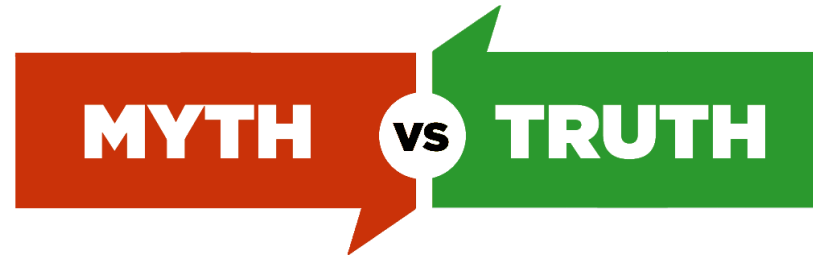




➤ PCP MYTHS & TRUTHS (PART 2)

› OUTLINE



#	TOPIC	STATEMENT
1	HOLE ANGLE	A PCP cannot be run at 90°
2	EFFICIENCY	A good PCP should have test bench efficiency of 60-80%
3	TORQUE ANCHOR	Every PCP system needs a torque anchor installed
4	CHOKE	Choking the tubing is a way to reduce free gas at the pump intake
5	INSTALLATION	When the rotor enters the stator during installation, the rig crew will see the rod string rotate
6	HIGH DLS	When there is high dogleg severity, the use of pony rods and/or rod guides can help improve system run life

➤ A PCP CANNOT BE RUN AT 90°

MYTH

➤ A PCP CANNOT BE RUN AT 90°- MYTH

- A PCP is not affected by the hole angle. It can even run in hole angles past 90°
- The limitation is the dogleg severity (DLS) or curvature in the wellbore. When the DLS is high, there can be tubing wear and/or rod fatigue failures. These are addressed by proper rod string design
- Space out can be more difficult if there are high DLS sections and/or high hole angles.
- The pump should be landed in a “tangent section” with low DLS.

➤ A GOOD PCP SHOULD HAVE
TEST BENCH EFFICIENCY OF 60-
80%

MYTH

➤ A GOOD PCP SHOULD HAVE TEST BENCH EFFICIENCY OF 60-80% - MYTH

- Test bench efficiency must always be stated at a speed and pressure and temperature
- 60-80% might be a good target for downhole volumetric efficiency, but the results on the bench test can be very different.
- We know of cases where the bench test target is zero efficiency at rated pressure (or sometimes even zero at a pressure less than rated pressure) – in these cases, the efficiency in the well is much higher due to elastomer swell and/or fluid viscosity effects
- It is important to note that a bench test is intended to give a relative indication of the tightness of a pump. It will NOT show you the efficiency downhole. Reasons the efficiency downhole might be different include :
 - Fluid viscosity
 - Elastomer swelling
 - Temperature profile inside pump
 - Gas production
 - Well pump off
 - Inflow restrictions

➤ EVERY PCP SYSTEM NEEDS A
TORQUE ANCHOR INSTALLED

MYTH

› EVERY PCP SYSTEM NEEDS A TORQUE ANCHOR INSTALLED - MYTH

- A torque anchor is generally recommended in PCP applications, but there are many wells where PCPs are used without a torque anchor
- Possible reasons include instrumentation, multiple tubing strings, or other special completions
- Ways to reduce probability of tubing unscrewing without a torque anchor include:
 - Make up tubing to maximum torque level
 - Use higher grade tubing and/or premium tubing connections
 - Install “torque rings” inside tubing connections
 - Install high-torque tubing connections

Tubing	Optimum Make-up Torque
3.5” 9.3# J-55 EUE	2280 ft·lb (2850 max.)
3.5” 9.3# L-80 EUE	3130 ft·lb (3910 max.)
3.5” 9.3# L-80 Premium	3825 ft·lb
3.5” 9.3# J-55 EUE w/ torque rings	3800 ft·lb (max.)
3.5” 9.3# J-55 EUE w/ special coupling	3500 ft·lb

➤ **CHOKING THE TUBING IS A WAY TO
REDUCE FREE GAS AT THE PUMP
INTAKE**

MYTH

› CHOKING THE TUBING IS A WAY TO REDUCE FREE GAS AT THE PUMP INTAKE - MYTH

- Choking the tubing can only affect the gas from the pump discharge to surface. It will reduce the volume of gas in the tubing, but not at the pump intake. It will also make the pump work harder—both to work against the higher tubing pressure, but also because there will be less “gas-lift” effect from the gas in the tubing.
- To reduce the gas at the pump intake (without changing separation), you would have to increase the pressure at the intake—to do this, you need to reduce the production rate
 - If choking the tubing reduces the rate by increasing slip in the pump, it might accomplish this, but a better way would be to reduce the pump speed
- Choking the casing without changing the production rate will not change the pressure at the pump—but it will give you less submergence
- The best way to reduce free gas volume in the pump is to land the pump deeper—below the perforations if possible. But even above the perforations, the deeper the pump, the higher the intake pressure will be, and the gas will occupy a smaller volume

➤ WHEN THE ROTOR ENTERS THE STATOR DURING INSTALLATION, THE RIG CREW WILL SEE THE ROD STRING ROTATE

MYTH

› WHEN THE ROTOR ENTERS THE STATOR DURING INSTALLATION, THE RIG CREW WILL SEE THE ROD STRING ROTATE - MYTH

- There is a tendency for the rods to rotate when the rotor enters the stator
- The rig crew will often see this, but it does not always happen
- When there is significant friction along the rod string, such as in a deviated well, no rotation may be observed at surface
- If the pump is very loose, there may also be no rotation



➤ WHEN THERE IS HIGH DOGLEG SEVERITY, THE USE OF PONY RODS AND/OR ROD GUIDES CAN HELP IMPROVE SYSTEM RUN LIFE



TRUTH

› WHEN THERE IS HIGH DOGLEG SEVERITY, THE USE OF PONY RODS AND/OR ROD GUIDES CAN HELP IMPROVE SYSTEM RUN LIFE - TRUTH

- The myth is that short rods are less flexible than long rods, and therefore are under higher bending stress and have higher contact loads than full length rods
 - While a short rod is less flexible than a long rod, equal lengths of pony rods vs full length rods have almost the same amount of flexibility
- But: flexibility doesn't actually matter!
- Contact loads (which cause wear) are based on the tension in the rod and the curvature of the well—but also on the spacing of the contact points
 - Pony rods (or rod guides on the rod body) result in more contact points, so the contact load is reduced at each one
- For rod fatigue, the biggest factor is a concentration of curvature near the connections
- Having smaller distances between the connections (or rod guides) greatly reduces this concentration of curvature, and gives a large increase in fatigue life
- Downsides:
 - Increased cost (both in material and in rig time)
 - Increased pressure losses in viscous oil

➤ CONCLUSION

› CONCLUSION

- There are a lot of beliefs about PCPs in the industry. Some of these may be based on fact, but are over simplified. We need to be very careful in how we interpret them and make decisions based on them.
- Please restrict questions today to the topics in today's webinar. I will be happy to talk to you offline about any other topics you like, or you can send me an email.
- Watch our LinkedIn page for announcements of future webinars!

› CONCLUSION

For further information, please contact us or visit our website

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