

# DEEP HOLE DRILLER

AN ATLAS COPCO PUBLICATION FOR THE DRILLING PROFESSIONAL - NO. 2 / 2010



## Atlas Copco RD20 in the Permian Basin

Contractor makes quick work of surface holes

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Geothermal drilling with the T3W

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TH60 drills for environmental testing

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*Atlas Copco*

## EDITORIAL



It's been a busy and successful year for Atlas Copco Oil and Gas. We've worked hard to develop new products and look forward to introducing you to them at the Permian Basin International Oil Show in Odessa, Texas, USA.



We've taken great care with the new Predator Drilling System. Before it is released to the market, it will have spent time drilling in Texas in the Permian Basin and Pennsylvania in the Marcellus Shale region with three drilling companies. It has already impressed those who have used the Predator as a prototype. We are also launching the RD20 XC, which has new oilfield external upset pipe-handling capabilities, and the RD20 APL (Auto Pipe Loader) for giving both RD20 Range 3 models the option of hands-free pipe handling.

Through testing these new products with drillers in the field, we've demonstrated the value in doing surface and intermediate work with smaller, more mobile rigs like the Predator and RD20 ahead of the larger conventional rigs – a mixed fleet. We predict a lot of growth in the shallow drilling industry with all the potential we're seeing in oil, gas and coal bed methane.

Of course, Atlas Copco offers more than just oil and gas industry products. Read on to learn more about them, as well as the Predator and RD20 and RD20 XC in this issue of Deep Hole Driller.

**Shane Lein**  
Product Manager,  
Oil & Gas Drilling Rigs

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# HAMMERING OUT ~~THE~~ RED BED

Texas Contractor makes quick work  
of surface holes by drilling with air. 



Pictured on the front cover:  
From left, Bob Morris, Delaney Erickson,  
D.C. Carter, B.J. Crawford, Julio Mora.



B.J. Crawford

“ We had the well drilled in an hour and a half, and that included swabbing the hole three times after each connection.

**Bob Morris,**

Drilling Supervisor for Butch's Rat Hole & Anchor Service Company

» They said it couldn't be done,” was Bob Morris' opening comment. “They” refers to everyone who has ever talked about air drilling the red bed strata in West Texas' Permian Basin oil patch. Morris, Drilling Supervisor for Butch's Rat Hole and Anchor Service Company, didn't agree with this long-standing assumption.

Scott Bryant, President of Butch's Rat Hole, is following in his father, Butch's, footsteps. Butch's Rat Hole supports the oil patch in Texas, New Mexico, Louisiana, West Virginia, New York and Pennsylvania doing top-work, including rig moving and anchoring as well as drilling rat holes, mouse holes, conductor pipe holes and pre-set surface casing.

Bryant was looking for a faster way to complete the job of pre-set surface casing without having all the ancillary equipment associated with mud drilling. After asking around to other companies who have used

top-head rotary drills, he sought out Venture Drilling Supply and inquired about Atlas Copco's RD20 drill rig.

Venture salesman Delaney Erickson said when Butch's called, he did something Venture Drilling Supply had never done before. Butch's wanted proof that it would work before they bought it, so Erickson would have to demonstrate the rig before they'd buy it.

The test required drilling a 12.45-inch (316 millimeters) diameter hole 380 feet (116 millimeters) deep. Erickson used a round button concave face bit on an Atlas Copco Secoroc QL120 HC down-the-hole hammer with the Hydrocyclone option. For the test, Erickson used 4½-inch (114 millimeters) RD20 pipe.

After spudding in on a Thursday afternoon, Erickson drilled to 200 feet (61 meters) the first day, stopping just short of the red bed. The next day, he finished up the hole without much difficulty. He

## The Atlas Copco RD20 and other equipment with Butch's Rathole

The Atlas Copco RD20 drilling rig was first introduced to the market in 1986. It was originally designed for drilling shallow oil and gas, as well as coal bed methane (CBM). Since its introduction to the market, approximately 250 RD20s have been built and shipped all over the world. The RD20, smaller and more mobile than conventional rigs, is often used to cheaply and efficiently complete the pre-set work.

Butch's Rat Hole and Anchor Service is currently using the Atlas Copco RD-20 drilling rig to do the pre-set work ahead of conventional rigs in Odessa, Texas. This pre-set work, which is also referred to as "top-hole work" consists of drilling and setting surface casing ahead of deeper drilling rigs that come in to get the well to total depth.

Hiring companies like Butch's to do this type of work can save time and money, allowing conventional rigs to move on location, nipple-up and go straight into drilling the intermediate and production sections.

On August 25<sup>th</sup>, Driller Bob Morris and his crew drilled six 12 ¼ inch (31.12 centimeters) surface holes, ranging from depths of 350 to 650 feet (106.7 to 198 meters), and set 9<sup>5</sup>/<sub>8</sub> inch (24.45 centimeter) surface casing. Using down-the-hole hammer (DTH or DHD) drilling methods, the crew was able to more quickly and efficiently drill through the naturally tough subsurface formations of West Texas.

DTH drilling, also known as "percussion drilling" uses air compressors to provide a sufficient pressure and volume of air to operate the hammer and clean the hole. Compressed air flows down the drill string



where it provides power to the percussion hammer and cleans the hole of the cuttings. In the right application, this drilling technique provides a faster rate of penetration, maintains a straighter hole, and eliminates the environmental impact of drilling fluids.

Though most drillers in the industry would be surprised by the aforementioned numbers, Morris' crew attributes their progress to the sophisticated equipment they've been using.

The Atlas Copco 1550 skid-mounted compressor, which is the largest single engine compressor on the market, performs 1500 CFM @ 365 PSI, or 2800 CFM with two compressors. Morris describes the efficiency and reliability of the product, adding "It's nice to have a piece of equipment that you can turn on and walk away from."

Another accessory used by Morris' crew is the Hydrocyclone hammer feature. Designed and patented by Atlas Copco, the Hydrocyclone improves performance by eliminating injected water before it gets to the hammer, yet still allowing for water mist to clean the hole. The hole is cleared of excess water and therefore increases the rate of penetration as fluids are injected.

Morris explained that each hole took about an hour and a half to drill, adding "it took longer to set the casing that it did to drill the hole." Morris' crew used threaded and coupled casing. Using T&C casing, the crew was able to save time and eliminate some of the problems that may be present with welded end casing, such as cracked welds and misalignments.

said, "The QL120 hammered all the way to TD [total depth] at 380 feet (116 meters)." Monday morning, Butch's held up their side of the deal and handed Erickson a check for the RD20.

The red bed is a reddish-colored, clay-like shale stratum, roughly 200 to 1,400 feet (61 to 427 meters) from surface, in the West Texas Permian Basin oil field. Drillers currently use PDC or tricone bits, drilling with mud to raise the cuttings. To drill using air on the first hole, Erickson injected 35 gpm (2.2 l/s) of water, foam and polymer to lift the cuttings. Once drilled, casing was installed immediately because the red bed will swell, making it difficult or impossible to install casing.

### Smart Air Power

To have enough air, Butch's purchased an auxiliary compressor to increase air availability. They chose the new Atlas Copco DrillAir XRVO 1550 CD7. This open skid >>



At the controls is Bob Morris with D.C. Carter at left and B.J. Crawford holding the rope.



unit offers the greatest volume air available from a single engine compressor, 1550 cfm at 365 psi. Combining the RD20's 1250 cfm 350 psi air compressor output with the auxiliary compressor brought total free air delivery to 2800 CFM.

Bob Morris said, "I'm really impressed with that compressor. It's the most intelligent thing on this job site. It's the one piece of equipment that I can turn on and just walk away from."

The compressor also works well for the

crew because they have all the piping and controls on one side – the dog house side – for easy hookup and monitoring. The company has outfitted an air trailer that sits parallel to the doghouse for easy access.

The last hole drilled by Butch's crew required both the rig air and auxiliary air with the pressure at 325 psi. They have purchased a booster capable of 700 psi, but have not needed it to date. The next hole the company will be drilling is a 15-inch (381 millimeters) diameter hole with the QL120, so they are ready in the event more air is needed.

To assist in cleaning the hole because of a smaller annulus, Butch's purchased 5½-inch (140 millimeters) RD20 drill pipe from Venture. They are also running 5½-inch (140 millimeters) drill collars to put extra weight on the bit.

Extra air was necessary because of the amount of water in this Pecos River area of the Permian Basin. Morris said they often run into water flowing at 100 gpm (6.3 l/s) as shallow as 100 feet (30.5 meters). Morris said doubters told them they would never get through this Windmill water zone because the hammer would water out. "I completely filled the mud pits with water, but that hammer never skipped a beat."

The Hydrocyclone feature on the QL120 is an important feature because of the amount of water. The Hydrocyclone has an impeller that diverts water out the top of the hammer. This allows the solution of water, foam and polymer to be injected for maximum cutting removal while maintaining a maximum penetration rate through air delivery to the piston and bit.

Six surface holes have been drilled to date, ranging in depth from 350 to 650 feet (197 to 198 meters). In Texas, the Railroad Commission of Texas sets the depth required for each surface hole, generally 100 to 150 feet (30.5 to 45.7 meters) below the water table. The production oil wells that will be drilled later will be 11,000 feet (3,350 meters) at total depth.

Butch's RD20 men are quickly becoming old hands. The last 440-foot (134 meters) hole took less than five hours from setup to cemented well. To rig down took 40 minutes. "We had the well drilled in an hour and a half, and that included swabbing the hole three times after each connection. It took longer to set casing than drill the hole," said Morris.

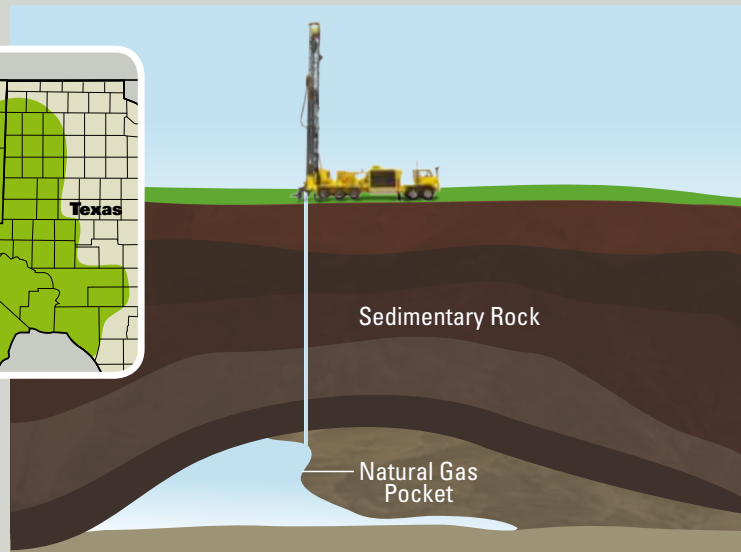
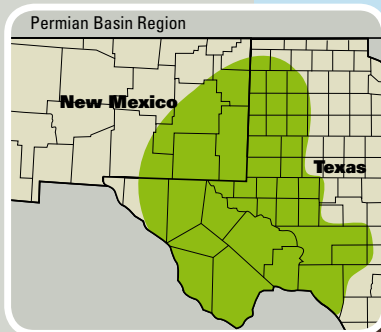
For all those who said "it can't be done," the proof is in the record books. Air drilling is more than a possibility in the red bed; it is now a west Texas reality. ☉

## THE PERMIAN BASIN AND RED BED

The Permian Basin of west Texas and southeastern New Mexico is one of the major petroleum producing regions of the United States.

The National Energy Technology Laboratory (NETL), part of the U.S. Department of Energy, says that in 2002 the Permian Basin accounted for 17 percent of the total United States oil production, and that it contains an estimated 22 percent of proven American oil reserves. This region still has a large potential for additional oil production.

The Permian Basin is so named because the sediments were deposited during the Permian geologic period — 290 to 248 million years ago, within the Paleozoic Era. The period is known for the largest mass extinction on Earth. As animals and plants died, they sank to the bottom of swamps and oceans in layers where pressure and heat



turned them into carbon-based fossil fuels over time. As the Earth changed and moved and folded, pockets were formed where oil and natural gas can be found. The RD20 helps reach these pockets.

The Permian Basin in the United States

covers about 115,000 square miles (185,075 km<sup>2</sup>). The red bed is called "red" for the iron that appears in the soil there, similar to sandstone and shale commonly found in many fuel-rich areas.



# LOOKING INTO THE FUTURE

## Driller talks about his experience as one of the first to operate the Predator

**O**'Ryan Drilling of Odessa, Texas, is doing Atlas Copco and future owners of the Predator Drilling System a favor. It is putting the new drilling system through the paces, logging time on the rig and going through the rig-up and rig-down process, looking for any necessary design improvements. The O'Ryan people are intentionally looking for flaws, also making

sure the Predator Drilling System does what the engineers have promised. Things are moving along well and the company is seeing success using the drilling system.

The company has drilled 12 holes to date. These are not the 6,000- to 8,000-foot (1,800 to 2,450 meters) holes the rig was designed for, but surface "presets" onto which a conventional rig will move

to complete the well.

This area, called the Dora Roberts in the Permian Basin of West Texas, is leased to Occidental Petroleum Company (OXY). OXY's company policy requires a 1,400-foot (427 meters) surface hole instead of the 400- to 600-foot (120-180 meters) surface casing on neighboring leases. This gives the crew sufficient hole depth to make a number of connections and set »



*Hector Machuca operates the pipe skate from the ground control box. No hands need touch the pipe except to stab the joint.*



» casing, while preventing the physical trial of rig up and rig down.

Mark Covensky is O’Ryan’s driller on the day shift. Covensky said it didn’t take him and his three-man crew long to learn the Predator operations. “We got the feel for it the first day. Now we’ve got it down.”

Covensky recognizes that having more automation is the way of the future. “You’ve got to understand, we are conventional rotary rig guys. It’s not just about learning a new rig – it’s about thinking differently. I guess you could say I’m not fighting it. I see this is the

future of drilling and I’m just happy I can be on the front end of it.”

Specifically, Covensky cited the controls and safety features as benefits of the Predator. While showing how he controls the whole operation with his fingertips on the driller’s console, Covensky adds pipe and makes the connection with a joystick and flick of a switch. “This smart-skate is a pretty cool invention,” Covensky said. “The trolley follows the pin to connection then the head pulls the pipe up and the tubular floats down vertically into place. See how I just flip the switch to ‘float’ and it does just that...floats over the connection? That’s cool.”

He points out how his crew is well out of the way while the pipe smoothly tips into position, stepping in only after the pipe comes to rest above the drill string. “The only human contact is a guy doping the pipe and stabbing it,” he said. While running collars, the two floor hands also handle the collar clamp (wedding band). One will tighten or loosen the collar clamp nut with a wrench. The fourth man, if required, on the crew works on the ground loading pipe on the rack with the forklift and operating the skate with the remote control box. The skate can also be operated from the deck control panel. Typically, multitasking is done on the Predator with a three man crew: driller, pipe skate operator and floor hand.

As for safety, Covensky thinks the Predator is safer than other rigs he has worked on. He said other manufacturers have skate-type pipe loading options, but do not offer the float feature and still require a lot of hands-on contact. “Other rigs are about clanging and banging with hands on iron, pipe tongs, slips. This is hands-off and a smoother operation,” he said.

O’Ryan is on its 12th surface well and has decreased drilling time from 20 to 13 hours since its first hole. O’Ryan operates around the clock with two 12-hour shifts. “We average one day over a hole, moving every other day,” said Covensky.

“It takes us about the same time over the hole as an HP Flex Rig, maybe just a little longer, but we take only about four hours for rig up and -down and cementing. Getting done quicker is a tremendous benefit for everyone.” He said the day rate, transportation and manpower on a Flex Rig is much greater than a Predator System that requires just three to four men, a few loads and a couple hours to move.

### Operating Predator

Covensky has all the drilling information in front of him on the driller’s console, on which a large computer screen is mounted. String weight, command weight on the bit, rotation speed, torque, hook load and more

“Other rigs are about clanging and banging with hands on iron, pipe tongs, slips. This is hands-off and a smoother operation”

**Mark Covensky**  
O’Ryan’s day shift driller



are available on the full-color digital panel.

“Atlas Copco has us operating the Predator to get the bugs out, and I have found a couple things that they have since upgraded, but this is a great rig. My job is to see if this rig can handle West Texas. If it can make it here, it can make it anywhere.”

Since drilling operations began, Atlas Copco has had a service and engineering crew on site monitoring the operation and documenting issues as they arise.

Lionel Gonzalez heads up Atlas Copco’s field support team. “Lionel is a real professional and on top of everything. He and his crew are really good at fixing what I break.” Convensky said he dropped the rear end (drive train differential) of the rig while backing it on the ramp and caused a few other problems.

Convensky said there have been minor issues that were fine-tuned as operations continued, but nothing that would stop drilling

for any length of time. He said Atlas Copco is taking changes back to the factory to correct on the future production rigs.

Convensky sees the Predator as the new future in drilling. “Today’s drilling is a different world. With the Predator, all the danger [in handling pipe] is removed. I think it’s going to be an asset for us to be in on the ground floor. If this is what the future looks like, I’ll be ready.”

*Fernando Moreno watches the drilling operation.*



*Drill operator Mark Covensky connects the pipe to the rotary head.*



# RD20 XC

## xtra capabilities

The RD20 is highly mobile, rapid to rig up and flexible enough to adapt to almost any location requirements. The patented, carriage feed system and detached-table design provide exceptional performance and economy, as well as the structural strength to handle the toughest drilling conditions.

Features and Capabilities	RD20	RD20 XC
120,000 lb (54.4 tonnes) hookload	x	x
8,000 lbf-ft (10.8 kNm) top drive	x	x
1250 CFM / 350 psi (590 l/s / 24.1 bar) compressor on board	x	x
755 HP (563 kW) deck engine	x	x
125° (52°C) high ambient cooling	x	x
2 7/8 - 4 1/2 in (73 - 114 mm) upset oil field drill pipe		xc
4 1/2 - 8 in (114 - 203 mm) oil field drill collars		xc
Hydraulic links and elevators on top drive		xc
Hydraulic slips in 17 1/2 in (445 mm) master bushing		xc
Hydraulic make up and break out wrenches		xc
3000 psi (206.8 bar) mud piping		xc
Nonincendive switches in console		xc
High-Intensity lighting		xc



### Top Drive with Elevator Links

A mounting assembly for the links is secured to the top-drive case. Rated for 120,000 lb (54 tonnes) — plus a safety factor — this design enables the links to tip in/out to handle pipe, collars and casing. Cylinders are attached to the mounting Assembly and each link to tip the links out from hole center and back. The spindle Sub includes a floating sub and saver sub. The hydraulic elevators open/close And lock with cylinders mounted on the elevators. A dual-caliper spindle brake is Available for directional drilling. Virtually hands-free pipe handling is easy, whether From a trailer, tubs, v-door or automated pipe loader.



### Table and Slips

The standard RD20 table assembly has been lowered 12 in (305 mm) to make Additional working space for the elevator system and breakout wrenches. The Table has a 26 in (660 mm) available opening and is fitted with a 17 1/2 in (445 mm) Master bushing and available hydraulic slip assembly. This table assembly is a Strong, solid base that is supported on all sides to handle tough drilling loads.



### Air / Mud Piping

The RD20 XC mud piping has been redesigned to accommodate higher Pressures. The air manifold is set up to handle auxiliary compressors and a Booster system. The main air valve and blow-down valve are actuated from the Driller's console. Connections for water injection and DHD lubricator are included. The mud piping is set up for a wide range of oil fi eld mud systems. It includes a Manual gate valve, a connection and valve for a mixer line, and a heavy-duty mud Gauge. Air and mud connections are at the side of the deck for easy access.



### Wrenches

The table assembly includes two heavy-duty pedestal mounts on the helper's side to mount a hydraulic make-up and break-out wrench. Both pedestals are height adjustable — up to 13 in (330 mm) with pin holes every 2 in (51 mm) — to accommodate a wide range of pipe and collar sizes. Both wrenches are heavy-duty chain-type that are adjustable to fi t a range of diameters, and are hydraulically activated. The wrenches can be turned over to reverse their function. Both wrenches are individually activated from the driller's console.





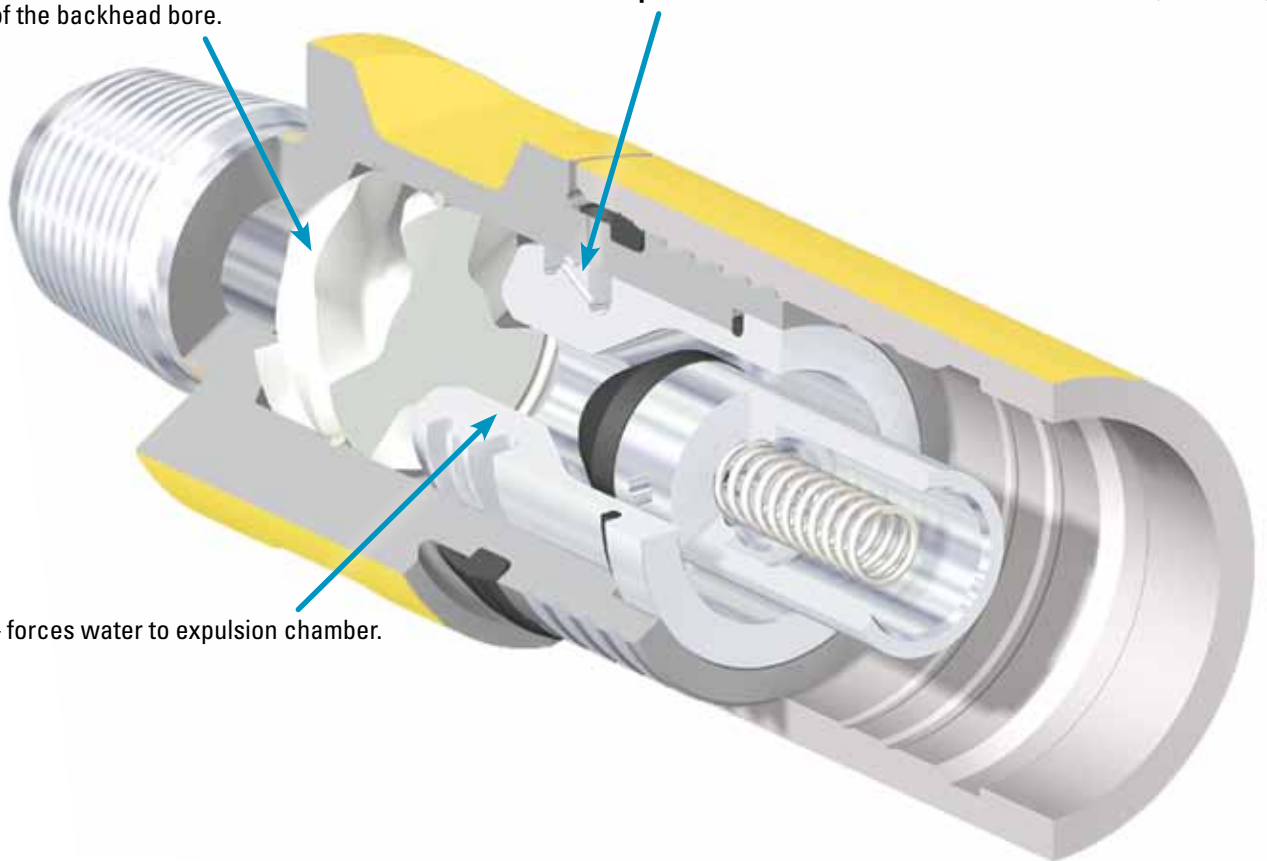
## Atlas Copco Rock Drilling Tools

Atlas Copco works tirelessly to develop down-the-hole equipment because we know that value comes from productivity and endurance. Atlas Copco has all you need for drill bits, hammers, hydrocyclones, jet subs and even oils and drill pipes.

### Hydrocyclone

**Inducer** – Spins water/air mixture. Water is more dense, so it is forced to the outside of the backhead bore.

**Expulsion Ports** – Channels water to annular area. (Well bore)



**Separator** – forces water to expulsion chamber.

### Hydrocyclone: keeps the hammer dry from injected fluids

Because a dry hole equals better performance, Atlas Copco developed and patented the Hydrocyclone feature.

- Expels liquids!
- Available as integrated part of the down-the-hole hammer.
- Or, Hydrocyclone can be purchased as an adapter that fits above existing hammer.  
Adapters available in 3½ inch (89 millimeters) API and 4½ inch (114 millimeters ) API connections.

When fluids have to be injected to clean a drilled hole, drilling speed can be compromised. With Atlas Copco Secoroc’s exclusive, patented system, those injected fluids are expelled just above the down-the-hole hammer.

**The result?**

- As much fluid as necessary can be injected without worrying about loss of performance.
- The hole stays clean and the hammer runs as if it were operating dry.

## Jet Sub: increasing air capacity

**Atlas Copco Secoroc Jet Sub increases air capacity by allowing air to be bypassed above the hammer.** The Jet Sub improves cutting removal in deep holes. It increases down-the-hole performance by “vacuuming” cuttings from the bit face.

- May reduce the need for a booster
- No performance loss
- Easy setup and cleaning
- Simple, robust design

**Available in:**

- 2<sup>3</sup>/<sub>8</sub> API reg sub (4 and 5 inch)
- 2<sup>7</sup>/<sub>8</sub> API reg sub (5 inch)
- 3<sup>1</sup>/<sub>2</sub> API reg sub (6 inch)
- 4<sup>1</sup>/<sub>2</sub> API reg sub (6 inch)
- 6<sup>5</sup>/<sub>8</sub> API reg sub (8 inch)
- 6<sup>5</sup>/<sub>8</sub> API reg sub (12 inch)



## New CaliberXD HG12 and XHG12 Heads

**Both new head designs:**

- 8-inch class bits
- Available in 8<sup>3</sup>/<sub>4</sub> and 8<sup>7</sup>/<sub>8</sub> inches
- Q8 shank with QL80, TD80 or TD85 Retrieval System
- Full face diamond or diamond gage insert configuration
- With or without gage protection inserts

*One recent test was done in West Virginia's Maxton Sand. Neither Atlas Copco nor any competitor had been able to drill this formation wet with only one bit. ... Until now with the CaliberXD XHG12 bit.*



**XHG12 increases the number of inserts on the 3rd row for severe drilling applications.**

## Workover Tricone Rotary Drill Bits

**Atlas Copco Secoroc Workover Bits for rehabilitation of existing oil and gas production wells.**

Over time, oil and/or gas flow from the formation into the well bore diminishes due to the blockage of casing perforations by the buildup of mineral scale, parafin, corrosion, etc. on the inside of the well casing and production strings.



- Clean the inside of old casing and production strings
- Remove scale and corrosion buildup
- Drill through cement plugs to expose additional productive zones that were previously not active or not developed
- Available in 2<sup>15</sup>/<sub>16</sub> inch to 7<sup>7</sup>/<sub>8</sub> inch OMR (IADC 2-2-1) and OHR (IADC 3-1-1) Workover tricone drill bits

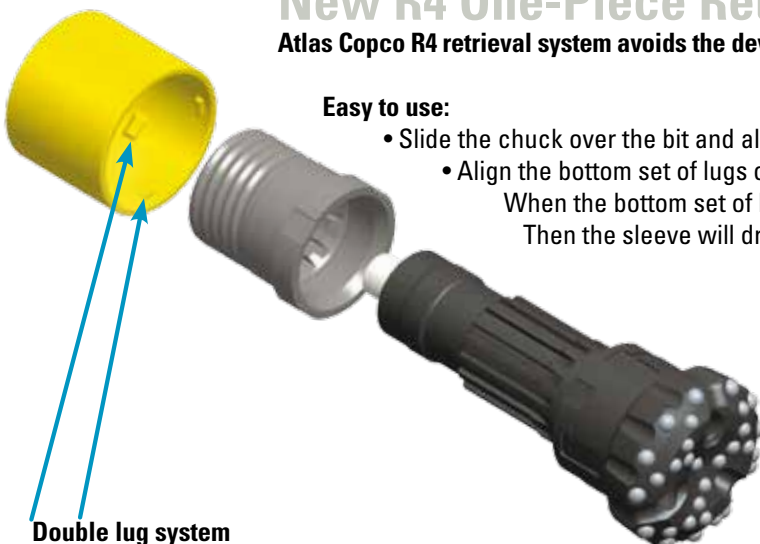
Atlas Copco Secoroc in Grand Prairie, Texas, USA provides Workover bits that comply with API Spec 7 requirements.

## New R4 One-Piece Retrieval System

**Atlas Copco R4 retrieval system avoids the devastation of losing a bit at the bottom of the hole.**

**Easy to use:**

- Slide the chuck over the bit and align the slots in the bottom of the chuck with the slot in the bit.
  - Align the bottom set of lugs on the retrieval sleeve with the slots in the chuck body.
- When the bottom set of lugs bottoms out, rotate the sleeve clockwise until it stops. Then the sleeve will drop down over the head of the bit.



**Double lug system**



**Assembled R4 Retrieval System**

# PROFITABLE PRODUCTION

Geothermal driller sets footage record with Atlas Copco DTH hammer and Rocket Bit.



“We have other drills that can drill just as fast in the first 100 feet, but nothing can keep up with the new T3W in a full day. The T3W really gets down and out of a hole; it’s definitely a production-based rig.”

**Mark Southward**, Geothermal Manager

It can’t be stressed enough that, although geothermal drilling is done with all the same equipment and tooling as water well drilling, geothermal drilling requires a different mindset. Drillers who have done quarry work know what it means to punch holes in the ground to meet the footage demands of the customer. Geothermal work follows the same production drilling philosophy.

Jackson & Sons Drilling has gone so far to emphasize the difference in their business that they have changed their marketing name to reflect the nature of their work: Jackson Geothermal.

The company currently operates 15 drills, with the bulk of their work on geothermal projects. For the first six months of the year, the company logged 508,000 drilled feet (154,838 meters). The crew works within an eight-hour drive of their Ohio-based company, focusing on large- but will take the small- geothermal projects. Geothermal Manager Mark Southward said, “Seventy to

80 percent of our jobs are commercial geothermal projects.”

It was on a recent 92,110-foot (28,075 meters) project at the Green County Career Center in Xenia, Ohio, that the company raised the bar on productivity by setting a footage record using an Atlas Copco T3W. In one day, driller Nick Sprowls and his helper, Josh Crawford, drilled 3,050 feet (930 meters).

The 17-man crew operated seven rigs on the job to complete the project in 10 days, averaging 1,309 feet (399 meters) per rig each day. But the performance of individual drills on certain days helped them overall. For example, on two different days, two 20-year-old Atlas Copco TH55s each completed 2,440 feet (744 meters) of drilling in a shift.

The company doesn’t consider a hole completed until it is drilled and the loop is grouted in place. On this project, each well required setting the loop, then pulling the 20-foot (6.1 meters) surface casing for each

305 foot (93 meters) hole. Bedrock began at approximately 18 feet (5.5 meters).

The day Spowls completed 3,050 feet (930 meters), his day began just after 7 a.m., logging his first rod at 7:30 a.m. and signing off on his last hole at 7:45 p.m. Spowls averaged 2,064 feet (629 meters) a day for 10,320 feet (3,156 meters) in each five-day week. This is not uncommon for him. Year to date, Spowls has logged 75,000 drilled feet (22,860 meters) on five different rigs with 25,455 feet (7,759 meters) from June alone.

Southward emphasizes that all his men work as a team with no one standing alone. Owner Jim Jackson has gone to the extent of printing the name “Team Jackson” on uniforms worn by the men to highlight the team effort needed for everyone to keep these numbers up.

Dave Tingley was the site foreman on the Green County project and was a major reason for its overall success. Southward said, “Dave breaks in all the new rigs and keeps things moving smoothly. He may have been the driller setting the record that day if he hadn’t been supporting the crew on another task.”

Southward said, “We have other drills that can drill just as fast in the first 100 feet (30.48 meters), but nothing can keep up with the new T3W in a full day. The T3W really gets down and out of a hole; it’s definitely a production-based rig.”

Southward points out that all his drills use the Atlas Copco Secoroc TD40 down-the-hole hammer with the Rocket Bit. “We did 302 holes in 10 days, and that hammer is what got us there.” He said the Rocket Bit works so well in a limestone formation because of its aggressive button structure and air channels. “It is the perfect bit for us because it cleans away from the face so well,” he said.

Jackson used another manufacturer’s hammer in the past, but found rebuilding the Atlas Copco hammers was a better value. “Our other hammers were cheaper, throwaway hammers. Now we work with our distributor, Stockdale Mine Supply, to service the hammers.” Each rig has multiple hammers on site and changes out when necessary. “We don’t mess around with a slow hammer. If it’s slowing down, we change it out and call Randy.”

Randy Neff is Jackson’s Stockdale contact. He said he put Jackson on a hammer contract for rebuilding hammers. Neff said, “An efficient hammer drills a hole faster, »



# TEAM JACKSON

» Jackson doesn't waste time with hammers and we know what to look for when pulling it apart."

Jackson also drills 5-inch (12.7 centimeters) holes when the rock formation requires it, but not in limestone. For 5-inch (12.7 centimeters) work they use

the Atlas Copco Secoroc TD50 hammer.

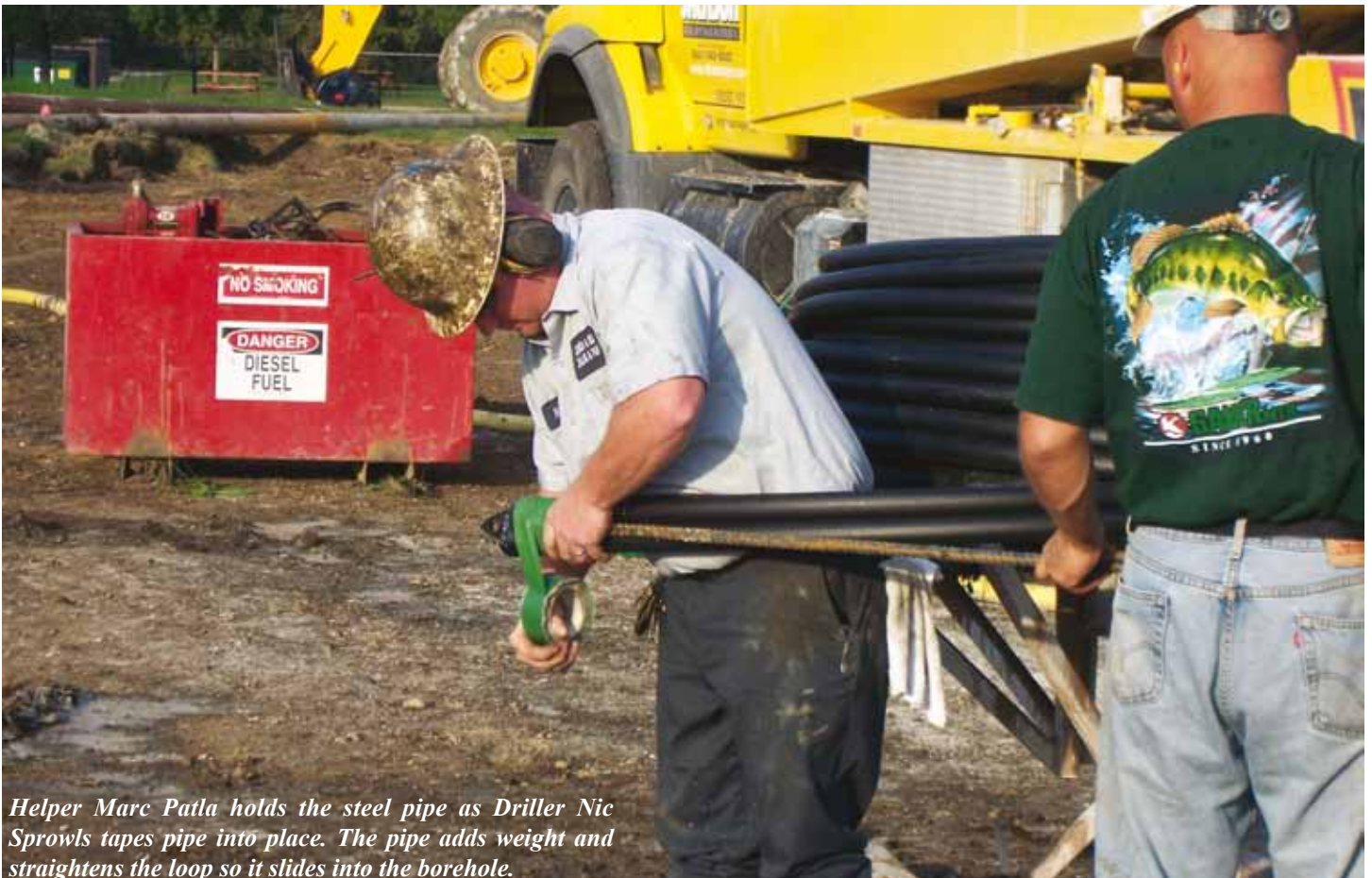
Cutting back on air also allows them to be more fuel efficient. "With the 4-inch (10.2 centimeters) hammer you only need 560 cfm. The 5-inch (12.7 centimeters) requires 900 cfm. This is production drilling and it's all about knowing and managing physical costs," said Southward.

For example, the company's two TH55 drill rigs do not have on-board air, so the crew drills using airpower from an 1,170 cfm 350 psi auxiliary compressor supplying air to both rigs. Sharing air from one compressor allows them to use less fuel. Each rig drags a hose, drilling five holes before the compressor needs to be pulled forward with a dozer. The newer T3W with Atlas Copco's electronic air regulation system (EARS) allows the air compressor's volume and pressure to be dialed back, saving on fuel to supply the necessary air.

Years of experience has given the Jackson crew members a chance to understand where they need to make adjustments and outfit a fleet while being cost conscious. Southward reiterated, "We know what each rig will do. First, it's about knowing your physical costs. Then it's all about production." ⦿



Stockdale Mine Supply Sales Rep Randy Neff stands with Mark Southward and the Rocket bit and TD40 hammer.



Helper Marc Patla holds the steel pipe as Driller Nic Sprowls tapes pipe into place. The pipe adds weight and straightens the loop so it slides into the borehole.





## Atlas Copco expands production in United States with new Pennsylvania plant

Atlas Copco has expanded its Fort Loudon, Pa., campus to include down-the-hole hammer production. The facility there has been making down-the-hole hammer bits since 1989.

The expansion includes a new 20,000-square-foot office, assembly and distribution facility to support the hammer assembly demands for the global market in the 4-inch and larger, QL- and TD-model hammer range.

Plant Manager Keith Mackling said, "Atlas Copco has already invested millions of dollars into Fort Loudon and this is an evolution of that investment." Previous upgrades included state-of-the-art robotics and other machining equipment designed to meet increased business growth around the world.

The expansion of the Fort Loudon facility was celebrated with a ribbon cutting ceremony and open house.

Guests at the event included Atlas Copco employees and management and some family members, as well as community and state representatives from the governor's office, state legislature and area economic development organizations. In addition to

the funds from Atlas Copco, the facility was supported by a grant along with incentives from the state of Pennsylvania. For the state funds, Atlas Copco agreed to hire 15 additional workers over three years, but has already hired 17 and forecasts that it will hire double the number originally promised.

"I think we've shown our division management a good quality product," Mackling said about the workmanship of local employees.

"They've done a really good job for us," agreed Jaco van der Merwe, Secoroc's Vice President of Manufacturing for United States operations.

This expansion in Pennsylvania coincides with the regional growth in the Marcellus Shale formation, which is one of the United State's top natural gas producers. State Sen. Richard Alloway II, who spoke at the event, said he expects Atlas Copco's down-the-hole hammer and bit production to be in even greater demand as more natural gas drilling occurs in the northern part of Pennsylvania.

"We really are happy to see this growth.



... As an international company, [Atlas Copco] could've gone anywhere to do this expansion," Alloway said.

Gene Mattila, U.S. Business Line Manager for Atlas Copco Rock Drilling Tools is looking forward to the expansion at Fort Loudon and said, "The United States is the largest individual market for Atlas Copco's hammers and this location is in the heart of the hard-rock drilling region."

Van der Merwe said Atlas Copco has grown despite the rough economy and will be ready for greater production as the economy recovers. "The success at Atlas Copco is a testament of the quality of people we have," he said. ●



Roy Wedell

# A CLEAN OPERATION



“Everything we do is out there; there are no secrets.”

**Lee Peterson,**  
Peterson Drilling Vice President

## Texas company focuses on environmental work with the TH60

A water well driller may encounter customers concerned about well contaminants, but nothing like Peterson Drilling and Testing’s customers. The company specializes in drilling environmental wells at contaminated sites. Sites include petroleum production, refining, distribution and industrial and commercial sites. All types of contaminants are encountered on different sites. Peterson Drilling serves clients in Texas, New Mexico, Oklahoma and Kansas.

How many drillers would think about putting on latex gloves when handling cuttings? Or capturing the first water and all the cuttings from a 400-foot (122 meters) well? Both are common practices for Peterson’s crew. Not all the time, of course, but when it could mean protecting all the fluids, everything is important. The general rule on all jobs is to “keep it clean,” said Drilling Superintendent Roy Wedell.

Peterson Drilling operates multiple drills in its environmental drilling business. Most of the work is done with a newer Atlas Cop-

co TH60, but the company also operates a Classic model TH60 and auger drills.

Environmental wells for Peterson include recovery wells, injection wells and monitoring wells, but the practice is similar in each case. Peterson’s crew captures all the cuttings and occasionally the fluids recovered from the well while drilling. They use roll-off containers or a vacuum truck to capture cuttings that their customers use for various types of testing.

Wells range from 100 to 450 feet (30.5 to 137 meters) in depth with the deepest that Wedell can remember being 540 feet (165 meters). They are generally 6-inch (152 millimeters) wells but can go up to 16 inches (406 millimeters) in diameter.

The company even owns its own cement mixing truck to make concrete. Often it’s required to pour a pad around the well head to provide a surface seal to protect the well from surface contamination as well as protect it from physical damage. The cement truck is also used to make a cement slurry to provide an annular seal above the benton-

ite plug. The bentonite plug serves as a buffer between the filter pack and cement seal.

When backfilling a well, most drillers use various aggregates required for proper water flow. Peterson orders washed silica sand by the pallet that will be used for packing their wells. "The slot size needed on the casing can be .010 to .020 to keep out natural fines," said Wedell. In some instances larger slot sizes are used, depending on the formation.


The casing is not your normal PVC either. Because bonding agents like PVC cement contain contaminants that may be detected in the monitoring process, the company uses threaded casing and no glue in the casing connection.

At times it is necessary to monitor various aquifers within the same boring. We protect the aquifers from cross contamination by drilling a large diameter hole and cementing the casing in place in the upper aquifer. A smaller diameter hole is then drilled through the larger casing and a smaller diameter well is installed in the lower aquifer. Samples can then be taken from the lower aquifer without cross contamination, said Wedell.

The company's new TH60 works well for Wedell because he says it's user friendly with comfortable controls. "It just makes more sense how things like the winch controls are positioned," he said.

He also thinks the full-speed hydraulics at idle are a benefit because they save fuel, while allowing full function.

The jib's boom swings and operates faster than his last TH60. He also said maintenance is easier than his previous rig. "I will let you know in the future, but right now not having to grease the sheaves because they are sealed is much better," Wedell said.

Peterson Drilling Vice President Lee Peterson is open about sharing his company's knowledge about environmental well development. "Everything we do is out there; there are no secrets," he said. The company has become an expert at what they do because they have the equipment to get the job done and be successful, Atlas Copco is happy to be part of that fleet. 



*An older and newer TH60 share work with Peterson.*

## Atlas Copco produces environmentally friendly hammer

Aqua 60



### Aqua 60

The Secoroc Aqua 60 DTH hammer is a unique technology for cleaner drilling. The Secoroc Aqua 60 uses water instead of hammer oil as a lubricant, leaving no trace of oil in the drill hole. This means that newly drilled water wells don't need to be flushed for such a considerable time before they can be put to work.

The Aqua 60 DTH uses special expandable, non-metallic wear bands at strategic contact points, injecting a small amount of water into the airstream, causing these bands to expand. This provides full sealing and compression while saving the expense of costly lubricant. The standard DTH hammer can consume over 200 gallons of lubricating oil during its service life.

The Secoroc Aqua 60 can drill through hard rock as well as unconsolidated rock, but also soft rock. Performance isn't sacrificed by the different design: in fact, performance is as high as any oil-lubricated Secoroc 6-inch (152 millimeters) DTH hammer, such as the COP 64 Gold Express or the QL 60.

### Easy Maintenance

Just change the wear bands at regular intervals and high drill performance is retained throughout the service life of the hammer (about 70,000 to 80,000 feet or 21,000 to 24,000 meters). One point to mention is that because the Aqua 60 uses steel components, it is necessary to run oil into the hammer if it isn't going to be used for a few days. Then, when it is ready to be used again, simply flush air and water through the hammer for about a minute to clean out any oil. The oil does not contaminate the seals.

With the added benefit of no extra maintenance, and the fact that it doesn't put oil in the ground, the Aqua 60 is worth a try.

Some customers might even choose a driller who uses a non-lube hammer because of the environmental benefits.

# TH60 Evolves to Suit Drillers' Needs

When selecting the options of a rig, it's best to outfit the rig to meet your drilling environment. Atlas Copco's TH60 drill rig is a versatile platform that can be rigged up to meet nearly any drilling method or geological condition. Shown here is one example of what Atlas Copco can do to suit a drilling company's needs.

The heart of the TH60 is the single-engine power source with reliable transfer case for long life and low maintenance. The TH60 is mounted on a Peterbilt 367 truck and has a powerful 600 horsepower Cummins ISM engine. When the transmission is disengaged, the power takeoff drives the drilling functions. This proven and durable feature gives the TH60 all the power needed with the maintenance in one engine. This also reduces the rig's weight and frees up deck space for other options to be added.

With standard features, the rig comes in two model classes, either 40,000-lbs or 70,000-lb pullback rigs, depending on the customer's depth and pullback requirements. Each model has a choice of winch capacity and air compressor sizes.

Recently Atlas Copco built the machine pictured to meet a customer's specific requirements. The customer needed to be able to drill deep test holes and gather a lot of information while drilling and was also able to wireline core. Atlas Copco set up the rig with a wireline coring system, dual mud pumps, custom piping for booster, auxiliary air connections and many other custom features as detailed at right.

The rig has an 8,000 ft-lb, two-speed rotary head capable of multiple applications. Combined with its Atlas Copco CS14 wireline winch and level wind system, this rig can be a coring rig as well as a mud rotary and down-the-hole hammer air drill rig.

To flush cuttings and control dust when air drilling or core drilling the drill is equipped with a 35 gpm Bean high pressure water injection pump. The rig includes an optional 1,500 psi piping package for high pressure air for deep hole work requiring a booster. A customized auxiliary air manifold and booster manifold allows for both additional air and a booster to be hooked up and supplement the 1070 cubic feet per minute of free air delivery at 350 psi on the rig.

With a 30,000 lb drawworks, which can be two parted, the rig allows the customer to pull out of extremely deep holes with their winch. A swing in jib winch was also added to make this rig even more versatile.

The rig was ordered with two different mud pumps; a Mission 3x4 centrifugal pump and also a Centerline high pressure duplex pump that puts out 300 gallon per minute at 450 psi.

Two unique options are an auxiliary hydraulic package and the rig's lighting. This auxiliary hydraulic package allows the customer to power hydraulic casing jacks or a hydraulic pick up pump. The lighting was upgraded to a Nordic light package that comes with high intensity discharge (HID) lights. These lights have great luminous intensity and a color that mimics natural daylight.

One of the newest options is not for everyone, but in certain situations is very useful. A data acquisition system displays functions of the drill and conditions in the borehole as they happen. Functions such as pulldown and pullback, hole depth, ROP (rate of penetration), rotary torque, mud pump pressure and mud conductivity, rotary rpm, temperature air pressure, pump strokes, and pit volume can all be captured for future use. This technology was developed for the oil and gas industry, but is also useful in scientific or environmental work.

The system collects data in a CPU mounted securely on the deck and displays on the screen at the drillers platform. The plotted drill log is also captured on a laptop to be emailed or transferred through digital media.

The TH60 has evolved over the years to integrate many new features like the auto cable tensioner system and electronic air regulation system meant to increase productivity and efficiency. The options available make this rig a top performer for many fleets regardless of the geology or application.



The drill data is stored on a Panasonic Toughbook and then plotted out in drill log format.



CS14 wireline winch with level wind system to be used for core drilling. Additional PL5 swing in jib winch.



Auxiliary air and booster piping — allows additional air compressor to be hooked up and for air to go through a booster.



Mission 3x4 centrifugal mud pump.

# Specifications TH60 and TH60DH

**TH60**.....**TH60DH**

## PULLBACK OPTIONS

- **Pullback** – 40,000 lbf (177.9 kN).....70,000 lbf (311.4 kN)
- **Pulldown** – 25,000 lbf (111.2 kN).....30,000 lbf (133.4 kN)

## FEED SYSTEM

Single cylinder, cable feed.....Twin cylinder, cable feed

- **Drill Feed Rate** –  
20 ft./min. (6.1 m/min.).....20 ft./min. (6.1 m/min.)
- **Fast Feed Up/Down** –  
150 ft./min (45.7 m/min.).....150 ft./min (45.7 m/min.)

## DERRICK

- **Capacity** – 45,000 lb. (20,412 kg).....75,000 lb. (34,019 kg)
- **Main Cord Length** –  
35 ft 6 in. (10,820 mm).....37 ft 6 in. (11,480 mm)
- **Head Travel** –  
27 ft. 4 in. (8,330 mm).....27 ft 4 in. (8,330 mm)

## STANDARD CARRIER

- **Peterbilt 367**; Cummins ISX Diesel Engine; 600 hp/ 447kW @1800 rpm; 247 in. (6,274 mm) wheelbase; 68,000 lbs. (30,844 kg) GVWR

## DRAWWORKS

- **Single Line Bare Drum** –  
Standard: 18,000 lbs. (8,165 kg); 165 ft/min (50 m/min)  
Optional: 30,000 lbs. (13,608 kg); 150 ft/min (45m/min)

## ROTARY HEAD

- **Standard** – 5,500 ft-lbs (7 458 Nm) @ 145 RPM Single-Speed Rotary Head
- **Optional**
  - 5,500 ft-lbs (7,458 Nm) @ 145 RPM Two-Speed Rotary Head  
(Second Speed) 4,000 ft-lbs (5,424 Nm) @ 195 RPM
  - 6,200 ft-lbs (8,475 Nm) @ 134 RPM  
Single-Speed Rotary Head
  - 6,200 ft-lbs (8,475 Nm) @ 134 RPM Two-Speed Rotary Head (Second Speed) 4,650 ft-lbs (6,310 Nm) @ 180 RPM
  - 8,000 ft-lbs / 10 848 Nm @ 105 RPM Single-Speed Rotary Head
  - 8,000 ft-lbs / 10 848 Nm @ 105 RPM Two-Speed Rotary Head (Second Speed) 5,500 ft-lbs (7,458 Nm) @ 145 RPM

## OPTIONS

- Mud pumps
- Single-pipe loader
- Pipe spinner
- No-air option
- Floating-spindle hub
- High-pressure air piping
- Sand reel
- Service hoist
- Water injection
- DHD lube injection



The collected drill data is displayed on this screen and stored.



Cable tensioner reduces need to tighten cables..



Custom Pipe Slide

Custom Tool Box



Clean working deck space with open access for maintenance.



Drill data is collected in a CPU mounted securely on the deck.



## New Compressors Made Environmentally Compliant

Atlas Copco Portable Air has selected the EGR/DPF system to make its portable compressors compliant with EPA TIER 4A/EU STAGE III B. The first prototype of this is the XRHS 366.

As of January 2011, the emission legislations for off-road diesel engines between 130 and 560 kW will become much more severe. For the European market, emissions are regulated by EU STAGE III B. For the United States, EPA TIER 4 A is in place. An important adaptation in this next step of the legislation is a drastic reduction of the allowed particles or soot in the exhaust. Nitrogen oxides, the primary contributor to the formation of smog, will be reduced by half from previous legislation.

Atlas Copco Portable Air division has evaluated the two existing technologies that can achieve these new restrictions: Selective Catalytic Reduction (SCR), and Exhaust Gas Recirculation (EGR) combined with particulate filter (DPF). The nitrogen oxide reduction system EGR/DPF of Caterpillar was chosen as the best

solution.

Guy Laps, Vice President Engineering of the Atlas Copco Portable Air division, said, "With this solution we ensure that off-road customers do not need to refill with Diesel Exhaust Fluid (DEF) or AdBlue. A load factor study, done on a representative population in the field, allowed us to come, together with CAT, to the conclusion that EGR/DPF is the best technology for our portable compressor applications."

EPA TIER 4A/EU STAGE III B was the most aggressive and expensive product development in Caterpillar history. The CAT clean emissions module minimizes impact on fuel efficiency. "First calculations show that, depending on the engine model, we will be able to have a fuel consumption decrease of up to 2 percent," said Guy Laps.

Also for the Atlas Copco Portable Air generator range the engines will be adapted in line with the emission legislations STAGE IIIA for Europe and EPA TIER 4 A for the USA.

## Atlas Copco Constructs New Distribution Center in China

Atlas Copco has started construction of a new distribution center in China. The facility, located in Nanjing, will strengthen the distribution of parts and consumables in Southeast Asia.

The construction of the 4,000 square meter facility, with the option to expand to another 4,000 square meters, follows the strategy to strengthen Atlas Copco's customer support in Southeast Asia. Customers will benefit from improvements in storage and shipping capabilities for spare parts and consumables.

"The new distribution center shows our strong commitment to customers in the region, and is another step in our ambition to strongly develop the business and continue to be the customers' first choice," said Björn Rosengren, Business Area President, Atlas Copco Construction and Mining Technique.



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