, fluid level instruments, pump-off control (POC) and efficiency monitoring/management systems, pump sand control, surface pollution containment and a shared-motor for multiple wells. For progressive cavity pump improvements, three companies have introduced new rod guides, a modified tubing anchor catcher, round continuous rods, a PC variable frequency drive and a multi-lobe pump system. And status of a 20-company sponsored project for PC pump improvement is outlined.

Pump sand protection. To protect the rod pump against sand damage, Stren Co., Houston, has developed PumpGard, a downhole membrane or composite material system of sand screen cartridges, that will unitize directly into the pump's standing valve and filter fluid entering the pump. Particles larger than the closest approach of the plunger to the barrel are screened.

A composite-type cartridge is shown in Fig. 17. The top thread of the unit screws into the standing valve. The lower spring-controlled ball shown is an automatic bypass feature. When the cartridge plugs, pressure differential on the ball exceeds the selected spring setting and the bypass opens to allow continued production. This system allows the operator time to service the well, after plugging is first indicated, without losing valuable production.

If needed, a stainless steel membrane with continuous precision cavities smaller than 15 microns can be manufactured. However, industry has determined that 50-75-micron membranes provide the most economical protection. When the system is first deployed in the well, pressure drop across the stainless steel membrane is less than 1 psi.

Stren equipment can also be used to clean power fluid streams for hydraulic pumping systems. A surface-mounted "PowerGard" cartridge can be installed on the suction side of a power oil pump. A second point of protection can be added with an "On-pump" tool, which threads between the pump and the packer nose assembly. A third point of protection can be added at the production end of the piston pump, utilizing the PumpGard tool threaded into the standing valve assembly; this allows it to be run and pulled with the standing valve.

Back wash for PumpGard. Stren has developed an Automatic Back-Wash System for the rod pump and

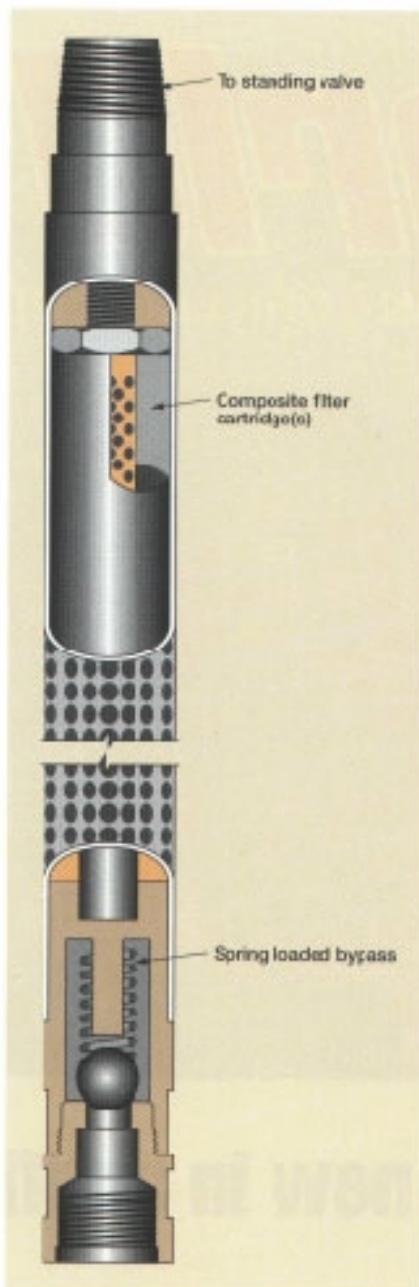


Fig. 17. Cutaway of Stren PumpGard composite cartridge sand filter and spring-controlled bypass system.

the PumpGard system. The system is designed to dislodge the buildup of particles, sand and bottom trash that accumulates on the outer periphery of the PumpGard stainless steel filter cartridge (not the composite cartridge) by reversing fluid backflow from the pump.

The back-wash system is automatically activated when differential pressure across PumpGard exceeds the preset rating of the pressure sensor spring, as described above for the bypass valve. This causes the internal piston system to trip the rod, which moves upward

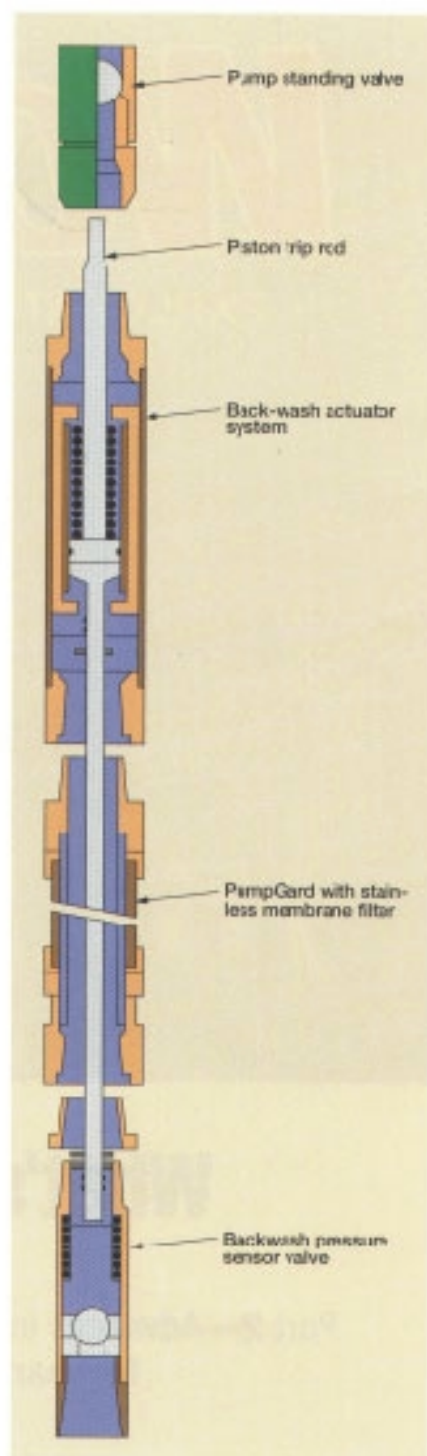


Fig. 18. Stren's Automatic Back-wash system used with stainless membrane-type PumpGard sand filter.

and holds the ball off the seat of the standing valve, Fig. 18. Clean fluid from the pump flows down and outward through the filter cartridges. Ideally, dislodged particles will drop into the rat-hole. After the differential pressure across the cartridges has been relieved, the sensor valve re-sets automatically and normal pumping is continued.