Which drill rig?

Thomas Way from Dando Drilling International talks MM through factors to consider when choosing a drill rig for mineral exploration

Carly Leonida | 10 Apr 2015 | 11:30 | Feature |

The Dando Multitec 4000 drill rig

The geology of the earth is infinitely variable. To investigate and sample the earth therefore presents a contextually diverse set of challenges, and selecting an appropriate drill rig for the job at hand requires a close examination of all the available parameters.

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To say that drilling is an art is perhaps overly romantic. There is no doubt that drilling requires scientific endeavour; the art is perhaps in taking all the available data about a project and synthesising it to proceed in the most advantageous way possible.

When a driller adjusts the rotation speed of the rotary head based on a minute change in the vibration felt through the levers, for example, he is making decisions derived from all the data at hand and evaluating it through the lens of experience.

For a mineral exploration project, the evaluation of the parameters starts from the outset when deciding upon an appropriate rig and requires a systematic approach to gathering all the required data. In order to simplify this task, what follows is a series of guiding questions to help a mineral exploration team identify the influential factors that will lead to their decision.

As a general rule of thumb, when choosing suitable exploration equipment we work backwards from the bit, up the string to the rig, all the while considering a number of important outside factors such as budget and future projects.

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Step 1: What kind of sample is needed?

Many geologists equate samples with coring, but is that really what is required?

A dedicated chuck drive coring rig offers unparalleled core retrieval rates, but often a core is not necessarily the best option. Perhaps a chip sample from an open hole is all that is required to identify that the target mineral exists and to log the bore for a possible revisit at a later date?

An open hole with air for chip samples is far quicker than coring, so impressive penetration rates can be achieved. For example, coal exploration teams in Kalimantan, Indonesia, achieved up to 300m/d using the Dando Mintec 12.8 which has an on-board 25.4m^3/min (900cfm) compressor for air flushing. While there is an additional outlay for the purchase of a compressor, there are substantial savings in time.

Likewise, if a quick, uncontaminated sample is required, a top-drive rotary rig setup for reverse circulation (RC) drilling may be preferable along with a rod rack and loader option to help reduce the time spent loading rods and improve safety.

Step 2: What is the 'drillability' of the formation?

A geologist requesting a core sample is all very well and good, but is it actually possible to retrieve one? Sand and gravel formations, for example, are notoriously difficult to recover good core samples from. And what happens if there are occasional boulders in the mix?

Whether or not the formation is competent enough to stand unsupported is a factor in the choice of equipment. Is the material cohesive enough to remain in the form of the core and allow recovery?

If not, a different solution may be necessary. Perhaps a sonic rig would be a better investment: a rig like the Dando SDC375 which is equipped with a Sonicorp 50k head is designed to retrieve excellent samples to over 100m in some of the least drillable geologies and offer extremely fast rates of drilling to boot.

Step 3: What size rig do you need?

This is perhaps an easier question to answer. The key parameters are the depth and the diameter of the bore or core size required.

Rigs are often rated by their pullback capacity and this is directly related to the relative weight of tools down the hole. The Dando Mintec 12.8, for example, has a pullback capacity of 12.8t, which equates to about 1,103m of drilling with H size wireline rod weighing 11.6kg/m. However, other factors such as in-hole problems can affect the maximum depth achievable, so it is advisable to work with a contingency to allow for this. For example, using 80% of pullback capacity to calculate drilling depth is often considered acceptable.

The Dando SDC375 equipped with a Sonicorp 50k head is designed to retrieve excellent samples to over 100m

The diameter of the core also plays a part, especially in terms of the rotational head speed/torque required, as does the method being used. N sized coring requires high revolutions per minute and less torque, however an RC setup may require only 50rpm but with a much higher torque rating.

Step 4: What will the budget allow?

Budget is an important consideration at every stage of the decision process, but particularly when considering the size of the rig. A bigger, fully-featured rig will generally produce higher meterage rates over the same depth. For many, the low-price of a small crawler-mounted rig is attractive as it can be used for coring, open-hole mud rotary or rotary air blast (RAB) drilling and RC drilling to depths of 200m.

However, for those with a bigger budget, a more powerful engine along with hydraulics, a rotary head and a longer mast stroke are appealing.

A dedicated exploration rig like the Mintec 12.8, which is able to load and trip 6m rods and develops 400kW with hydraulics and rotary head to suit, could tear through a 200m bore in a single 10 hour shift. Drilling with air in coal measures for example, it is almost as quick to drill 3m as it is to make and break a joint, so the time saving of the additional mast length is considerable.

At the other end of the spectrum, a mineral prospector who simply wants to find out whether their concession is a viable site for further investment maybe looking for a low-cost, low-impact solution. A tiny track mounted rotary rig like the Dando Terrier which is capable of RAB drilling to 50m with a small crawler-mounted compressor is ideal for this kind of work.

Step 5: What ancillaries are needed?

Drill rig ancillaries need to be considered early in the process as they can impact heavily on the final choice of rig. If air drilling is required for example, is it better to get a larger rig with an on-board compressor, or to look for a smaller rig and use a separate compressor?

A rig with an on-board compressor would be much larger than one without and would add to the initial purchase costs. However, with this on-board fewer support vehicles will be needed to move them around later which obviously saves money in the long run.

Other options include coring pumps and larger mud pumps, rod racks and rod loaders, cyclone units for RC drilling, as well as fuel and water logistics. If water is not freely available a tanker may be required. If a compressor is being used, fuel consumption will be higher and additional storage may be required.

Step 6: What carrier type?

Some rig manufacturers will offer a range of carriers including crawler, tractor, truck, trailer or skid-mounted options. For many mining locations, rough terrain will necessitate a crawler-mounted rig. However, in generally dry, flat areas such as those found in the Australian outback, a truck-mounted rig may make more sense.

A degree of foresight needs to be employed here. Perhaps a truck-mounted unit is suitable for the first project, however, if future exploration is likely to be in forested areas a track-mounted rig is more likely to ensure continued use.

Step 7: Who offers the best support?

Approach firms that have a track record of listening to customer's requirements. Every exploration project is different and a highly effective rig will reflect this.

If you are able to select components that you know are well supported in your region then you are less likely to face downtime while waiting for components. Dando, for example, facilitates this with rigs that are highly modular. This provides the customer with control over the specification of the rig, including engine manufacturers and rotary head types right from the outset.

And finally...

Now you have identified the key parameters for your exploration needs, you should be better equipped to make an informed purchase.

Thomas Way is PR Specialist at Dando Drilling International. See: www.dando.co.uk (http://www.dando.co.uk)

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