# PIVOTAL™ PROGRESSING CAVITY PUMPS

## *FREQUENTLY ASKED QUESTIONS*

### Will sand settle within the clearance (inactive) sections during a shutdown?

The maximum amount of sand that might settle within the clearance sections is proportional to the sand cut of the emulsion. If the fluid is carrying 5% sand, then during a shut down 5% of the cavity will contain sand. It is doubtful that this sand will impact pump restarts because the amount of sand is equivalent to the amount of sand settled in sealed (active) cavities.

### Will the abrasives wear the elastomer in the clearance (inactive) sections during operation?

No. Prior experience and testing with abrasive media, such as sandy emulsions, have not shown to wear the inactive sections of stator elastomer. Research into abrasive erosion has indicated that the velocities required to cause erosion to the elastomer do not occur.

### Will this pump handle sand?

Expect the PivotAL PCP to perform similarly with regards to sand handling as a conventional PCP. Sandy applications tend to wear out the stator quickly, so this is an ideal application.

### Will this pump handle gas?

Yes, the PivotAL pump is an excellent solution for gas handling. PC pumps in general are very good at handling gas, but their performance and life will be reduced due to the compression of gas from intake to discharge. This creates increased slip and fluid shear towards the pump discharge. Heat buildup will occur in the discharge area of the pump as the gas compresses through the pump. These effects cause damage over time and result in eventual failure of the elastomer where the rotor and stator create a seal (interference fit). By relocating the PivotAL rotor into the second position, a declining pumping condition can be restored.

### When should I run this pump?

Any well with a PC pump is a potential candidate but the best candidates are those that have a high likelihood of stator damage as the failure mode especially due to modes such as run-dry/burnt or rapid wear that occur quickly without a lot of damage to the rotor.

Some examples of good candidates are low inflow, gassy, sandy, or abrasive conditions. A recompletion or new well completion is a good application as a sacrificial pump to clean up the sand. Wells with very high rig costs should be considered given the savings from not having to pull the stator/tubing.

### Is the rotor susceptible to breaking?

The rotor has a subtle undercut in the clearance area of the rotor minor cross-section. Lifting Solutions pump geometries are designed to be strong enough that this small change does not impact the overall rotor torsional strength and the transition between the two sections is blended to eliminate stress concentration. After the rotor is lifted 12 inches into position 2, it may be at a higher risk of breaking due to bending stresses associated with the rotor protruding/orbiting out of the top of the pump. Cyclic fatigue is also dependent on the wellbore geometry, dogleg severity in the landing zone, torque fluctuations in the pumping system, corrosion, and other downhole conditions.

### What polished rod stick-up is appropriate?

Polished rod stick-up should be minimized during installation, so a 12 inch lift can be undertaken in the future while keeping the overall stick-up within the 16 to 18 inches maximum polished rod stickup recommended by the industry. A 1-foot pony rod should be installed at the top of the rod string, directly below the polished rod. This short pony rod can be removed to lift the rotor the appropriate distance and maintain a safe polished rod stickup.

### Is the rotor space-out procedure for initial landing any different?

No. The space-out procedure is the same as the LS conventional models.

### Can you lift the rotor less than 12 inches at a time?

Yes. Incremental rod lifts may be a good strategy to maintain a proper seal during operation, as the elastomer starts to wear out. Incremental lifts also have the secondary benefit of moving wear spots on the rod and tubing strings.

### Is the bottom of the pump ever inactive (clearance fit)?

No. These rotors are designed so that in both positions (initial and lifted) the bottom cavities have an interference fit.