Casing Pump Operation

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When the drilling operation of an oil well is finished, an oil string of casing is left in the hole. In the early days, if the well would flow, it was allowed to flow through the casing. When it quit flowing, tubing was installed inside the casing. Oil was then pumped through the tubing with a working barrel and valves. The valves used leather cups with a ball check in the traveling and the standing valves. When this type pump needed repairs, it was necessary to pull both the rods and tubing to effect repairs on the pump.

Then the rod pump came into use. This pump was seated in the tubing and only the pump and rods were pulled for repairs to the pump.

In many cases the largest tubing that could be used in the oil string of casing was not sufficient to handle the great amount of water necessary to move in order to recover a paying quantity of oil. This brought on the idea of lodging the pump in the oil string without the use of tubing and pump direct through the casing.

Prior to 1932, eighty or more patents were applied for and many of them granted by the United States Patent Office covering this type of operation, none of which were very successful. The major difficulty encountered in all casing pumps until this time was in the pack-off arrangement. Rubber and canvas packers had a tendency to stick or vulcanize to the casing and much difficulty resulted in pulling the pump for repairs. In the late 20's and early 30's much development was made on synthetic rubber. With the advent of synthetic rubber this difficulty was eliminated. Neoprene packers presently being used are chemically inactive with oil and will not adhere to casing or expanding head.

Present day casing pump assemblies consist of a packer, which seals off in the casing by means of a steel expanding head and a drain arrangement. Fluid is released by the drain arrangement when necessary to remove the pump from the well. A conventional working barrel pump with upper and lower valves is attached to the drain arrangement and anchored at any desired depth by means of an anchoring device.

The casing pump as now used is a proven method of pumping. The primary purpose of the casing pump is to move large volumes of fluid. A casing pump that will handle as much fluid as a tubing pump using 4" tubing costs the operator approximately one half as much and operates at a higher rate of efficiency with less overall operating cost than the tubing pump of the same size.

Successful pumping operations are now being carried out by casing pumps at depths of 5,000 feet. They are producing from 20 to 4,000 barrels of dead fluid, and have produced much more where formational gas aids in the lift. The size of the well makes little difference in application of casing pumps and they operate equally as well in lime and sand horizons. In fact, casing pumps are standard equipment for major and independent companies in Mid-Continent, California, Rocky Mountain and foreign fields.

The installation of the casing pump is as simple as the installation of the tubing or rod pump. It is merely an oversize rod pump, using a larger tubing (in reality, the casing) than the regular tubing or rod pump. The casing pump has the added feature of raising or lowering the pumping level without the expense attached to the tubing or rod pump. To change the pumping level of the casing pump it is unseated and raised or lowered as the pumping problem may dictate, by either eliminating some of the rod string or adding rods. To change the pumping level of a tubing or rod pump it is necessary to pull both the rods and the tubing.

The casing pump is a large insert pump to run in the casing to produce large volumes of fluid. It has very nearly the same problems of any large reciprocating pump as to power requirements and operating conditions, except that the casing pump can be serviced much quicker with less cost and is more efficient in operating than other pumps of the same size.

When equipping a well with a casing pump it is well to bear in mind that a long slow stroke with a large cylinder is the most efficient operation. Be sure that your surface equipment is heavy enough to handle the large pump and the heavier rods.

There are many advantages of casing pumps.

Some are: 1. In wells where corrosion occurs above fluid level in tubing equipped wells, the casing pump successfully prevents corrosion by keeping the casing and rods in a submerged state, thus preventing corrosion by excluding oxygen and free hydrogen sulphide.

2. Whether large or small volumes of fluid are to be handled, casing pumps have accomplished the purpose at one-quarter to one-half the initial investment required for tubing alone.

3. Dynamometer tests on many installations show that polished rod load and horse power requirements range from eleven to thirty percent less than tubing operating with the same size working barrel. This reduction is the result of decreased fluid and rod friction and natural lift effect of formational gas. The reduction naturally increases the fluid produced per horsepower output.

Other advantages include: Completely eliminates tubing investment. Saves in maintenance and pulling costs. Reduces down time for working barrel repairs. Saves in power costs. Reduces fatigue on sucker rods. Reduces fatigue of surface equipment. Permits economical adjustments of working barrel size to well production. Affords more flexible operation of equipment. Problems: Fishing. Broken rods are fished as easily in 9" casing as in 2" tubing if you are properly equipped to do so.

Rod wear on casing: Casing wear is prevented if excessive speeds are not used; also, by the use of rod guides. If production cannot be obtained at reasonable speeds, then increase the plunger size and travel of the plunger.

The main thought to bear in mind when installing a casing pump is the same when installing any type of pump, i. e., fit the pump to the well, fit the rod string to the pump, fit the pumping unit to the pump and rod string and be sure you have a prime mover that will handle the unit.