

History

- Crinum has been operating for nearly nine years now with three Joy continuous miners and in that time there have been many upgrades to the miners. I.e Supply Cassette system, Onboard ventilation, Rib Protection Platforms and the transformation of the machines from 12scm30 to 12cm32.
- With the Crinum roadway width of 4.8m we had to consider the overall length of the machine when making the machine change. The gathering and cutterhead were moved back approximately 400mm to keep the length to a minimum so break offs could be done with ease.

History

- With the front end of the machine moved back the roof bolter platform has been reduced in size.
- With the four ARO series 4000 bolters and Apitech controls the distance from the drill head to the operator is approximately 500mm and with that distance Crinum was experiencing a number of injuries whilst operating bolters.

History


- Reducing the number of strain injuries related to roof bolter.
- Team assembled in March 2000 to look at improving the efficiency of the bolting cycle.
- Ergonomics and work platform space were key areas to consider in the development of the new bolter controls.
- Specialist Engineering companies and the Crinum team developed and implemented an 'Industry first' concept of installing electro-hydraulic controls on the continuous miner.

History

- The equipment incorporates a semi automatic drilling and bolting process to improve the quality and consistency of the bolt installation cycle.
- Another aim of the system is to measure 'The Specific energy of drilling' providing data for site geotechnical engineers with information about immediate roof conditions.
- Installation was completed on the first machine in Oct 2002 and has been in operation since January 2003.

Old Controls

- Crinum roadway width is 4.8m this does not allow for large work platform area on the machine.
- Looking down on the old roof bolter controls and work platform area
- Minimum distance between the inside control valve and the body guard on the machine.



Old Platform

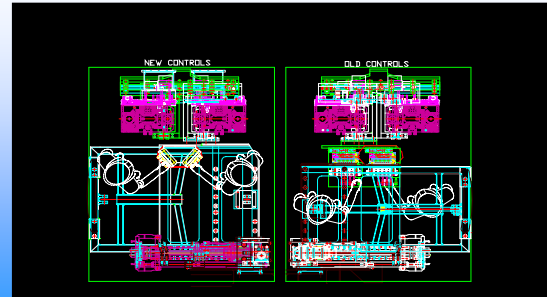


- Side view of the platform showing the limited space for two operators to work in.



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Platform Comparisons



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Operator on old Controls



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Operator on new Controls



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New Controls



- New Controls are 'V' shaped to allow better access to the bolter for the operator.
- The handle controls are for positioning the bolter only.
- Push button controls for the drilling and installation cycles.
- Minimum oil flow at the operator platform due to high flow oil valves being mounted on the bolter.



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New Controls



- Push button controls are mounted above the handle controls allowing more room on the platform.



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Push Button Control



- A Four line Lithium Crystal Display is mounted above the membrane buttons for programming functions, trouble shooting and to show which functions are being operated whilst in auto mode.
- Blue and green buttons are the auto functions and have to be pressed for 1 second before the operation starts. This was recognised by the team as a safety issue if inadvertently pressed.



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13

New Controls



- The same software is utilised for the roof and rib bolters with adjustable parameters that the operators can adjust within limits.
- The parameter changes are for variations in chemical set and mix times, also for when a cuttable dowel is used instead of a steel bolt in the rib.
- There are 2 levels of security for any adjustments, the operator level and the supervisor level. The operator level is restricted to plus or minus 5 seconds of the setting the supervisor has set.
- The supervisor level has limits set-up in the software to restrict the amount of adjustment on all functions. There are only a small number of people onsite that have access to this option. All hydraulic pressures and times can be adjusted in this set-up.

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14

Advantages



- **Programmable Drilling Parameters-** All functions can be adjusted to suit the roof / rib conditions. All bolters are individually adjusted to customise for the operator needs.
- **Consistent Roof Bolt Installation-** Repeats the bolt cycle installation identically every time with predetermined values.
- **Reduces Operator Fatigue-** Push buttons used instead of handles in drill and bolt function.
- **Fast Learning Curve for new Operators-** Less time for an inexperienced operator to become productive with less risk of injury or incorrect installation of bolt.
- **Designed for high Availability -** Bolter control components can be changed individually. ie all parts are modular.

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15

Advantages



- **Capable of Mapping the Mine Roof -** Records drilling parameters which are correlated to types of rock and anomalies. This information is available on the geotechnical engineers computer on the surface.
- **Ergonomically Appealing Operators Platform**
 - The platform allows for easy access to the drill heads and controls.
- **Built in Diagnostics -** The system includes diagnostics which enable an operator or tradesman to quickly find the source of the problem.
- **Safety Interlocks -** The rotation feedback governs the speed of the feed and automatically slows down if the drill steel is blocking. If the drill steel blocks the rotation and feed will automatically stop. No water flow through the steel will also stop the drilling cycle.

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16

Advantages



- **History of Roof Bolts -** System will have provision to look at previously installed roof bolts to assist the operator to determine secondary support requirements.
- **Reduced Number of Handles -** Remaining handles are well protected from inadvertent operation and entanglement.

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17

Roof Mapping



- Roof mapping is a measure of specific energy of drilling, and to gather this information the new controls on the outside rigs have been set-up with a pressure transducer and flow meter on both the rotation and feed circuits.
- The information gathered is fed up through the continuous miner power cable to a modem in the section transformer. Then transferred to the surface via Ethernet to a server where the information can be displayed on computers in the office, on the internet or on the machine itself.

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18

Roof Mapping

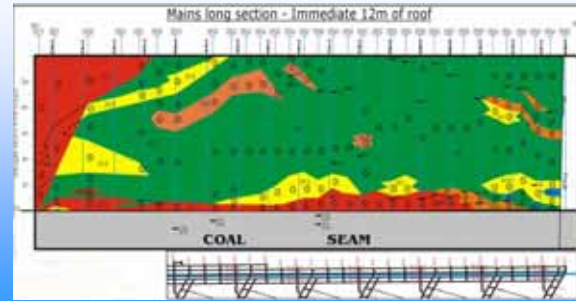


- Crinum have a roof hazard map for all areas of the mine that shows the various roof strengths. The software has been designed to incorporate the hazard map and update the data onto the map on a shiftly basis.
- The data obtained through this will provide site geotechnical engineers with information about the immediate roof conditions and eventually enable calculation of empirical roof strength contours, optimisation of primary and secondary support in roadways and improve our understanding for future longwall mining risk.

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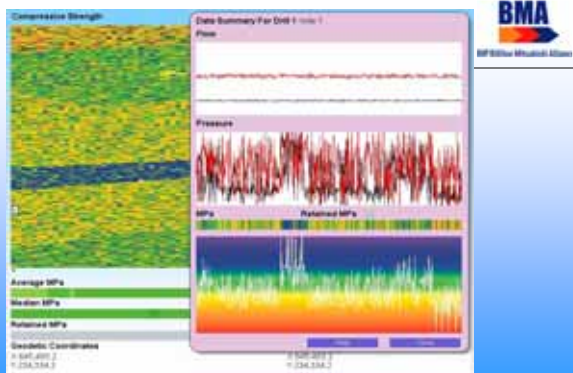
19

Roof Mapping

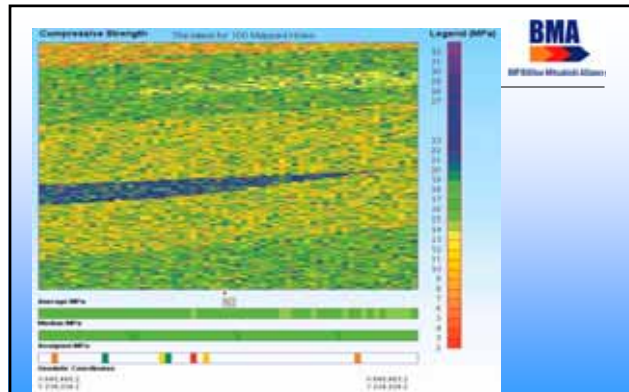


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20



21



22

Summary



- There have been no bolter related injuries since the machine has been operating.
- The team has achieved an ergonomically designed work platform well accepted by the operators.
- The electronic controls are working to expectation.
- Industry first in gathering data for roof mapping.

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23



QUEENSLAND MINING INDUSTRY
Health & Safety
CONFERENCE 2003

Accepting the Challenge

3.00-3.30pm

Afternoon tea