DD422iE – Automatic Drilling Jumbo
WITH ELECTRIC DRIVELINE SYSTEM FOR UNDERGROUND TUNNELING AND MINE DEVELOPMENT

Johannes Välivaara
Product Manager, UG Drills
Sandvik Mining and Rock Technology
Stakeholders

Jaakko Kilponen
Manager of Mining
Boliden Kylylahti Oy
DD422iE – AUTOMATIC DRILLING JUMBO

SUMMARY

• World’s first highly automated UG mining / tunneling jumbo with electric driveline system
• Better Health & Safety
• Increased Drilling productivity
• Reduced Operating costs
• Energy efficiency
• Automation & Digitalization
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ELECTRIC DRIVELINE SYSTEM

- Onboard battery pack to store energy for tramming
- Electric motor mechanically connected onto axles via dropbox (high torque, high efficiency)
- Tramming speed control via inverter (high precision)
- During drilling the electric motor is connected onto hydraulic pumps via same drop box
- Multivoltage compliance (380-1000V, 50/60Hz)
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BATTERY PACKAGE

• Sodium Nickel Chloride (SoNick) technology – regarded as safe battery chemistry for underground operations
• One battery block contains 252 cells connected together and contained in a vacuum sucked steel box. Weights 210kg.
• Total Energy: 3 x (24.7kWh, 38Ah)
• Operating temperature over 250degC
  – Requires preheating (up to 24hrs)
  – Thermal loss <130W
  – Keeps operation temp. with own energy 7 days
• Air cooled with fan (150degC air out)
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BENEFITS

Better Health & Safety

- Zero Emissions (DPM / NOx / CO2)
- Reduced heat generation
- Less noise
- Reduced risk of fire (no fuels exposed with hot surfaces)
- Utilisation of DD422i / DT922i cabin ergonomics:
  - Increased visibility
  - Reduced noise and dust
  - Maximised operator ergonomics
**DD422iE – AUTOMATIC DRILLING JUMBO BENEFITS**

**Increased Drilling productivity**

- Active power compensation system to draw reserve power from batteries during peak loads
- Battery charging done while power intake is low (eg. boom movements) during the drilling cycles
- Possibility to prelimit power intake from mine electrics
- Sandvik patented technology!

→ Stabilised power load for mine electrics
→ Up to 20% increase in drilling power
→ No waiting times to charge up the batteries
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BENEFITS

Reduced Operating costs & Energy efficiency

Direct savings:
- Reduction in operating costs (electric driveline vs. diesel)
- Regenerative braking system
- Concept easily adaptable to various UG Construction / Mine operations

Indirect saving potential:
- Reduced costs of diesel fuel logistics
- Reduced costs in ventilation (Greenfield projects)
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BENEFITS

Automation & Digitalization

Wide range of automatic drilling functions

STANDARD
• Torque optimised drilling control system
• Electric joystick controls & GUI
• Advance carrier functions
• No instrumentation

SILVER
• Basic angle & drilling depth measurement
  → Reference hole & penetration rate information
  → Counters for drilling consumables

GOLD
• Instrumented drilling booms
  → Design & analyses tools for drill patterns
  → Drill bit location & angle indication vs given plans

PLATINUM
• Upgraded boom kinematic model
  → Automatic boom control
  → Semiautomatic boom control
  → Hole end-correction
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CASE STUDIES

BASIC DETAILS:

• Located in eastern part of Finland, near the city of Outokumpu
• Production rate in 2016 was 9,000 tonnes of copper, 9,000 ounces of gold and 1,600 tonnes of zinc
• Long hole open stoping with voids filled by a mixture of waste rock and cemented waste rock
• The lowest level in decline appr. 800m

VIDEO: Link OR https://www.youtube.com/watch?v=l_WB5kqHgXQ
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THANK YOU!