

## **BOP Closure Time – Some Factors to Consider**

As the industry continues to evolve & risks are mitigated the standards are also reviewed and revised. They become mandatory for some & recommendations for others.

Recommendations, depending upon your work environment & culture can be taken on-board, added to a mythical future plan for when this industry recovers or thrown overboard. One fact remains when you have a major event that involves Well Control issues then the costs tend to rise at an exponential rate negating any years of savings.

For Wireline Operations it is quite common to see a control panel with accumulators providing dedicated fluid to the Pressure Control Equipment (PCE).

For Coiled Tubing you will likely see a mixture of dedicated panels for the Tertiary PCE and the Coiled Tubing hydraulic power source for the Primary PCE.

For the Hydraulic Volume requirements it is common knowledge that the accumulator should have sufficient volume to Close / Open & Close the rams in sequence whilst still retaining a defined minimum residual pressure.

The time required to close the rams has been the subject of discussion for many years and the feeling is that a specific minimum time will be once again recommended in the near future.

So what are some of the factors that affect closure time?

- Accumulator Size and Pressures
- Hose lengths to and from the hydraulic source & the PCE (volume)
- Hose sizes and restrictions within in the hydraulic system (friction)
- Hydraulic Fluid Viscosity
- The actual volume within the BOP Actuator itself

Take for example a PCE package being run from a coiled tubing unit's diesel driven power pack or tractor unit (wet kit). The hydraulic fluid is typically contained within a common tank from which it is used for various circuits (Injector Head, Reel, PCE and some other functions). Heat is generated when hydraulic oil is used to do work and so the oil within the tank rises in temperature too, heat exchanger systems are in place to manage the temperature to an acceptable level. The hydraulic oils properties are chosen on several factors but primarily to ensure the hydraulic system runs in an

efficient manner. Selecting the right grade is a balance between volumetric and mechanical efficiencies.

The oils viscosity can be significantly affected by temperature and so in a cold environment a lighter grade / less viscous oil maybe chosen & visa-versa in a hot environment a heavier grade maybe selected.

For the PCE circuit the oil is stored within the accumulators but there is not the constant circulation within this circuit as there is say in the Injector or Reel circuits. The oil present within the hoses from the power source to the PCE will typically be at ambient temperatures & therefore the viscosity is very much a factor upon closure speed.

A Coiled Tubing Unit may typically have 125 ft (38 m) of hose so the accumulator must supply sufficient pressure and flow to circulate fluid through a total of 250 ft of hose to cycle the actuator. In extreme conditions (Arctic or Desert at night) petroleum based fluids will increase in viscosity and potentially even congeal to the point where it may no longer flow.

So if you are faced with some varying or challenging conditions you may certainly want to consider your options.

Running your Tertiary PCE on a stand-alone panel allows you to choose a specific hydraulic fluid for that specific set of environmental conditions, ensuring you have the right hose sizes & sufficient accumulator volume is another vital check & the most obvious is the pressure control equipment's actuator volume itself.