

Qittit Technology Research Note

Pros and Cons of Rod Service Units: 10 Key Insights

Qittit Consulting researched rod service unit usage practices of oil and gas firms operating in Canada and the U.S. Our research objective was to benchmark current practices and assess how these “rod rigs” compare to standard service rigs or workover units. We interviewed a variety of stakeholders about their practices and their experience with installing new rod pumps and PCPs, working over rod wells and adopting continuous rod strings to extend run life.

The scope of our research is summarized in the table on the back.

Rod service units (RSU), also known as rod rigs or flushby units, are lightweight, self-contained well service units that integrate a fluid tank, a triplex pressure pump and a derrick. RSUs are used for rod pump and PCP installs and for a wide variety of workover operations when tubing interventions are not required. By combining the features of a pressure truck and a rod rig into one highly mobile unit, wells can be diagnosed and worked over in less time than a conventional service unit or workover rig when tubing does not have to be pulled. Some specialized units include a truck-mounted injector so continuous-rod strings can be installed or removed safely and efficiently without additional equipment. Portable injector units can also be used in conjunction with conventional workover rigs.

RSU applications include

- Tubing and pump flushing to clear sand, paraffin and other debris
- Pumping well kill fluid
- Wellhead, casing or tubing pressure testing
- Rod pump or PCP installs or maintenance
- Seating or unseating pumps
- Polished rod changes
- Spacing, re-spacing and rotating rod strings
- Fishing rod strings
- Changing PCP rotors, driveheads, stuffing boxes
- Changing wellhead valves
- Running continuous rod strings
- Well stimulation with coiled-tubing units

Interviews with eight Canadian and 15 U.S. operators revealed 10 key insights.

1. RSUs are frequently used in Canada, Australia and South America because they can be rigged up in less than 30 minutes by a two- to three-person operating crew that can usually complete rod work and pump installs in less time and with less expense than a standard workover rig.
2. RSUs are well known for their efficient PCP applications in California. They are used on some PCP wells in New Mexico, in the Delaware and Powder River basins, and in a few other plays.
3. While usage in the Eagle Ford and Permian Basin is less common than in California, RSU demand is increasing in these areas because some operators are reporting 10% to 500% higher run life from using RSUs to install and maintain continuous rod strings.
4. One Permian operator estimates using rod rigs to deploy continuous rod in horizontal wells with dogleg issues that cause short sucker rod life can achieve 18 months of run life and more than \$5 million in savings.
5. A Permian operator with thousands of wells uses RSUs as scout rigs to diagnose sucker rod and rod pump problems before deploying a larger workover rig. Six common failure types can be handled more economically than a standard workover rig, and the RSU can rig up and rig down in only an hour if it cannot handle a tubing or a stuck pump pull.

Companies and Subjects Interviewed

8 Canadian operators (Alberta, British Columbia)
15 U.S. operators (5 Eagle Ford, 11 Permian Basin, 4 Rockies)

3 major oil companies
20 independent oil companies

Area Engineer	Production Manager
Artificial Lift Supervisor	Production Supervisor
Completions Engineer	Sr Artificial Lift Technician
Consultant	Sr Operations Production Engineer
EOR Lead	Sr Production Foreman
Manager, Operations	Superintendent
Operations Supervisor	Workover Engineer
Production Engineer	Workover Superintendent

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6. An operator with an inventory of down wells uses RSUs to efficiently diagnose and work over two wells a day.
7. In areas with a high frequency of tubing leaks or stuck pumps, some operators always deploy a standard workover rig to avoid the cost of double rig-ups and rig-downs if they use an RSU first and it cannot handle the job.
8. Lack of availability of RSUs and repeated service quality issues during the initial stages of deployment in an area have caused several operators to believe the potential time savings and increased production are not worth the risk of waiting for an RSU or having RSU equipment failures.
9. Some operators use the all-in cost of a workover as the basis of comparison, and others use only the base hourly rate of a standard workover rig to estimate the cost of an intervention. The difference can be considerable when rental fees for the additional equipment needed to accomplish the job are included. Example: Three operators surveyed in the Permian stated a typical rod well intervention takes a minimum of 6 hr after rig-up to as long as 12 hr with an all-in standard workover operation of \$4,000 to \$4,500 per day. In this scenario an RSU is more economical. Six other operators stated the same workover operation can always be accomplished in 6 hr at \$225/hr to \$250/hr—about the same as a 4-hr RSU operation charging \$375/hr. Savvy operators use a scorecard with actual time and all fees incurred and then choose the unit with the lowest total cost of operations, least failure frequency and highest chance of delivering more uptime.
10. RSU operations are less risky because the units are smaller and easier to drive, there are no guy wires needed for setup, and the crew size needed to perform a job is about half that required for a standard workover rig. Fewer hands on location means less chance of an incident.

Rod Service Unit vs Conventional Workover Rig Findings	
Conventional sucker rod well completions	
RSU rig time × Rig rate = Total operating cost	10% to 40% less than conventional WO rig depending on operation
RSU mobilization time	Equal to or 66% less than conventional WO rig
RSU rig-up/rig-down time	33% to 90% less than conventional WO rig
RSU pressure test	Less costly than conventional WO operation
Kill well	Same time and cost
Rigged-up to rigged-down operating time	RSUs 75% more to 40% less depending on operation
Rig availability	RSUs scarce in some areas; sometimes unavailable
Hook load	RSU 50,000 lbf to 70,000 lbf
Depth limit	RSU approximate rod limit 12,000 ft [3,505 m]
Tubing pulls	RSUs may not be able to pull; a few 100,000-lbf units may be able to pull
Free stuck pumps	RSUs may not be able to pull; a few 100,000-lbf units may unseat
Continuous sucker rods	
RSU rig time × Rig rate = Total operating cost	10% to 20% less than installing sucker rods
Trip rate	25% faster
Pump pulls	30% less costly
Rod handling time and risk	Less
Coupling and pin failures	Less
Side load	Uniformly distributed, usually less
Pressure losses	Less
Run life in deviated wells	+10% to 500% depending on dogleg severity
Impact on production	Can handle heavier loads and produce more fluid
Cost	About equal to sucker rods plus coupling
Corrosion resistance	High with tubing liners