The Development of a Multi-Split-Tube Sample Configuration

Greig Knox
Adrian Berghorst
Presentation Path

- Current Testing Configurations
- Multi-Split-Tube Theory
- Testing Methodology
- Results
- Discussion
Laboratory Based Testing
Perfect installation
Competent Rock
Current Testing Configurations

Continuous-Tube Configuration

Split-Tube Configuration
Current Testing Methodology:

Continuous-Tube

Loading applied **directly** to the sample
Current Testing Methodology:
Continuous-Tube
Loading applied **directly** to the sample
Current Testing Configurations

Continuous-Tube Configuration

Split-Tube Configuration
Current Testing Methodology:

**Split-Tube**

Loading applied *indirectly* to the sample

**Split Tube Test**
Current Testing Methodology:

Split-Tube

Loading applied **indirectly** to the sample
Mutli-Split Tube Configuration Theory

Highly Fractured Ground
Multiple dislocation
Multiple Loaded Lengths
Total Capacity
Multi-Split Tube Configuration Theory

Diagram showing anchor point and applied impulse of energy with multiple deformation points.
Multi-Split Tube Configuration Theory
Test Methodology

PAR1 Resin
- Ø 25 mm
- 2.4 m
- 2 Sets of 5 Paddles

Diagram:
- DIN 405 RD 27 LH Thread
- 1st Paddle Set (Paddles 1:5)
- 2nd Paddles Set (Paddles 6:10)
- 45° Mixer
Methodology

Split-Tube Configuration

- Plate Load Cell
- Impact Plate Welded to Sample Tube
- Impact Load Cell
- Grouted Sample
- Receiver Tube
- Coupler
- Flag Extension
- Split in Sample Tube
Methodology

Split-Tube Configuration
Split-Tube Configuration
Methodology

**Multi-Split-Tube Configuration**

- Impact Plate
- Impact Load Cell
- Grouted Sample
- Receiver Tube Coupler
- Split In Sample Tube
- Flag Extension
- 150 Square 8 mm Face Plate
Methodology

Multi-Split-Tube Configuration
Dynamic Impact Tester

- 65 kJ
- 6.4 m/s
Dynamic Impact Tester

- 3171 kg
- 2.1 m
Split-Tube Configuration
Results

Split-Tube Configuration

![Graph showing load vs. displacement for different split-tube configurations. The graph compares ST1, ST2, ST3, and the average performance. The load is measured in kN, and the displacement is measured in mm. The graph shows variations in load across the displacement range, with the average line indicating a trend.](image)
## Results

### Split-Tube Configuration

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Results

Multi-Split-Tube Configuration

![Graph showing Load vs. Displacement for MS1, MS2, MS3, and Average.](chart)

Load (kN)

Displacement (mm)
## Results

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Results

**Multi-Split-Tube vs Split-Tube**
## Results

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• The washer

• The end anchor

• Dynamic and Quasi-static testing
Discussion

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Innovative Performance
Discussion

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Thank you Questions?

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