Hydraulic Unit Pumping For The Low Production Well

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INTRODUCTION

The hydraulic unit manufacturer has, and is presently going through, a program of product improvement and product simplification. The multiplicity of valving and piping is gradually being replaced with compounded automatic valves. Operators need no longer constantly adjust for optimum cycling. Maintenance has been reduced and simplified. All this adds up to lower lifting costs.

Generally, when comparing operating costs of the small hydraulic to the mechanical beam unit, the horsepower used is slightly higher. However, this is compensated in part by a substantial savings in capital expenditure. Foundations are never required on the small unit. And, installation time is reduced. These should all be factors in choosing between hydraulic and beam pumping equipment.

UNIT MAINTENANCE

Frequently, the all important question of unit maintenance must be faced. But, here again, the facts indicate very little maintenance required on the small units. Initially, immediately after installation, the suction strainer should be cleaned. Although most all hydraulic equipment is factory tested, still metallic particles or casting sand is jarred loose while in transit from the factory. Initial strainer cleaning after two or three hours operation will purge the circuit.

Then, after an additional two week operation period, the strainer should again be cleaned. From there on the suction strainer should be cleaned only as required. In areas of extreme dust, this period may be three months. Other areas may dictate only once a year. (Note, anytime a hydraulic unit begins to become extremely noisy, the suction strainer should be checked.)

There are no grease fittings on the small units which require attention. The hydraulic oil acts as the lubricant throughout the circuit. The stuffing-box requires changing a maximum of once a year. It is important to visually examine the unit for fluid leaks. Hydraulic oil ranges in price from 75 cents to $1.25 per gallon. A small, neglected leak on a small producer or marginal well can raise the lifting cost appreciably. But here again, leakage is most frequently caused by constant vibration, which many times can be traced to a partially clogged suction strainer.

Further Advantages

The unit is now in operation on the well - - maintenance is not a "minus" factor. What further advantages can be exacted? First, the type of cycle the unit makes - - a slow upstroke and a fast downstroke. The slow upstroke brings fluid from the well bore through the standing valve into the pumping chamber at a slow rate. Standing valve cage problems are thus reduced. Pressure drop across the valve is minimized, hence, reduced gas breakout results. Also, there is less tendency for sand to be carried into the subsurface pump because of the reduced flow velocities.

However, once the fluid is in the subsurface pumping chamber, then it is only a matter of logic to transfer the trapped fluid to the production tubing column, above the travelling valve, as rapidly as possible. The hydraulic unit is allowed to "free-fall" at this point - the transfer time is minimized.

Another advantage using the hydraulic unit is the ease of determining the subsurface valve action. A pressure gauge applied to the unit will provide a visual means of determining if the well is "pumped off", or if a partial "gas lock" is present or if there are loads appreciably higher than originally calculated.

The hydraulic equipment lends itself especially well to "time clock" control. The unit can be stopped or started during any portion of its cycle. All hydraulic equipment utilizes a "relief valve" of some sort. Hydraulic fluid will be bypassed back to the reservoir in the event of an extraneous load such as a "sanded-in" condition sometimes provides.

Points To Remember

Some important points to remember when applying a hydraulic unit to a well are:

1. Utilize a subsurface plunger fit slightly tighter than with mechanical beam units. (During the slow upstroke portion of the cycle "slippage" of oil between the plunger and barrel will be reduced.)
2. Do not exceed the manufacturer's specifications. (Specifications have been established to provide long, trouble-free life of all components. Higher loads or pumping rates will greatly accelerate wear.)
3. Use the type of hydraulic oil specified by the manufacturer. (Oil deviating from the recommended specifications may result in increased slippage through the power pump and valving. Increased heat generation within the circuit may also result.)
4. Maintain the proper amount of oil in the system. (Low oil levels encourage pump cavitation, internal heat and malfunctioning valves.)
5. Refrain from using pipe wrenches on the unit polished rod. (Both the unit and wellhead rod should remain exactly what they are, "polished". Poor surfaced polished rods will destroy the packing in the unit stuffing box and hydraulic oil will be needlessly wasted.)
6. Do not mix hydraulic oil brands. (There are many hydraulic oils which can be safely used in hydraulic equipment. However, many of these oils come from unrelated base stocks which are not compatible with each other. Mixing may create sludging, excessive foaming or neutralization of the additives.)

CONCLUSION

Utilizing hydraulic equipment in industry today is an accepted fact. It has resulted in more economical as well as safer operation. However, it is essential that operational personnel be acquainted with the basic characteristics of hydraulics. One needn't be versed in the engineering principles of hydraulics in order to use them economically. Know the answers to a few questions and hydraulics can reduce your lifting costs.