

Graeme Lightfoot
Kenneth Macleay
David Stevens
Brenton Wallace
Peter Wright

held their first meeting on Wednesday July 19 (with David Stevens unable to attend) and we are indebted to Peter Wright for the minutes of that meeting, from which we quote –

Peter Wright advised that first and foremost we need to establish a suitable date in 2007 on which we are to hold the symposium. It was suggested by all in attendance that later in the year is preferable over having it earlier.

It was suggested by all in attendance that the venue should be here in Perth rather than down south or elsewhere in the nation.

A two day symposium verses three days thus leaving out the fun day has been seen as the most favourable for all considering feedback. October 4th and 5th 2007 has been suggested as the date at this stage.

Ken Macleay has volunteered to investigate 2007 mining and exploration calendar to see if this clashes with other symposiums, expo's or other forums at the same time and report back at the next meeting.

Graeme Lightfoot has volunteered to investigate availability of suitable venues. It has been suggested that we use Burswood or Perth Convention centre. Graeme is to investigate this and others in the metropolitan area and report back at the next meeting.

All of the committee and board members are to give consideration towards a theme between now and August 16 when next committee is to be held.

Papers – It was felt by all of the committee members that topics should be more related around drilling topics rather than safety related topics. It was agreed that whilst this is what the committee and general attendees wish to see, it is acknowledged that some safety related topics still need to be

Suggestions for general comment and feedback are but not limited to:

- Orientation – New tools / methods
- Steering systems – what's the latest and greatest.
- New safety and environmental initiatives.
- New products / technology (mud's, hammers, bits, tooling, sonic drilling etc)
- Deep hole diamond drilling equipment – what's new in the consumables field to support these operations

- Major projects – BHP Billiton (Iron Ore / ODX / Nickel West) Rio Tinto (Iron Ore, Coal), project drilling giving some insight into their large scale operations in terms of what participation the drilling industry has done to date in both activities and costs and where they see themselves in the future.
- Human Resources – Recruitment, training, retainment, succession planning.
- Traineeships in the drilling industry – RIISC??
- Drilling competencies – ADITC, RIISC??
- Hands free drilling – joint paper between Sandvik UDR & Mosslake Drilling.

How long is required to present their paper? Is 45 minutes adequate?

Action – Open for further discussion based on feedback. Peter Wright is to send out email to all members highlighting discussions to date and asking for more suggestions but more so volunteers.

It was suggested to second Merilee Gregg into the committee to help give a feminine perspective in the arrangements of the partner's tours and where ever else the female touch was necessary.

Contact was made with Gary Weston to obtain blessing in approaching Merilee in this role. The blessing was received and Merilee was subsequently asked and agreed to come on board as a member of the symposium committee.

FROM INDUSTRY

Ron Sayers, Managing Director of Ausdrill Group advises that Steve Budiselic has been appointed General Manager of Supply Direct, the Supply and Logistics subsidiary of Ausdrill Limited. Steve commenced in his new position on July 17, 2006.

-----+++++++-----

Noted in the West Australian, Saturday July 22 -

Ausdrill Limited are looking for an Exploration Drilling Area Supervisor for the Agnew / Mt Keith region.

Major Drilling are seeking drillers in a number of categories including for –

- Dual purpose top head drive rigs
- In seam methane
- Directional drillers
- Chuck drive rigs
- Multi purpose drillers
- U/G diamond drillers

Swick Mining Services are looking for u/g diamond drillers experienced on Longyear LM series drills

Sanderson Drilling is seeking experienced Diamond Drillers for Boddington.

-----+++++++-----

There is much interest in the concept of computer assisted drilling, and there are a number of developments in the pipeline, so it was felt that a reprint of the paper by Anders Gustaffson, of Atlas Copco, presented at the 2006 MDAA symposium would be timely.

Computer Controlled / Assisted Drilling

1. INTRODUCTION

There are trends in the diamond drilling industry for deeper holes and larger diameters, which means more powerful machines and, at the same time, increasing demands for safer and more ergonomically and environmental friendly equipment.

All these factors combine with the demand for lower operating costs and increased productivity.

Computer controlled core drilling or, more precisely, **computer assisted core drilling**, is one way to reach more production at lower total costs.

Computer assisted drilling was first introduced for percussive drilling and, today, absolutely the majority of drill jumbos sold have a computer system. One large difference between percussive drilling and core drilling, is that the actual drilling time per hole in percussive drilling is quite short and the positioning operation much longer, i.e. the computer is mostly used for the positioning and drilling pattern. With core drilling, it is the opposite, and the drilling and rod handling operations are computerized and the positioning is, for the time being, carried out with manual hydraulics.

Computer core drilling rigs were first introduced about 15 years ago, and we are now using the third generation of these systems. The computer systems for percussive and core drilling are becoming more and more the similar, using the same basic components.

2 WHY COMPUTER ASSISTED CORE DRILLING?

The drilling time for one rod/core barrel is quite long. A penetration rate of 15 - 20 cm per minute, meaning a 3 m rod will take 15 – 20 min to drill, is quite common.

This is an opportunity for automatic drilling – unmanned drilling. The operator starts the drilling, pushes the "Auto" button and lets the computer continue the drilling at a constant penetration rate. As soon as the core barrel is completed it automatically stops. This gives the operator an opportunity to carry out some other duties, taking care of the cores, preparing bits, have a coffee break and so on...

As the right combination of drilling parameters is of utmost importance for good economical drilling results, the

operator has to get information on the actual values:

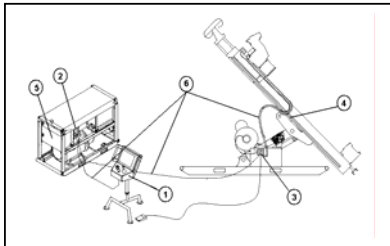
- Penetration rate
- RPM
- WOB
- Flush water pressure
- Flush water flow

The computer will continuously monitor and show these figures and, during the unmanned drilling, ensure that these parameters are within set limits. Drilling with a constant penetration rate is proven to substantially increase the bit life and fast and safe monitoring of the parameters minimizes the risk of burnt bits, core blockages etc.

No computer will be as good as a good driller, but everybody is not the best and it is harder and harder to find experienced operators. Computer core drilling rigs make drilling less difficult and at the same time easier to train less experienced operators.

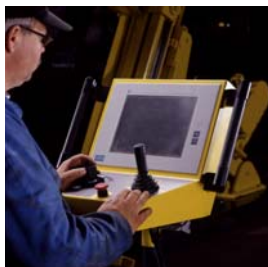
Tripping the rods is a non-profitable operation. It has to be done as fast and safely as possible. The computer can make it more simple with an automatic function breaking or making the joints and feeding the rods to a position for the operator to just pick them. All controlled by the operator by just pushing a foot pedal once per rod. This is an opportunity to operate with one driller and no helper.

3. HOW IT WORKS

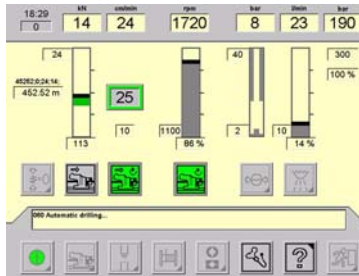


All drilling operations are done from the APC control panel (1), APC stands for Automatic Performance Control. This control panel has a sealed computer with touch screen. The electronics are very rugged and cope extremely well with harsh conditions. Changes of drilling modes and parameters are done with the touch screen and the adjustment knob. A joystick is used for manual rod handling and controlling the wire line hoist.

The foot pedal will start and stop automatic rod handling.



From the touch screen the operator gets information on what is happening with the rig, actual values of the drilling parameters and their settings. For the safety there an E-stop button.



The I/O module (2) mounted on the power unit is connected to the control panel through a communication cable (6).

This I/O controls:

- Incoming cooling water valve
- Flashing light when rig is in operation
- On/off signals to the starter box for the electric motor

It also sends information from sensors back to the control panel:

- Hydraulic oil level
- Hydraulic oil temperature
- Filter condition
- Open/closed E-stop circuit
- System pressure from the main hydraulic pump
- Motor overload warning signal
- Motor overload signal
- Status of the module and recognized short cuts or broken cables on the connected equipment

There is another I/O module (3) on the rig which is connected to the I/O module on the power unit through a second communication cable.

This I/O module controls:

- Hydraulic valves (PWM "Pulse Width Modulated" or on/off 24VDC signals)
- Flushing water needed during drilling operations

It also sends the following sensor information back to the control panel:

- Different hydraulic pressures
- Water pressure
- Water flow
- Rotation rpm
- Wire line hoist rpm
- Foot pedal operation
- Rod end detection
- Status of the module and recognized short cuts or broken cables on the connected equipment

The position sensor LDT (Linear Displacement Transducer) (4) is mounted along the feed frame. It is connected to the I/O module on the rig.

It sends information back to computer about:

- Position of the rotation unit
- Status of the sensor unit

The starter box's (6) main function is to power the electric motor and to convert the incoming voltage 230-1000V to 24VDC for the control system.

4. PROS AND CONS

There are large advantages

- **Increased reliability and less spare parts consumption**
The "smoother" drilling has proven that the spare parts consumption for both rotation units and feed frames has decreased.

- **Improved bit life**
Both tests and practical experiences have shown that the drilling with constant penetration rate and the right combination of WOB, RPM and flushing has increased the bit life on average 30 – 50 %.

- **One man operation and simplified rod handling**
Computer drilling makes single man operation possible. New drill rigs have also been designed in a way that positioning can be carried out alone. They are one-man operation rigs. There are local rules which in some areas restrict this advantage.

- **Better control of drilling**
There are very few manually controlled rigs which give the operators the needed information for optimal drilling. You have to be very experienced to hear the right RPM and "feel" the actual WOB.

- **Unattended drilling between shifts and during meal breaks.**
There is an opportunity to drill an extra core barrel between shifts and during breaks. You start the rig up and it will stop after the core barrels are completed. As the operator doesn't need to have his hands on the control panel all the time he can carry out other duties. The computer watches that the drilling is done in an effective way.

- **Use of less experienced/skilled drillers.** The computer helps the driller and limits the number of mistakes. At the same time, it shortens the training period.

But, of course, there are also some negative sides, as it is a "new" technology.

There is a need for a modified service organisation compared to the old core drilling rig.

There is a demand for knowledge about electrical equipment, but that is the same for all modern equipment. But, by integrating the troubleshooting into the computer system, there is a powerful self diagnostics system which simplifies the job

for the service personnel. Also, the similarities between the systems in our drill jumbos and the core rigs mean that the same personnel can easily carry out service and repair on all type of rigs.

Another negative factor is that the initial cost of a computer core drilling rig will, of course, be somewhat higher, but it is a cost that is paid-back by lower bit and spare parts costs.

5. WHERE IS IT USED?

We sold the first computer rigs to INCO in Sudbury Canada about 15 years ago and in Scandinavia, all underground and surface core drilling rigs bought in latest 8 years have been computer rigs.

Both mines and contractors found it profitable early as it increased production while cutting the total operational costs.

Australia, Mexico, Spain and France are among other markets which have adopted this technique but there are still many markets which prefer the manual control.

In percussive drilling, the transfer to computer drilling has gone faster, but core drilling is coming strongly.



6. FUTURE DEVELOPMENT

Computerized core drilling is here to stay and it will accommodate future improvements.

Collection of drilling data, logging of drilling parameters, has already been in operation for years and some customers have started to use on-line systems for following up the drilling.

Geologists are investigating how the drilling parameters can be used as a complement or perhaps sometimes as a supplement to the core. But also, the use of the computer to collect and store other data, as for example, deviation is expected.

Remote troubleshooting is the next step if the rig is connected to an internet system.

An effective automatic rod handling system will be needed in the not too distant future for core drilling, and the

computer system is most important to ensure to simple, fast and safe drilling.

Another area is optimization of the actual drilling operation, by automatically finding the best combination of drilling parameters for the rock being drilled..

HERE AND THERE

With thanks to Ken Macleay



How would you collect this fine ?

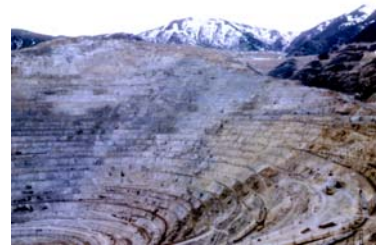


Yeah !!

TRAVELOGUE



Cone Winder on a deep incline shaft near Marquette, Michigan, 1968



Bingham Canyon, Utah, 1968



Camp near Thunder Bay, Canada, 1968



6 ft diameter core drilled with Calyx drill at Angels Camp, California



Drill site access near Ouray, Colorado



"Amphitheatre" Ouray, Colorado, 1984