

Coal mining environments are becoming more demanding, proving new challenges for drill rigs. **Thomas Way, Dando Drilling International, UK**, describes the company's solution to overcoming new challenges.

The fluctuating coal market over the last three years has caused drill rig manufacturer, Dando Drilling International, to re-evaluate what is required by effective coal exploration teams. The result is a number of innovative solutions aimed at injecting new life into the sector.

"Coal exploration has traditionally been one of our strongest markets in the mineral drilling sector," explained Dando Managing Director, Martin Fitch-Roy. "Our rigs have been used by some of the big coal miners, such as PT Kaltim Prima Coal (KPC) in Indonesia, for over 25 yr and the Dando brand has become very well established in coal exploration."

So much so, it seems, that the demanding conditions of coal mining in environments as harsh as the Indonesian jungle have been a driving force behind the design of their flagship coal exploration rigs.

Thirty years ago, Dando top-drive rigs were being used for very fast air-flush drilling of coal in UK mines. Taking experience from using this method at home, Dando began building specialised rigs for coal exploration globally. At the time, the Dando D250 was a revolutionary piece of equipment and it was this rig that Fitch-Roy took to the jungles of Kalimantan where coal mining was only just developing. Fitch-Roy trained the KPC drillers to use the air-flush method to drill very fast open-hole bores ready for logging and later coring – a method that continues to be used today.

"Prior to this, air-drilling wasn't common practice outside of the UK," Fitch-Roy recalled. "It requires care, especially where safety is concerned, and this is a main focus in our design and construction. Used skilfully however, it produces unparalleled drilling rates."

The rigs have continued to evolve and the current Mintec 12.8 machines are arguably specialised coal exploration rigs. They feature onboard 900 cfm / 350 psi compressors, 540 hp Caterpillar turbo diesel engines driving a crawler unit with uprated hydraulic motors and single bar grousers to clear the thick mud often found at mine sites.

A versatile rotary head is able to drill open hole with rotary air blast (RAB) or traditional mud rotary can take undisturbed samples using reverse circulation (RC) and yet has the higher speeds necessary for effective wireline coring. The new Mintec 12.8 rigs frequently complete 300 m – 350 m boreholes in a single 20 hr day of drilling.

INNOVATIONS IN COAL EXPLORATION



Using the small Dando Terrier rig in the jungle provides an affordable route to the early stages of exploration in environmentally sensitive areas.



The Dando Multitec 4000 provides all the drilling capability required by drilling teams within current budget constraints.



Coring for coal in Indonesia: the Multitec 9000 is modular, allowing exploration teams to choose components to suit their project and budget.

While coal prices were at a high, a number of the bigger coal mines decided to run their own exploration rigs and the Mintec 12.8 was an obvious choice. Currently there are around 20 of these rigs working at the mine sites of Indonesia alone.

But then, three years ago, the coal bubble burst and budgets were cut.

Engineered solutions

"Many of our customers are continuing to see increases in coal

production," Dando Sales Director, Quentin Dulake, explained. "However, overall profits have decreased substantially and exploration budgets are just not the same as they were. The mines continue to require fast, strong exploration drilling rigs but they are looking for solutions at a lower capital outlay."

Rather than wait for the market to rebound, the Dando engineering team decided to return to first principles and tackle the problem from a design standpoint.

"We came up with a range of rigs that use smaller crawler units and engines but continue to provide the capabilities of our much larger rigs," Engineer Rupert Coler explained.

The first model put in to production was the Multitec 9000. Sitting on a small track system that is only 142 cm wide, this rig features 10 000 kgf of pullback and can take H wireline cores to over 500 m with plenty of additional pullback to spare if difficult drilling conditions are encountered.

The rig features a modular design that allows the customer complete control over the specification. The customer can, for example, choose between a number of engines, including Caterpillar or Kubota models, a range of mud and coring pumps, a hydraulically deployed mast extension that allows tripping out two lengths of rod at a time (6 m) on the

winch, an onboard rod rack and a rod loader.

"The modular design of the rig means we can make very quick changes based on the customer's preferences," continued Coler. "The result is a rig that meets the needs of the drilling project in every way but at a substantially lower price than would previously have been possible."

Geryndo Utama (GU), a Kalimantan-based drill contractor that has a fleet of around 100 small exploration rigs, were so impressed with their Multitec 9000 that they affectionately named it 'The Robot.'

Using the rig for H wireline coring from the surface down to 120 m, Director Fachrul Rizal has been delighted. "Our efficiency increased so much," he said, "that our drillers joked the rig was doing all the work like a robot, and the name stuck."

Although the rig is being used primarily for coring, the versatile rotary head allows the crew to drill water drainage holes, drill open hole for logging or use RC or RAB techniques with a separate compressor.

Reducing strip ratios

While better value coal exploration is a priority for most coal mines aiming to maintain or increase production, miners themselves are turning to drilling to reduce overheads. One customer has recently purchased Dando's smallest rotary drilling rig, the Terrier, and is using it to help define the position and depth of the coal seam in the pit.

"The customer is drilling closely spaced, shallow holes to around 15 m and retrieving chip and core samples to find and mark the exact boundaries of the seam," explained Dando Key Account Manager, Callum Mee.

The programme is being undertaken to reduce the costs associated with high strip-mining ratios by eliminating unnecessary overburden removal. Ultimately, this will result in increased profits. Due to the Terrier rig's small size, working in the pit among the bigger plant is not a problem. A small aluminium mud-tank or air-compressor for RAB also reduces the need for large amounts of space

and ensures the entire drill pad does not interfere with mining operations.

Mee believes that this solution is going to become increasingly prominent at coal mines around the world and is excited about the prospects of future business for the Terrier. "The initial expense and running costs are extremely low but the rig is perfect at these shallow depths. We are getting lots of interest from contractors working on other coal mines planning similar programmes."

Fitch-Roy also sees a place for the Terrier rig in the early stages of coal exploration: "What many prospectors are starting to realise is that they don't need an operation with large coring rigs requiring high capital outlay and substantial running costs in order to prove the viability of their concession. There are other, low-cost, low-impact solutions for the early stages of exploration."

Low environmental impact is often a prerequisite during these early stages and at only 780 mm wide and mounted on a rubber-tracked crawler, the Terrier rig is able to navigate through even tightly spaced vegetation and exerts low ground pressure, which helps protect

the local flora. Using the rotary mast option, rather than the standard percussive drive sampler mast, the rig is capable of open hole drilling with either air or mud as the flushing medium to depths of over 40 m.

To accommodate the need for angle-drilling in areas with sloping terrain or formations, the Dando designers added a hydraulic mast dump feature. To provide air where open hole drilling is required a 400 cfm/145 psi compressor can be mounted on a separate, remote controlled crawler unit. The Angle Drilling Terrier has already proved cost effective for one prospector and, despite the small size of the rig and difficult topographical and geological conditions, is achieving up to 65 m per 9 hr shift in a jungle environment.

Modular by design

Fuelled by the success of the mid-sized modular rigs, Dando has revealed a new model that they feel will make a big impact.

The Multitec 4000 is a smaller crawler mounted rig that can take H wireline cores to 200 m. Similar to the larger Multitec 9000, it is modular by

design and has a versatile rotary head capable of a wide range of drilling methods, including wireline, RAB, RC and mud rotary. Despite its capabilities, the rig has been launched at a fraction of the price of the bigger models and is aimed at contractors that do not have the operating budgets of the big coal mines.

The rig has engine options from 50 – 100 hp and rotary head options that allow speeds of up to 1000 rpm or torque of up to 6500 Nm. It also has a choice of masts to allow the loading of 2 m or 3 m rods and sits on a steel or rubber-tracked crawler unit that is only 1.4 m wide – ideal for navigating forested or other limited access drill sites.

Dulake is optimistic about Dando's future in coal drilling: "There's a lot of doom and gloom about coal at the moment but the fact is that demand remains high in many of the locations where our customers are situated. Coal companies are having to make smart decisions to minimise costs and stay profitable. That's good news for us because our new developments are designed to solve this exact issue." *WC*