Critical Issues in Drilling & Completions

Critical D&C issues with Zuhair Al Hussain, Saudi Aramco

Safety focus is key amid personnel shortage

ZUHAIR AL HUSSAIN is general manager, drilling & workover for Saudi Aramco.

DC: From your perspective at Saudi Aramco, what do you see as the most critical issue facing the drilling & completion industry today?

Al Hussain: The most critical issue is safety. Shortage in manpower, coupled with a young and less experienced workforce is making the work environment fertile for accidents. We should put more focus and emphasis on safety training to instill safety behavior and build a safety culture.

Another critical issue is downtime due to human error, equipment failure, borehole stability, fishing, side-tracking, etc. Downtime can be reduced by better tool design and training.

A third critical issue is the elimination of drilling-induced formation damage, especially where special well completions are installed. We are having success in this area by using reservoir drill-in fluid wellsite management systems as part of the drilling and completion process.

Other important issues are:

• The ability to de-complete the complex multilateral completions we have today without extended fishing operations.

• The ability for reliable well intervention (coiled tubing) for the multilateral, extended-reach, maximum reservoir contact wells that we’re drilling and completing today.

• The ability to remove drill cuttings from highly inclined and horizontal wells to facilitate running tubulars, completion equipment and whipstocks.

• Shortage of competent and experienced rig crews, drilling engineers and service company personnel.

• Severe lost circulation across fractured and vugular formations is a major contributor of rig lost time, high mud cost and well control problems. Innovative techniques are needed to shut off lost circulation while drilling.

DC: Do you believe that automation can improve safety and efficiency in drilling operations?

Al Hussain: Yes, automation can and does improve safety and efficiency. Iron roughnecks make far less mistakes and don’t get injured or killed like human roughnecks. Drilling operations should apply relevant technologies to automate drilling operations to be safer and more efficient.

DC: In what ways has Saudi Aramco implemented more drilling automation into its drilling projects over the last few years?

Al Hussain: Back in the ’70s, we used a “spinning chain” attached to a “cathead” to make up DP connections. Many men lost fingers, arms, legs and lives due to this procedure, which was eventually replaced with the pipe spiner. At Saudi Aramco, a major drilling automation that was introduced was the top drive, with its associated “pipe handler.” Connections can now be made with little human intervention, and three joints (one stand) of DP and be con-

DC: As an operator, what kind of cost increases have you seen in drilling operations over the past 2 years?

Al Hussain: Rig costs, wellhead equipment and well tubulars have increased two or three times. As worldwide activity levels increased, so did the demand for drilling rigs and drilling materials and equipment. Rig rates have stabilized. As a matter of fact, we have noticed a slight decrease lately.

Cost increases have affected everybody. However, looking at it from the positive side, it has helped promote technology implementation and increased competition among technology providers.

DC: What progress do you hope to see in downhole technologies in the next 1-2 years?

Al Hussain: Mono-bore completions would be of great benefit to Saudi Aramco since our wells need telescopic casing designs to shut off the many aquifers while drilling to the payzone. This is in contrast to Canadian oil and gas drilling, where surface casing is set at 20% of the well depth as per government requirement, then the well is drilled to the top of the payzone (all in one hole section) and production casing set, thus negating the need for monobore.

Also, Saudi Aramco has invested and started up its first “drilling real time operations center,” and we expect to
see progress in the next few years in reducing borehole instability, stuck pipe, fishing, lost-time events and increasing drilling efficiency.

Others progress I’d like to see include:

• The development of expandable casing patches to shut off lost-circulation zones without reducing hole size.
• Logging-while-drilling tools to measure drilling parameters, wellbore pressures and formation properties. This is particularly true for HPHT wells.
• Real-time mud properties and rheology:
  • Bits to drill hard and abrasive sandstone formations.
  • More reliable tubular inspection tools to detect cracks and reduce drill string failures.
  • Casing drilling.

DC: How do you see a true smart well and why don’t we have it yet?

Al Hussain: A smart well is a compartmentalized horizontal multilateral well where pressure, temperature, flow rate, GOR and water cut can be monitored and controlled remotely and in real time. The biggest bottlenecks are downhole instrument and equipment reliability / longevity and the unavailability of BOPE to effectively seal around tubing with external control lines attached alongside it. This lack of BOPE technology increases the inherent dangers during completion and workover operations.

DC: How do you see the role of MPD/UBO changing in the drilling industry in the future?

Al Hussain: There must be improvements on the evaluation of prospects for this technology. Specifically, defining when and where these methods can be applied with a benefit to drilling costs.

DC: What are your biggest challenges in deepwater or HPHT?

Al Hussain: We are experiencing limitations with materials and equipment ratings, at high temperatures in aggressive environments, BOPE, LWD and downhole completion equipment.

DC: How are we doing on safety?

Al Hussain: The industry must strive to incrementally improve its safety performance. The biggest challenge is recruiting and training highly competent staff. The most effective way to do this is by providing a superior compensation package.

Zuhair Al Hussain is a former member of the IADC Executive Committee.