Workovers/Well Interventions

Versatile HWO/snubbing units offer multiple benefits over conventional rigs
Versatile HWO/snubbing units offer multiple benefits over conventional rigs

Steadily advancing HWO and snubbing technologies have merged to provide a viable and economic alternative to conventional rigs in a host of onshore and offshore drilling, completion, and live-well intervention applications.

AUTHORS
Steve Wehrenberg and Mike Ponville, Boots & Coots

While hydraulic workover (HWO)/snubbing will never wholly replace traditional workover rigs, particularly in dead well applications requiring multiple trips and fishing jobs, in live and pressured well re-entries the technology offers myriad operational; economic; and health, safety, and environment advantages.

From its inception solely as a mechanism for handling tubulars during well control operations, hydraulic snubbing technology has evolved into a mechanism that can perform any operation once considered the sole jurisdiction of conventional drilling and workover rigs.

The ability of modular HWO/snubbing units to pull existing completions, drill open holes, and re-complete a well bore at flowing (near-balanced or underbalanced) conditions has effectively bridged the technological gap between derrick equipment configurations and coiled tubing (CT) units. Consequently, standalone or rig-assisted HWO/snubbing units have been employed successfully in a variety of activities worldwide, from re-completions and completions under pressure to tubing-conveyed perforating to the drilling of sidetracks, slim holes, and well deepening operations, among others.

Faster rigup, rigdown
Together with its capacity to rotate pipe in live well conditions and perform intervention operations without having to shut in production entirely, HWO/snubbing units can often be mobilized and de-mobilized in a fraction of the time and associated costs of a conventional workover rig.

Key to the comparably faster and more cost-effective mobilization and de-mobilization is the modular design that allows HWO/snubbing units with up to 600,000 lb hook load and rotary torque in excess of 14,000 ft/lb to be transported easily by air, sea, or over land. Accordingly, the modular design, in tandem with a comparatively minimal footprint as small as 2,500 sq ft (753 sq m), makes the technology an ideal contender for applications on remote offshore platforms.

Depending on the wellhead equipment, one of the foremost drivers for the growing use of HWO/snubbing units is a design engineered specifically to operate under pressures as high as 20,000 psi. Consequently, operators can perform a variety of well intervention operations without having to first kill the well and discontinue production completely.

Cost efficiencies
Compounding the costs associated with lost production is the expense of killing the well and re-initiating production once the re-entry operation is completed. By way of illustration, installing a completion string after a typical fracturing job requires that the operator first employ high-density fluid to kill the well. In addition to the costs of the brine and kill pump are the rig-related expenses associated with running the pipe in the well bore. Afterwards, a CT unit and nitrogen may have to be used to restart production, magnifying the costs even further.

By comparison, an HWO/snubbing unit normally can perform the same operation in one to two days with production continuing while the operation is under way. All things considered and
depending on the specific application, employing an HWO/snubbing unit generally is more cost-effective on new and producing wells than a conventional workover rig and is less than that of the daily rate for a CT unit.

Besides the production revenue lost during the balanced well intervention, there also is the risk of future shortfalls resulting from reservoir damage caused by the introduction of overbalanced kill fluids that are especially harmful to some shales and other highly reactive formations. Hydraulic snubbing not only can use existing pipe and tubing for work string, but it does not rely on kill-weight fluids to bring the well bore to static condition. Consequently, the risk of reservoir damage is minimized dramatically or eliminated altogether.

Moreover, with HWO/snubbing technology, the operator avoids the costs and potential environmental liabilities associated with the onshore/offshore disposal of heavy-weight kill fluid. Also from an environmental perspective, since less equipment is required on location, operators do not have to flow the well to atmosphere to maintain pressure control, thus further reducing the carbon footprint. Since the units do not require any water from nearby streams or underground aquifers, hydraulic snubbing is especially beneficial in areas where water is a premium or scarce resource.

**Snubbing evolution**

Contemporary hydraulic snubbing technology bears little resemblance to the units introduced in 1929, only 10 years after the development of well cementing. Those first units comprised little more than a series of cables, sheaves, and counterweights and were used strictly for well control operations and snubbing in live completions.

At their conception, snubbing units relied on a rig’s drawworks to hoist pipe in and out of the hole, and the sheaves were rigged up so that as the traveling blocks hoisted upward, the pipe would be snubbed into the well. Conversely, lowering the traveling blocks brought the pipe out of the hole.

Over the years, increased understanding of hydraulics resulted in the development of the “concentric” snubbing unit, which consisted of a hollow hydraulic cylinder. This design also created the first pipe guide that prevented the buckling that plagued earlier units and allowed operators to work on higher-pressure wells with longer strokes, which reduced the time required to complete the job.

Soon afterwards, the first multicylinder snubbing unit was developed, which was a prototype of the system used today. The industry also developed specialized slips and blowout preventers (BOPs) configured for the purpose of snubbing/stripping. As the unit designs progressed, they incorporated stronger gin poles and hydraulic rotary tables. Today, a standard HWO unit can be transformed into an HWO/snubbing unit in an hour with the simple addition of two sets of slips and a tubing guide.

The steady progression of hydraulic snubbing coincided with drilling advancements that have led to the widespread construction of ultraextended-reach drilling, multilaterals, and other unconventional wells that all too often are outside the capability of conventional service tools and technologies. In unconventional plays and well configurations, the advantages of HWO/snubbing to more conventional CT units, for example, are evident. Unlike CT, the ability to rotate the pipe and work string dramatically reduces wall-to-wall frictional drag.

In turn, minimizing friction increases depth capability significantly, crucial in laterals that extend past 3,000 ft (915 m).

**HWO at work**
The benefits of hydraulic snubbing in unconventional applications recently were illustrated in the tight gas North Jonah field in Wyoming’s Pinedale Anticline. Since production from the field was uneconomical using conventional technologies, hydraulic snubbing was employed, allowing the well to be drilled and completed simultaneously. Hydraulic snubbing in concert with an innovative flowback package allowed the well to begin production even as the live completion was still under way.

Elsewhere, in an oil producer offshore Dubai, the technology was used in a live re-completion encompassing tubing-conveyed perforating (TCP) guns and acid stimulation at a well depth of 9,500 ft (2,898 m). After pulling the completion, the operator was able to run a cast-iron bridge plug and TCP guns before perforating. After successfully performing the acid stimulation, the hydraulic snubbing unit was used to run the re-completion assembly. From rigup to rigdown, the operation required 15 twelve-hour days.

The technology also was applied in a dry and pressurized re-completion of an onshore 16,000 ft (4,880-m) deep gas well in Sharjah. After the tree was frozen and removed, the BOP stack was installed and the 5-in. production string pulled from the hole. Afterwards, a tapered 2¾-in. to 3½-in. production string was run in the hole to 8,500 ft (2,593 m), at which time a retrievable bridge plug was used to isolate the reservoir from surface to change out the hanger spool. The remaining completion installation was completed with 3½-in. production tubing. The entire operation, including rigup and rigdown, was completed in 11 days.
Considering the size of most E&P investments, it’s natural to be concerned about the well-being of your operation. No one is more experienced than Boots & Coots at providing pressure control services. Our snubbing/hydraulic workover services and pressure control rental tools set the industry standard. You’ll rest much easier with Boots & Coots on your team. So call 1.281.931.8884 or 1.800.BLOWOUT today. And relax.