Hitting the jackpot: Another succesful day of exploration drilling for natural gas in Arkansas.

Drilling the BIG ones

U.S. specialist has the keys to profitability in gas exploration

Big-hole drilling is the backbone of exploration in the oil and gas industries. But deep holes with large dimensions are not always easy to produce with consistent and cost-effective results. Pense Brothers of Missouri has the solution.

Pockets of natural gas are a common feature of the geology in the central southern states of the USA. Pense Brothers have been drilling exploration holes since 1962 and rely heavily on Atlas Copco rigs and rock drilling tools.

The company specializes in drilling vertical shallow gas wells. They are usually contracted to drill the initial hole to a depth of approx. 3,000-4,000 feet (900 to 1,200 m). Following the initial drilling, another drill rig will be used to gradually deflect the hole a further 3,000-4,000 feet toward the horizontal.

Pense Brothers need to be highly organised as the company covers a vast territory that includes Alabama, Arkansas, Colorado, Missouri, Utah, New Mexico and Oklahoma and follow a busy drilling programme. To keep the operation running smoothly, 180 dedicated employees work to ensure everything from scheduling and maintenance to drilling stay on track.

Good co-operation: (from left) Derek Anderson, Midwest Region Manager, Atlas Copco CMT USA with Toolpusher Gary Warren and Ronnie Pense of Pense Brothers Drilling.

ARKANSAS' MINERAL WEALTH

The state of Arkansas covers 137,732 square kilometres and has a population of almost 3 million people. It is the only state in the U.S. where diamonds are found naturally (on or near the surface). The site is now a national park and the public are able to prospect themselves for USD 5. The state possesses rich mineral resources, exploitation of which contributes over USD 1bn to Arkansas' economy. Petroleum, natural gas and bromine account for most of the production. Arkansas is the U.S.A's biggest producer of bauxite and bromide in the world. Other mineral deposits include zinc, titanium, manganese and coal.

Like most big-hole specialists working with hole dimensions in excess of 12 inches (30.5 cm) and depths of about 3,280 feet (1,000 m), Pense Brothers have to maintain profitability and a smooth-running operation hole after hole.

The secret of success, the company says, lies in the reliability and efficiency of its drill rigs, and perhaps more importantly in the quality of its down-the-hole hammers.

Drilling on the move

Pense Brothers have a total of 18 rigs working at any one time, 10 of these are Atlas Copco RD 20's with an 11th rig on order. Set-up time is a vital factor in overall efficiency at the company and the rig crews need to be highly capable and mobile. In the field, the RD 20 can be up and running at a new site in a matter of hours rather than days.

In order to stay profitable, the very best performance must be extracted from the rigs and drills used. The equipment must also be able to get on with the job and uptime is critical to success. "I use the RD 20 because it is a smooth operating and easy to operate machine," says Ronnie Pense. Using the RD 20 rig allows one hole to be drilled in a week and within a few hours of completion the rig can be setting up at the next site.

The geology of the territories worked by the company varies. Colorado has lots of shale to drill through while Alabama presents harder formations. Whatever the conditions, Ronnie Pense uses the same equipment. Only the drilling is adjusted to compensate for the different conditions. Pense explains, "Each hole is a little different, but we use the same set-up from Colorado to Alabama."

Ready to go: Large bore casings line up for threading by the RD20.

No compromise on drill quality

The first 490 feet (150 m) is drilled with a 12 1/2" (318 mm) bit on a Secoroc QL 120 down-the-hole hammer, with two 8-inch (203 mm) stabilizers above the hammer to add weight. The hole is then lined with 9 5/8" (244 mm) casing that has threaded and coupled ends. After that, the RD20 uses a wishbone device to pick up and thread the joints of the casing together. This way, the surface casing is cemented in place.

The next stage for the crew is to drill a 8 7/8" (225 mm) hole through the concrete down to the contracted depth using TD 90s. Pense says: "We always use Atlas Copco Secoroc because of the dependable performance."

The TD 90 hammer achieves an im-

After the hammer and stabilizers have drilled deep enough into the hole to clear the surface casing, the collar is set in place, forcing the cuttings, water and gas through the discharge line.

The dependable Atlas Copco Secoroc QL 120 with a 12 1/2 " (318 mm) bit at the start of the drill run.

pressive usage rate of up to 39,000 feet (more than 12,000 m). Pense reveals: "We can wear the outside of the skin of the hammer before the inside wears at times!"

In the past, the company has even been offered free bits by other manufacturers but Pense Brothers has been unwilling to take the risk of "shanking" (breaking) a bit. Pense continues: "We don't switch because we know what works. It's a commercial thing; time is money. We use Atlas Copco Secoroc because they are the best."

The cost to the operation of retrieving a bit at the bottom of a hole is not something that Pense is keen to do: "To shank a bit at 1,000 meters just isn't worth it. I do have a retrieval system on some of my rigs but I sure don't want to use them!" M&C 1-06

Performance and reliability crucial to success

Drilling for oil and gas is technically demanding and commercially challenging. The equipment must perform well repeatedly for the operation to be financially viable. Rudy Lyons, Operations and R&D Manager at Atlas Copco's Roanoke plant in the U.S., highlights some of the issues unique to the industry.

A basic tenet of oil and gas drilling is that everything that goes into the hole must come out. A deep oil-gas well that is clogged with failed parts is little more than an expensive hole in the ground. The risk of losing parts to down-the-hole equipment must be avoided at all costs in order to maintain the integrity of the hole and the investment made in it. That is why it is worthwhile to use the highest quality products such as those made by Atlas Copco Secoroc.

As drilling quite often occurs in remote areas, the need to avoid a breakdown that cannot be immediately serviced is essential. Again the need for high reliability and risk avoidance is critical to the success of the drilling operation.

Exploration drillers don't usually work on a 9-5 basis, so round the clock back up is also important. Oil-gas drilling operations are 24/7 businesses that require support with a similar commitment, along with technical know-how to support a complex operation.

Operating costs of the drill rigs are very high involving lots of people. Total drilling cost is a key motivator for buying fast and reliable products. Leveraging penetration rate and uptime are also very important.

The Atlas Copco Secoroc TD range of down-the-hole hammers was developed to provide the maximum return on investment for drilling contractors. The TD hammers can also be adapted with a range of options to suit a driller's specific needs.

JetSub is a system that prevents power losses to enhance performance and hole cleaning and can be used on all Secoroc DTH equipment. The JetSub enables high flows to be bypassed above the hammer with upward facing nozzles that evacuate and clean the hole.

Many oil-gas contactors see a key benefit of the JetSub system as having no need for a high pressure booster. It also improves performance and requires less bit wash due to better hole cleaning.

Another optional feature available on the TD hammer range is the patented AirSelect system. The generally high and variable flow demands on hammer drills in oil-gas application are taken care of by the system that adapts flows according to need and supply. The AC Secoroc Airselect system makes air changes easy with its rapid and efficient air selector system. M&C 1-06