Multiphase Booster Pump Creates Value for Operators in GOM

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Top view of the 12x60 Weatherford RamPump unit installed at HI 23.

Weatherford Artificial Lift Systems recently introduced a new product for managing oil and gas production called the RamPump™ multiphase booster pump. This duplex piston pump is operated with a hydraulic power system that can be driven with a gas, diesel or electric motor. The RamPump is designed to simultaneously boost full well stream fluids and gases in one system without separation.

The benefits of this type of system are most apparent to offshore producers wanting to lower operating pressures in order to maintain or even improve production but do not have the space to install separators, flash tanks, compressors, liquid pumps and vapor recovery units to achieve the lower well head pressure (WHP) desired. The RamPump alone can be used to lower the WHP on a well by creating a low pressure zone between the well and the high backpressure source such as a long flowline or downstream separator thus minimizing equipment requirements.

On a recent installation in the Gulf of Mexico, the RamPump's 12" plungers x 60" stroke is allowed a major independent oil and gas company to flow a well that otherwise would have been shut in due to high backpressure (Fig. 1). Flowing tubing pressure (FTP) was reduced from 600psig to 150-250psig while boosting the combined gas and liquids into a downstream separator at 1000psig. The gas and oil was metered from the separator and then sent into the 1000psig sales line without additional boosting. With the RamPump installed, the well was isolated from the high backpressure imposed by the HP separator and the operator is now recognizing an estimated 150 BOPD and 250 MCFD in incremental production. Total volume managed by this unit in this application has ranged from 7,500-10,000BPD equivalent. This pump was chosen instead of a conventional method adding an additional IP/LP separator with a gas compressor due to its reduced size and weight and lower installed cost. This well is not currently using any downhole artificial lift due to the limited space available offshore. However, evaluations are underway to determine if installing subsurface

View from the helipad at EI 257D with RamPump unit.

artificial lift on the well along with the surface mounted RamPump will enhance the recoverability of the reserves.

Another GOM installation has a 10" x 42" stroke RamPump boosting oil, water and associated gas from a four well satellite platform to a host facility for processing and metering for sales. The failure of conventional pumps caused by produced sand and solution gas volumes that caused excessive wear and vapor locking of the pumps proved a valid opportunity for the RamPump multiphase booster. The unit was installed in April 2001 in the GOM and has all but eliminated the problems previously experienced with conventional triplex pumps. In addition, this unit has provided an incremental increase in oil of nearly 200 BOPD and reduced the gas lift required on the wells. Operating pressure is 45-65psig at inlet and 200-400psig at the outlet and includes a 50hp electric motor driven hydraulic power unit and is rated for about 6000BPD equivalent.

The experience gained from these applications is providing valuable insight to the practical application of this unconventional form of booster pumping to enhance recoverability of reserves through reduced surface backpressure. When combined with other forms of downhole artificial lift such as gas lift, jet pumping, electric submersible pumps (ESP's) and progressive cavity pumps (PCP's) the improvements can be sustained over longer periods of time.

The current pump design incorporates maintenance-friendly features such as injectible packing and slide out check valve cartridges for easy access for inspection and maintenance. The hydraulic system uses standard components that are commercially available and is virtually

Weatherford 10x42 RamPump system at EI 257D in operation since April 2001.

maintenance free except for periodic filter and fluid changes. Also, this system also has a built in variable speed capability to adjust output according to process conditions without a VFD or PLC. The RamPump is available in sizes ranging from 6" to 36" diameters all with up to 60" nominal stroke height and capacities from 500BPD to 170,000 BPD of equivalent well fluids including gas with differential pressures to 3000psig. For more information contact: Glen Curtis at 713-983-5217.

CAT engine driven hydraulic power unit for a 12x60 RamPump unit on a test stand.