

Diverse needs of the water sector

While demand for drilling equipment in the mineral-exploration and site-investigation sectors ebbs and flows depending on the success of the mining and construction markets, the requirement for water-boring equipment remains comparatively stable

Awareness about issues connected to maintaining sustainable levels of water supply has increasingly reached the general public over the last year with California facing what many are describing as its worst drought on record. With this awareness, there has been a realisation that availability of water is not only a developing-world problem.

The Organisation for Economic Co-operation and Development forecasts a 55% increase in global water demand by 2050, and emphasises that current ground-water depletion more than doubled between 1960 and 2000, and shows no signs of abating. Along with deteriorating surface-water quality, the depletion of existing aquifers could be the greatest threat to water supply in the near future.

Martin Fitch-Roy, chief executive of UK-based Dando Drilling International, explains why the water sector is so important to the continuing success of the mobile drilling-rig industry: "The world population continues to grow and along with it the demand for clean water. Ground-water has a very significant part to play in this.

"For Dando, water has been a

focus since we started out over 140 years ago and nothing has changed in this respect. What has changed is the variety of equipment we now offer to meet the needs of a more diverse customer base. Dando continues to invest heavily in developing water-well equipment, as well as our geotechnical and mineral rigs, to meet demand."

Fitch-Roy believes that some of the new designs emerging from the Dando factory reflect the increasingly diverse requirements of water-well drilling globally.

He says much of the equipment manufactured over the last decade focused on mid-sized rotary rigs capable of medium-diameter boreholes suitable for water provision to rural communities. While these rigs continue to be popular, there has been a resurgence of orders for both larger and smaller rigs to meet an increasing variety of needs.

Two current water-well projects on different continents serve to highlight current market trends in the water sector.

WATER FOR CITIES

The city of Dar es Salaam in Tanzania is in the process of expanding its network of wells to meet the demands of its munici-

pal water supply. The requirement for large-diameter boreholes to depths of 400-450m in formations that are prone to collapse was ideally suited to Dando's Watertec 50 rig set up for flooded reverse-circulation (RC) drilling.

Drilling in fragile formations at large diameters is challenging using regular mud rotary techniques, because the pressures required to force water through the narrow opening of the drill rod with enough force to lift cuttings up a wide annulus can result in aggressive erosion and hole collapse. By contrast, the

flooded RC technique, whereby mud fed into the annulus then flushes cuttings up the centre of a large-diameter 6in (152mm) drill rod, is a very gentle method that protects the integrity of the borehole wall.

Adrian Scott, vice-president of international sales at Dando, explains the technique in more detail: "The aim is to create an imbalance in fluid pressure ►

"The OECD forecasts a 55% increase in global water demand by 2050"

The Dando Watertec 50 set up for flooded reverse-circulation drilling complete with shale shaker and hydro-cyclone (foreground) is suitable for large-diameter boreholes to great depths





Top: the Watertec 4000 is a small-footprint, top-drive rotary water-well rig capable of drilling 200m with mud rotary or DTH hammer

Above: the Watertec 4000 has a progressive cavity pump visibly mounted along the side of the deck

centre of the rod with less aggressive flushing to the bore itself. Mud is then returned to a stilling chamber where the air is separated from the liquid, which is, in turn, cleaned in a stand-alone shale shaker and hydro-cyclone before being recycled back in to the borehole.

The weight of the 6in drill rod and the large-diameter drill bits require power. The Watertec 50 provides 50,000kgf of pullback on the rotary head. This is achieved directly by the rotary head rams, which are rated at 30,000kgf, and an additional 20,000kgf is obtained by using a powerful winch that pulls the rotary head from above. This ensures a truly vertical pull on the drill string and prevents undue lateral forces on the mast structure.

The rig utilises a 580hp Caterpillar C15 deck engine to power the hydraulics, 8 x 7½in GD mud pump and 900cfm/350psi Doosan compressor, all of which are mounted on a 6x6 IVECO truck. A 7.6m working stroke allows the loading and pulling of 6m drill rods, and an uprated breakout cylinder is secured by double-acting positive-displacement rams and 540mm clamps.

The Dar es Salaam boreholes are initially drilled at 16in diameter to around 220m, and the pilot hole is then reamed out to 24in; 18in casing is then inserted, and the well is drilled to the finished depth at 16in before completion.

COMMUNITY WATER IN THE TROPICS

In contrast to the high-volume municipal water supply required in Tanzania, the Indonesian holiday island of Lombok presents a very different scenario. Once regarded as Bali's poor neighbour, the island is now attracting tourists and locals alike to exploit both leisure and business opportunities.

As a result, private residential complexes comprising small clusters of homes are being built

all over the island. Lacking infrastructure to support these, one Dando customer has decided to start a contracting business to provide wells to these clusters.

Requiring an affordable solution to drill in the 100-200m range for a 5in completion, Dando prepared a new model in its range, the Watertec 4000, to suit the project.

Measuring only 1,400mm in width, the track-mounted version of the rig is small enough to access tight spaces between buildings or through forested areas. A 2.6m working stroke accommodates 2m rods, and a folding mast extension allows the handling of 4m lengths of casing or tripping out two rods at a time.

The rig is compact and highly modular, allowing for unprecedented levels of customisation. For the project on Lombok, where mud rotary is the preferred drilling method, a progressive cavity pump was chosen. While set to produce 450L/min, the cylindrical shape means it can be mounted down the side of the rig, which takes up much less deck space than a conventional mud pump.

A range of power units are available from 50hp to 100hp, including the latest Stage 3B/4 silent-pack models required by European regulations. The control panel is mounted within sight of the borehole, and an umbilical remote is used when tracking to ensure operator safety. Other options include radio-remote control, hydraulic break-out clamps, a range of mud and coring pumps, a mast with 3.6m working stroke, and mounting options including truck, trailer and skid.

Dando engineer Rupert Coler believes this rig is an important one for Dando: "Many contractors are no longer able to afford bigger equipment. They need the power and versatility of the big rigs, but in a smaller package and at an affordable price. This rig fills that niche in the market." ▼