Drilling equipment promotes safety and efficiency

WHILE THE US Gulf of Mexico may appear to be in the doldrums, the US onshore market is moving along nicely, as is E&P in international regions both onshore and offshore.

As in the past, despite high sustained oil and gas prices, the industry continually seeks ways to drill wells more safely, efficiently and at lower cost to both the contractor and the operator.

As a result, equipment manufacturers are working to develop and produce equipment that helps reduce costs while drilling wells quicker.

Following are reviews of three major equipment manufacturers and what they have been developing in terms of new equipment for the industry.

IDM EQUIPMENT

IDM Equipment has developed a quick moving land rig dubbed Quicksilver that can rig up and down and move on to the next well with as few loads as possible.

To help improve drilling performance, the rig incorporates automatic driller controls as well as including an AC drive option.

This improves the rig's performance and also results in lighter drilling equipment by eliminating some of the water cooling pumps and heat exchangers that typically are included with the traditional electric brake.

"On our new rigs, we use variable frequency drives with electronic braking and air cooled caliper brakes," said **Norman Myers**, a co-owner of IDM Equipment.

"Those controls also integrate with the automatic driller that lets the driller set rate of penetration and weight on bit."

The automatic driller incorporates a touch screen display of all the drilling operation parameters and the position of the hook and drawworks.

That information, along with all of the mud system data, can be tied back to a central data collecting software that transmits the data over the Internet by satellite so it is available 24/7 from virtually anywhere around the world.

IDM Equipment's Quicksilver rig features a hydraulically raised substructure and telescoping mast. The unit can be rigged down and transported to the next wellsite typically in less than 48 hours.

The Quicksilver rig's telescoping substructure and telescoping mast are raised hydraulically. And it can move from well to well quickly.

"Our goal is to have a rig that can move in less than 48 hours," Mr Myers said, "and closer to 24 hours, depending upon the next location."

Everything that is large enough to require a crane to rig-up is hydraulically raised on the Quicksilver rig.

The stairs and other similar items are raised with the boom pole or a pole truck. Hydraulically raised components include the automatic drillers cabin skid, mud processing skid, degasser, mast and substructure.

As mentioned, rig-down takes 48 hours or less in most cases, and requires 18-21 skids depending upon the living quarters and drilling requirements.

The mast is telescoped in when it is horizontal. After the fifth wheel crown is lowered onto the truck and the mast base is lowered from the substructure floor to the ground by hydraulically rolling down diagonal rails, it is then telescoped in horizontally by using the truck's winch.

The drawworks is on a skid on the ground and is operated from the automatic drillers cabin. The braking is done through pneumatic air controls, including the brake bands.

The mast for the 1,500 and 1,600 hp Quicksilver units will accept a top drive system with no modification, however, the 1,000 and 1,200 hp units will require modification to install a top drive.

The rig is available in 1,000 hp AC or DC, 1,200 hp AC or DC, 1,500 hp AC or DC and 1,600 hp AC.

The first rig was delivered earlier this year and the company is beginning production of the unit presently. The cost is competitive with other similar hydraulically raised, quick moving rigs.

"We are targeting our price close to the $6 million mark," Mr Myers said. "Our rig has some equipment manufactured in China but the bulk of it is manufactured in the US.

Mr Myers noted that the equipment manufactured in China, some of the pumps and the substructure, enable the company to offer the rig at such a low cost.

VARCO

Varco is introducing a new BOP for land rigs that includes boltless door technology that previously was offered primarily on offshore rigs.

"This saves a lot of time removing doors for replacing rubber elements, rams, etc," said **Greg Hottle**, Senior Vice

Varco's ST-80 Iron Roughneck was designed for land rig applications. It combines the spinning and torquing into one package that allowed the company to reduce the size while still allowing the unit to make up and break out pipe as fast as a rig crew.

President, Sales & Marketing for Varco. "The technology is in the lock, how to lock the door without bolting it."

The LXT ram type BOP, offered by Shaffer, is boltless but it is still manually operated, which reduces the cost and makes it more applicable to onshore drilling.

The boltless door feature requires less manpower to service the BOP and reduced time to change the rams without special tools.

The hydraulically operated BOP incorporates the quick access opening and closing boltless door assembly that utilizes twin lock bars to manually lock and unlock the door from the BOP body.

This is accomplished by the extraction of two lock rods that is accomplished without special tools in less time that it typically takes to break out and retorque conventional door bolts.

The addition of a ram extraction tool that pivots around the BOP door and allows for overhead access to the ram block eliminates the need to open both doors on a double when changing rams.

Varco also offers an iron roughneck that, like the LXT, was designed for land rig applications, although it is also being sold for offshore use.

"We combined the spinning and torquing into one package," Mr Hottle explained, "and that allowed us to remove a lot of the size while still making the unit as fast as a rig crew."

The ST-80 Iron Roughneck has been available for about a year and approximately 200 have been sold during that time, according to Mr Hottle.

The pedestal-mounted machine combines spinning and torque functions into a single controlled foot.

Full hydraulic controls provide for safe, fast and reliable make-up and break-out of tubulars ranging from 4 ¼-8 ½-in.

The Iron Roughneck can be installed on virtually any rig floor utilizing a single floor-mounted socket with no hanging cables, mast modifications or overhead equipment.

The equipment can work at well center as easily as at the mousehole and can be rotated about the pedestal for storage when not in use.

It provides up to 60,000 lbs of make-up torque and 80,000 lbs of break-out torque.

Another new product soon to be available, according to Mr Hottle, is the Varco Compact Racker that is designed for jackups and large land rigs.

"We have developed an economical and easily retrofitted arm that moves like our large pipe racker to assist moving the pipe between well center and set back," he explained.

The compact racker is less expensive than the company's large systems and can fit on an existing rig with no modification to the derrick since it fits below the derrickman's board.

All that is necessary, Mr Hottle explained, is additional bracing in the derrick.

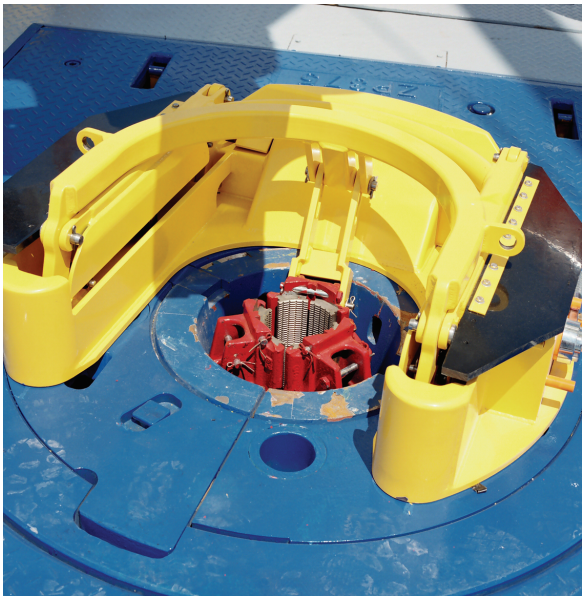
The racker can be operated remotely from the finger board level or it can be operated by someone on the drill floor, depending on his visibility.

Varco also has developed what it calls the Stand Hand, which is an economical way to make up stands offline.

While Varco had the retrofit market in mind for the compact racker and stand hand, according to Mr Hottle, the first racker was sold for a new construction jackup rig.

Varco also introduced its BJ CRT 14 Casing Running Tool. The CRT 14 provides safety while handling casing, and results in faster casing speeds and well improvements as well as is economical to operate.

No stabbing board is required during operation of the tool, which eliminates the number one identified cause of lost time casing running incidents, acording



National Oilwell's Rotary Round Power Slip utilizes existing manual slips and can be remotely controlled from the drill floor or the driller's cabin.

to Varco.

It minimizes manual interference by removing 50% of all identified safety hazards present when running casing conventionally.

Additionally, eliminating the need for power casing tong operations results in a clean work environment around the well center.

Faster casing running speeds saves up to 50% less rig time. The operator's running speed determines the criteria for how fast the casing will be run.

With the tool, the casing can be run by the drilling crew. The Torque Turn Control minimizes the chance of damage caused by cross-threading, resulting in safer and faster casing running times. Make-up and suspending of the cementing head can be accomplished within an hour.

Additionally, the tool provides the ability to rotate and reciprocate while circulating, decreasing differential wall sticking and improving cement bonding.

The tool is installed onto the main shaft of the top drive for rotation and torque and is suspended from links for load transfer. It maintains proper alignment during stabbing and make-up of casing.

It also has the ability to push casing into the well by 40,000 lbs force, which allows tripping-in duirng underbalance drilling operations.

Lower pipe sensors detect casing so the slips will set automatically for fill-up mode.

An upper sensor is used to set slips for circulation mode. The sensors can be hinged away during inspection and maintenance.

NATIONAL OILWELL

National Oilwell has developed its own lightweight compact roughneck called the IR-3080 that can make and break drill pipe and drill collar connections in sizes from 3 ½-in. to 8 ½-in. diameters.

Like Varco's ST-80, this unit is also aimed at the land rig and small offshore rig market.

The rougneck utilizes National Oilwell's Automated Arm that provides accurate travel with long reach capabilities from 55-in., 88-in. and 144-in.

This provides for greater mounting versatility while providing maximized well center clearance in the fully retracted position.

The unit's unique spinner head employs a floating suspension system that naturally follows tubular movement as threaded connections are spun in or out.

The unit is also equipped with a remote operator's control to ensure that the operator is positioned safely away from the work area during operation.

National Oilwell also has a Rotary Round Power Slip that can improve drilling and tripping operations with simple, lightweight and compact hydraulic slips.

The slips can be operated from anywhere on the drill floor via electric hydraulic remote control or manually by foot pedal and manual hydraulics, increasing safety by moving personnel away from the drilling operation.

The slips can remain in position when using a top drive system.

Two hydraulic cylinders operate the slip. A pressure reduction valve allows operation at any pressure greater than 600 psi.

Crew fatigue is minimized by reducing the time and energy required for manual slip operations ■

Varco's CRT 14 Casing Running Tool features an air cushioned weight compensator for balancing out full weight of the tool and a single joint of casing. Soft stabbing and thread compensation minimize thread damage.