Applications of Closed Loop “Feedback” Controls in Rock Drilling and Bolting

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Remote Controlled Roof Bolting Equipment

ARR-D 1988

Remote HDDR 1990
Automated Roof Bolting Equipment

Auto-Bolt Module

Quad Auto-Bolter
Semi-Automated with Feedback

Roof Ranger 2000

HDDR boom retrofit
Features of the Feedback Control System

Electric Controls:

* Simplify Controls and Hydraulics
* Reduce Operator Fatigue
* Enhance Safe Operation
Features of the Feedback Control System

Optimized Drilling:

* Provides Drill Energy Management
* Reduces Need for Experienced Operators
* Decreases Noise and Respirable Dust Generation

Feed Horsepower and Bite Control (patent pending)
* Dravo Lime:
  25-28 ksi comp
  1.03” dia. X 6’
  50 seconds

* Commercial Stone:
  30-35 ksi comp
  1.03” dia. X 8’
  55 to 58 seconds
Decreased Respirable Dust

Test 1 – Manual Control

Test 2 – Feedback Control

* Cutting Size Control
* Collection Feedback (patented)
Features of the Feedback Control System

Programmable Drilling Parameters

* Maximum Feed Force
* Hole Collaring Limits
* Hole Depth
* Free Running Limits, Both Directions
* Safety Interlocks
Fletcher Quad-Ranger
Features of the Feedback Control System

Collection of Drill Data
Provides Immediate Void Detection and Information to Generate...

Drill Data

Roof Support Design Methodology

Mine Map of Roof Lithology
“Our goal is to manufacture equipment for underground mining that increases safety and production through engineering innovation, quality control, experienced service and ownership stability”

- J. Robert Fletcher
Chairman

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