



Conference Presentation

Top coal caving

Tuesday 23rd October 2012: 11.45am

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Presentation Summary

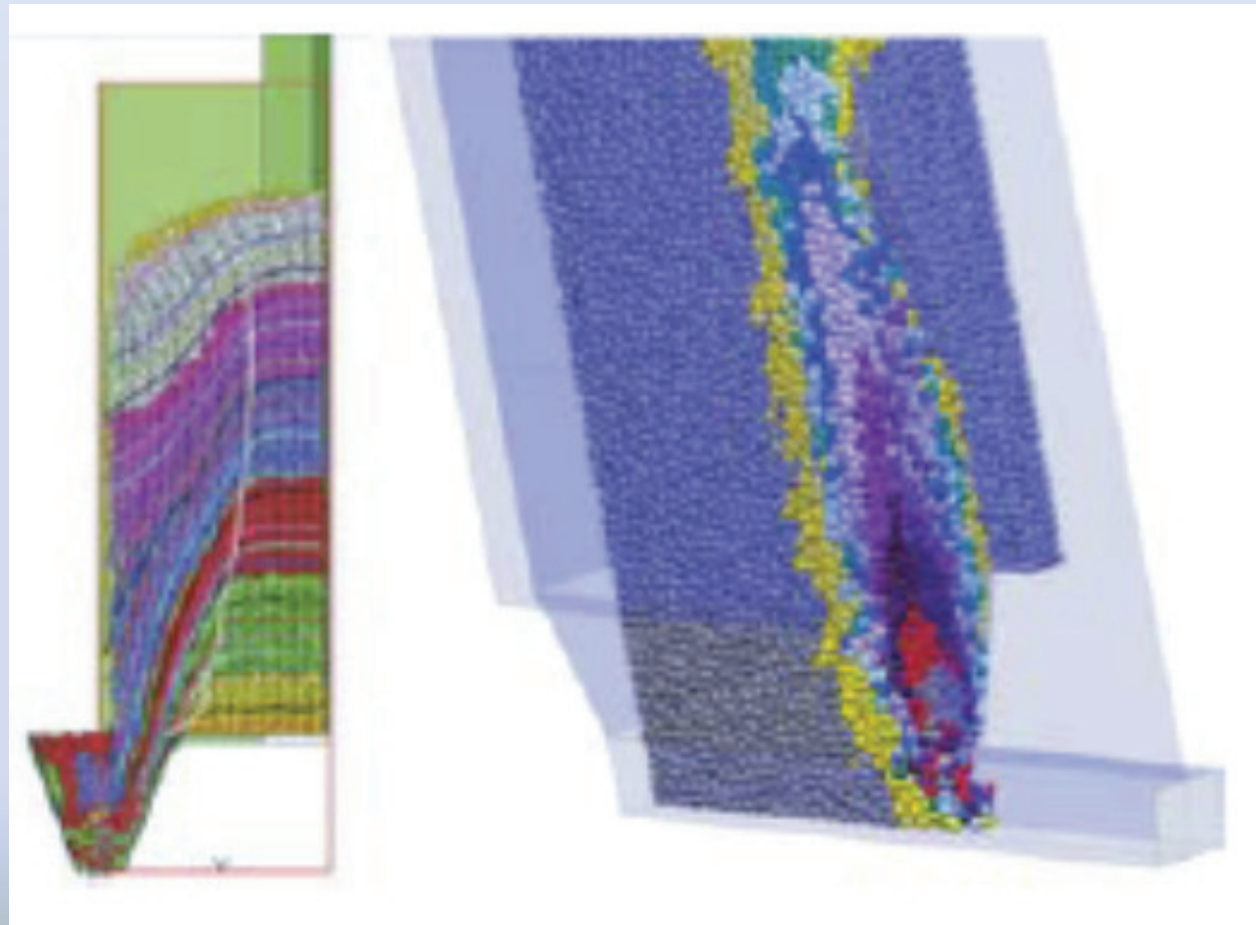
- Methodology
- Myth
- Theory
- Mining planning
- Ventilation
- Development panels
- Roadways
- The equipment
- The skills
- Training
- “How does it all work?”



Background

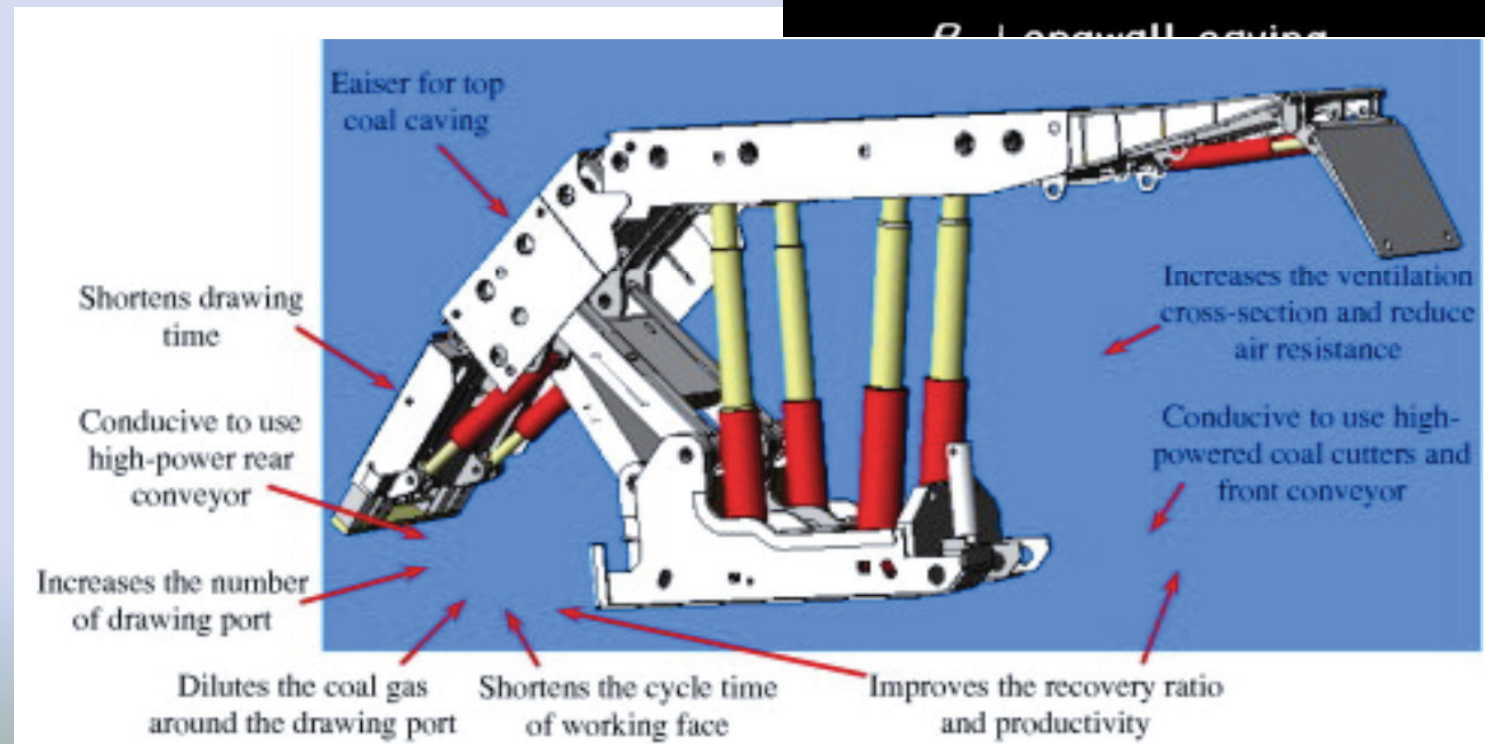
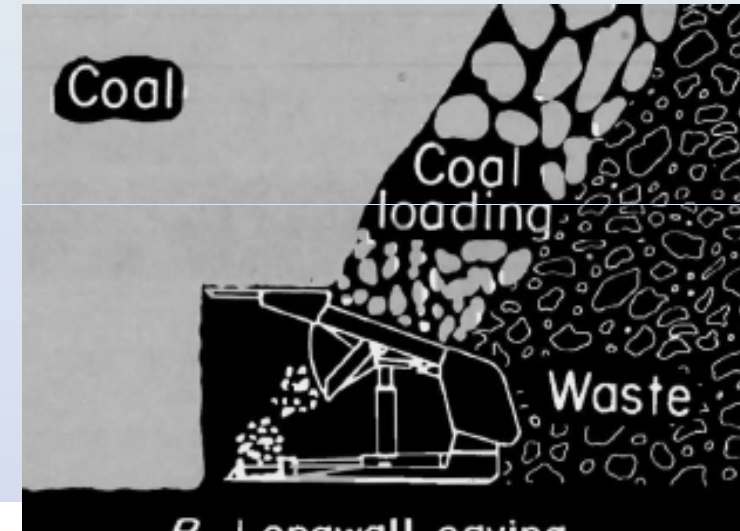
Thick seam mining

- More than 4.8m
- Strata control
- Premature pillar failure
- Spontaneous combustion
- Heavier supports required
- Subsidence
- Higher capital
- Easier to plan
- More dilution
- Higher extraction ratio
- Higher gas make



Methodology

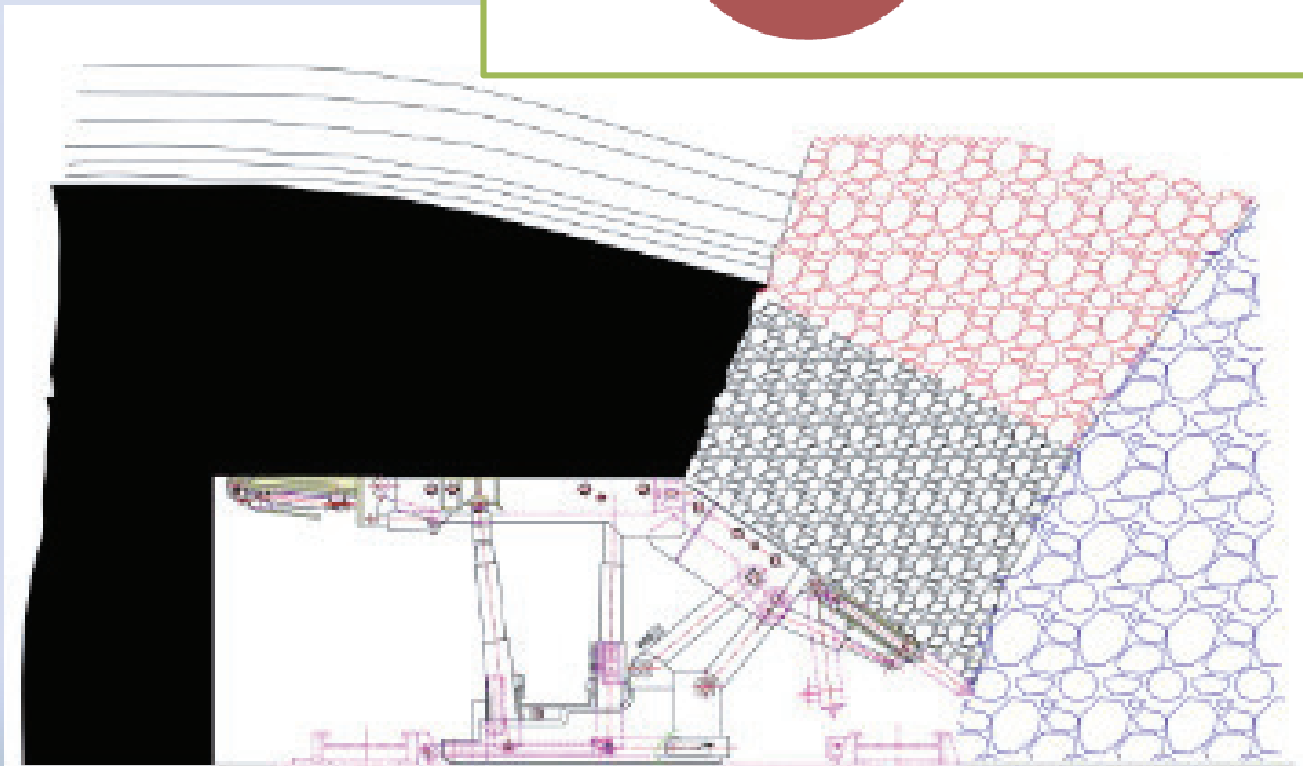
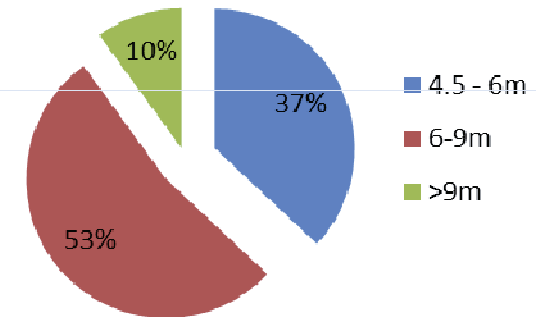
- Same suite of machinery
- Extracts higher than normal LW
- Upper part of the seam is caved



Methodology

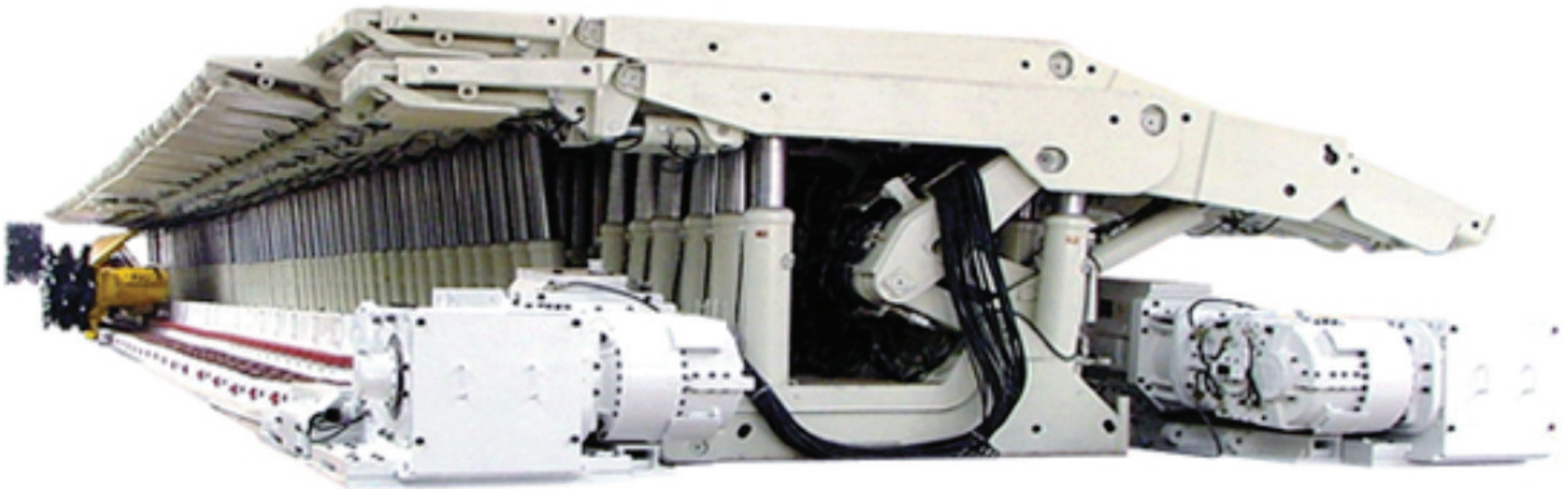
- 85-90% recovery
- 6.4Bt estimated Australian reserves suitable for LTCC (UNSW/CSIRO)
- Stimulation
- Caving by gravity
- LW at foot of seam
- Two AFCs
- Suits high fluidity coal with good fragmentation

Australian Seam Thickness Measured Resource



Myth

- Use conventional longwall equipment
- Full extraction
- Low dilution



Theory

Benefits

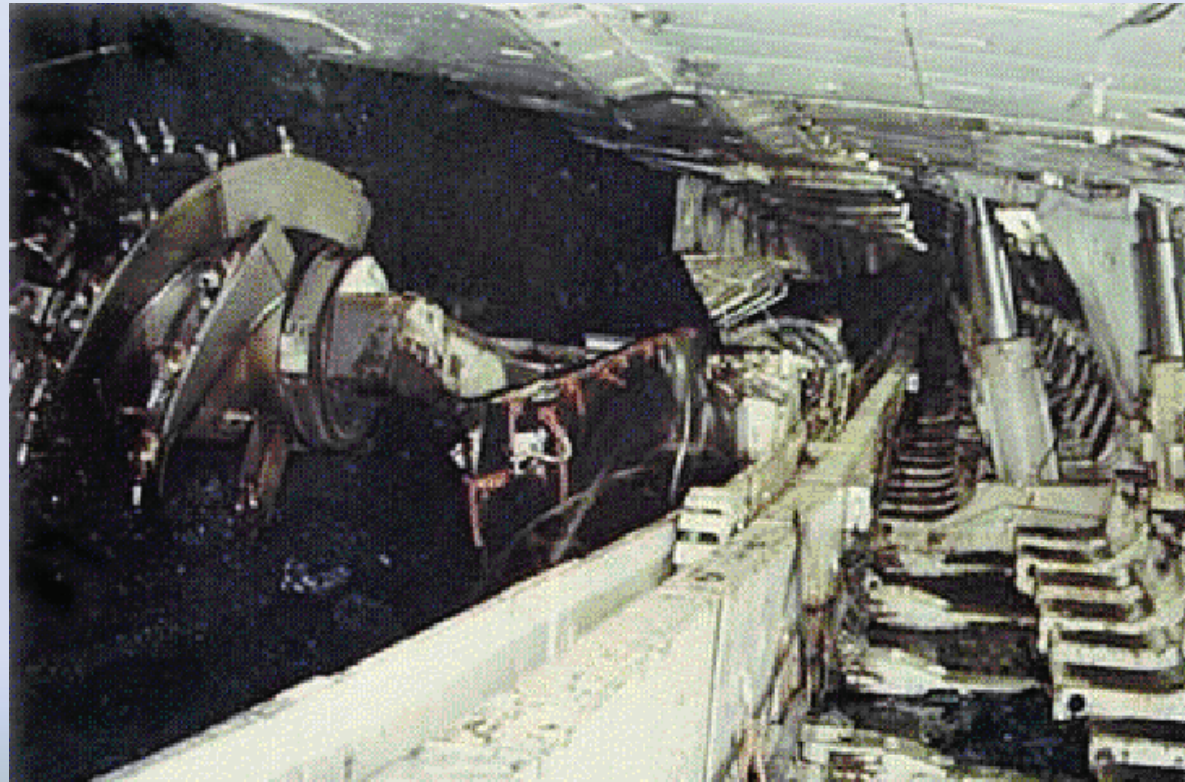
- Recovery
- Lower face extraction height
- Increased face stability
- Easier development
- Reduced risk of goaf spon com
- Higher resource recovery compared to cost of development
- Less wall moves



Theory

Risks

- Spontaneous Combustion
- Dilution
- Conditioning – hydro fracturing or blasting
- Gas make
- Fire risk
- Subsidence
- Dust
- Convergence of gate roads
- Parts availability



Theory

- Geotechnical risk
 - Waste angle of repose
 - Top coal max radius
 - Top coal caving angles
 - Yield angles
 - Wall friction energy
 - Wall stress

- Equipment selection

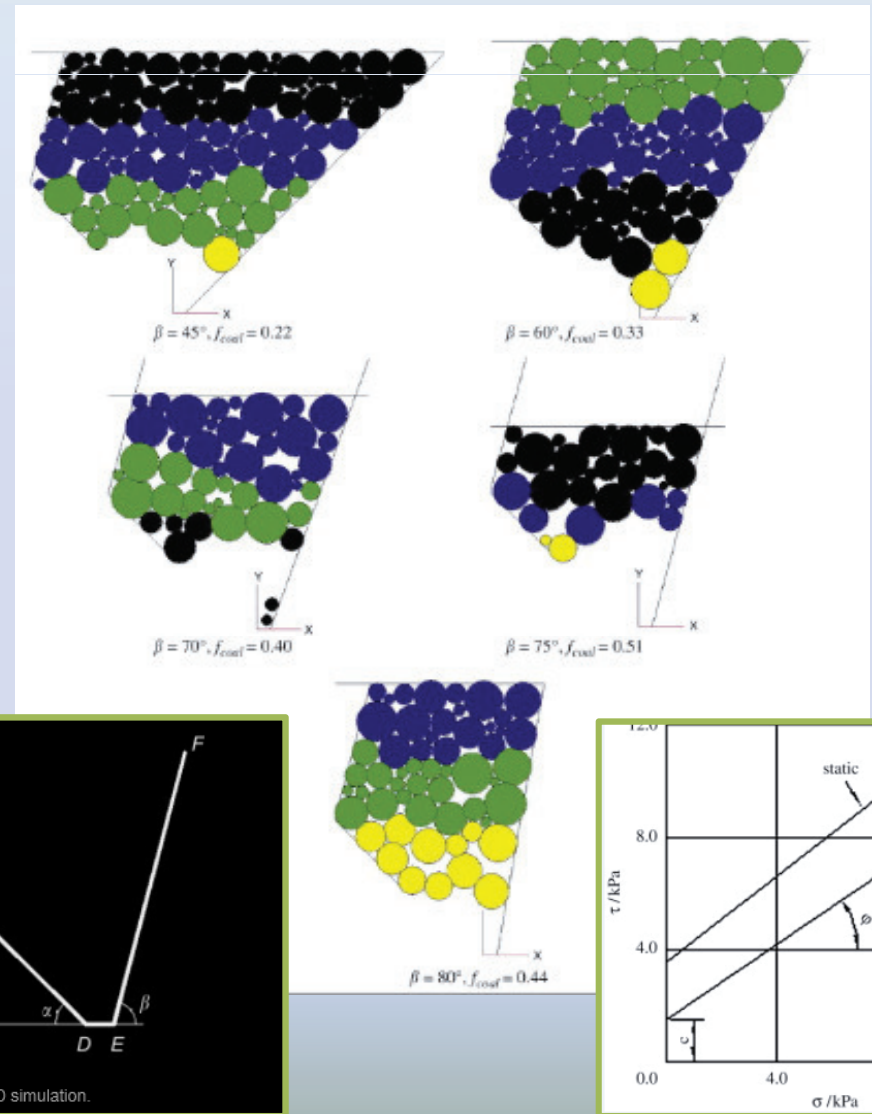
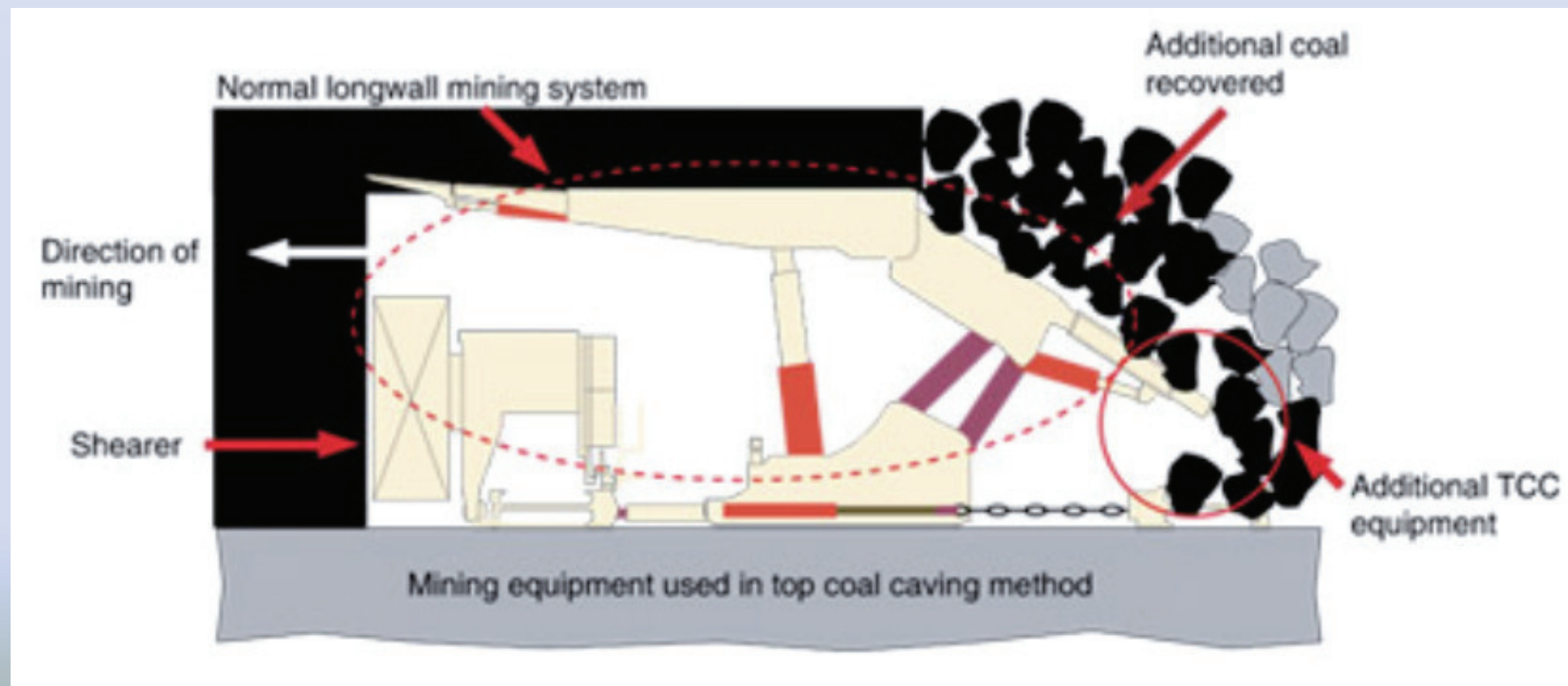


Fig. 4. Models for PFC2D simulation.

Case study

- Case study - Austar
- Soutirage



How does top coal caving work?

- Case study – Austar
- Acknowledge the assistance of:
 - Austar website
 - Ellton Longwall website
 - China National Coal Mining equipment website
 - China Overseas Development co website
 - Kurt Ekanayake – Austar commissioning and now Principle Mining Engineer AMC



Mine planning and panel layout

➤ Plan

- Capital
- Seam thickness
- Coal recovery
- Same roof and floor conditions as normal LW
- Gassy – non simultaneous multislice
- Sealing and spon com
- Ventilation

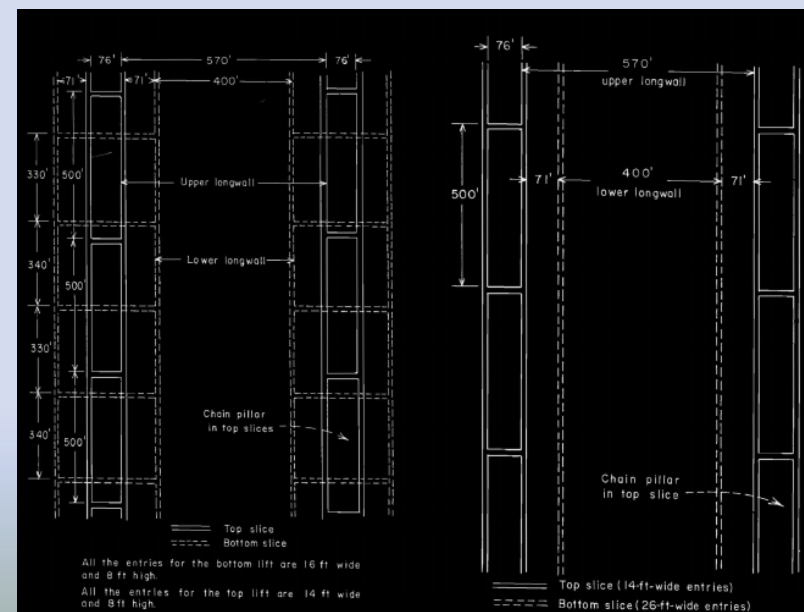
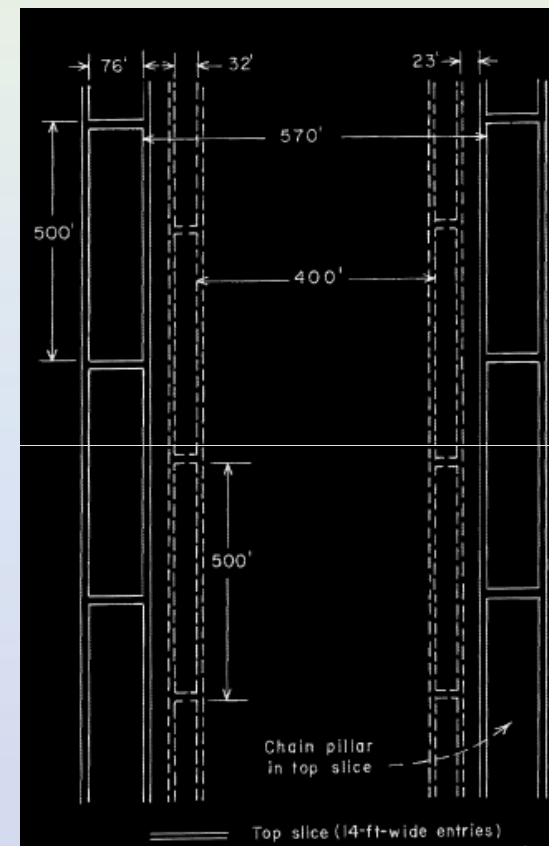


FIGURE 8. - Longwall panel layout with upper entries

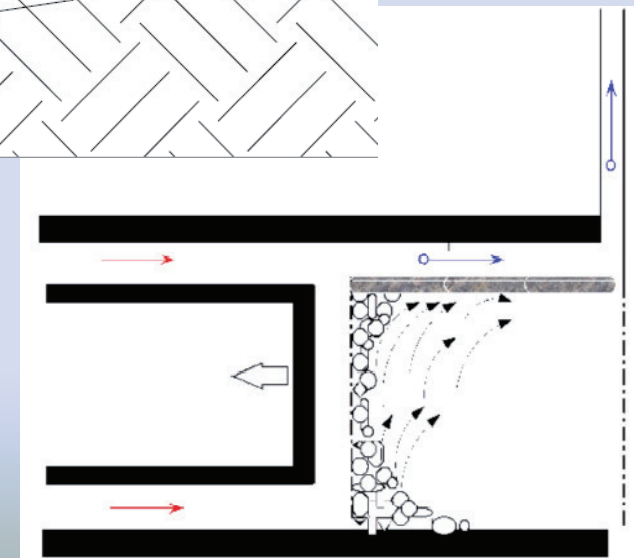
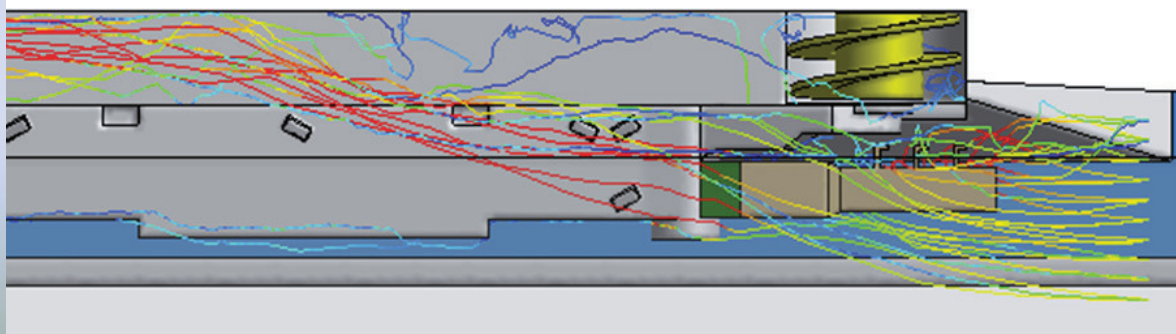
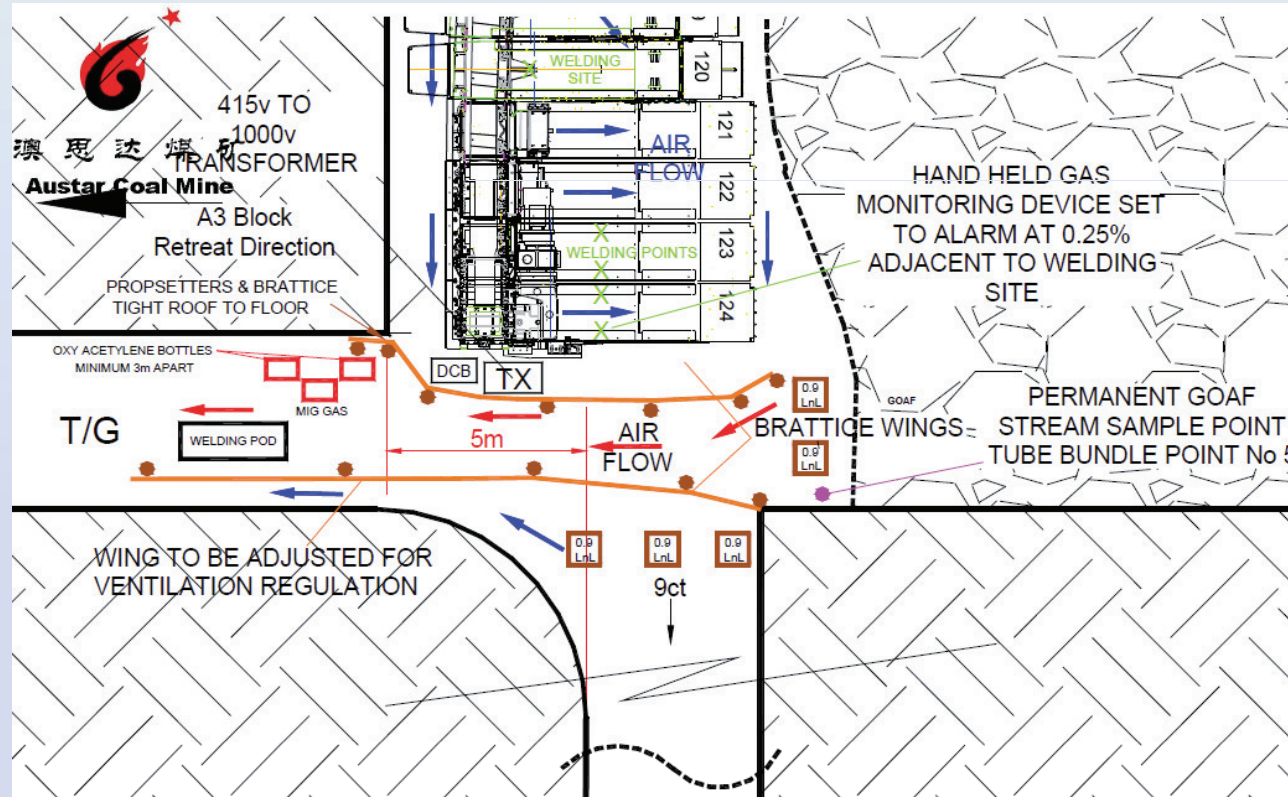
FIGURE 9. - Longwall panel layout with double entries

Ventilation

- Maintenance - Operations

- Gas
- Spon com
- Dust
- Heat

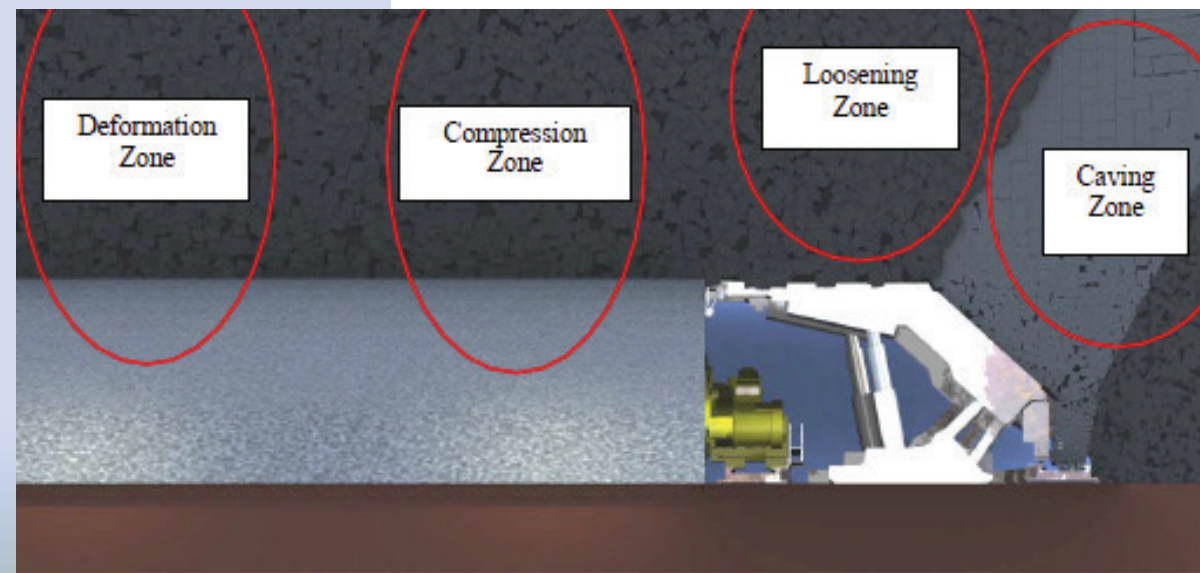
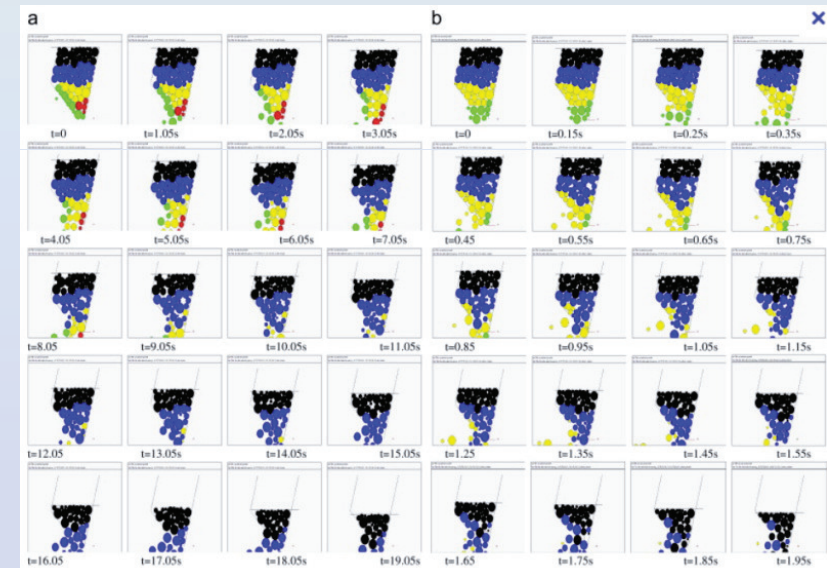
- Good ventilation is important



Mine planning

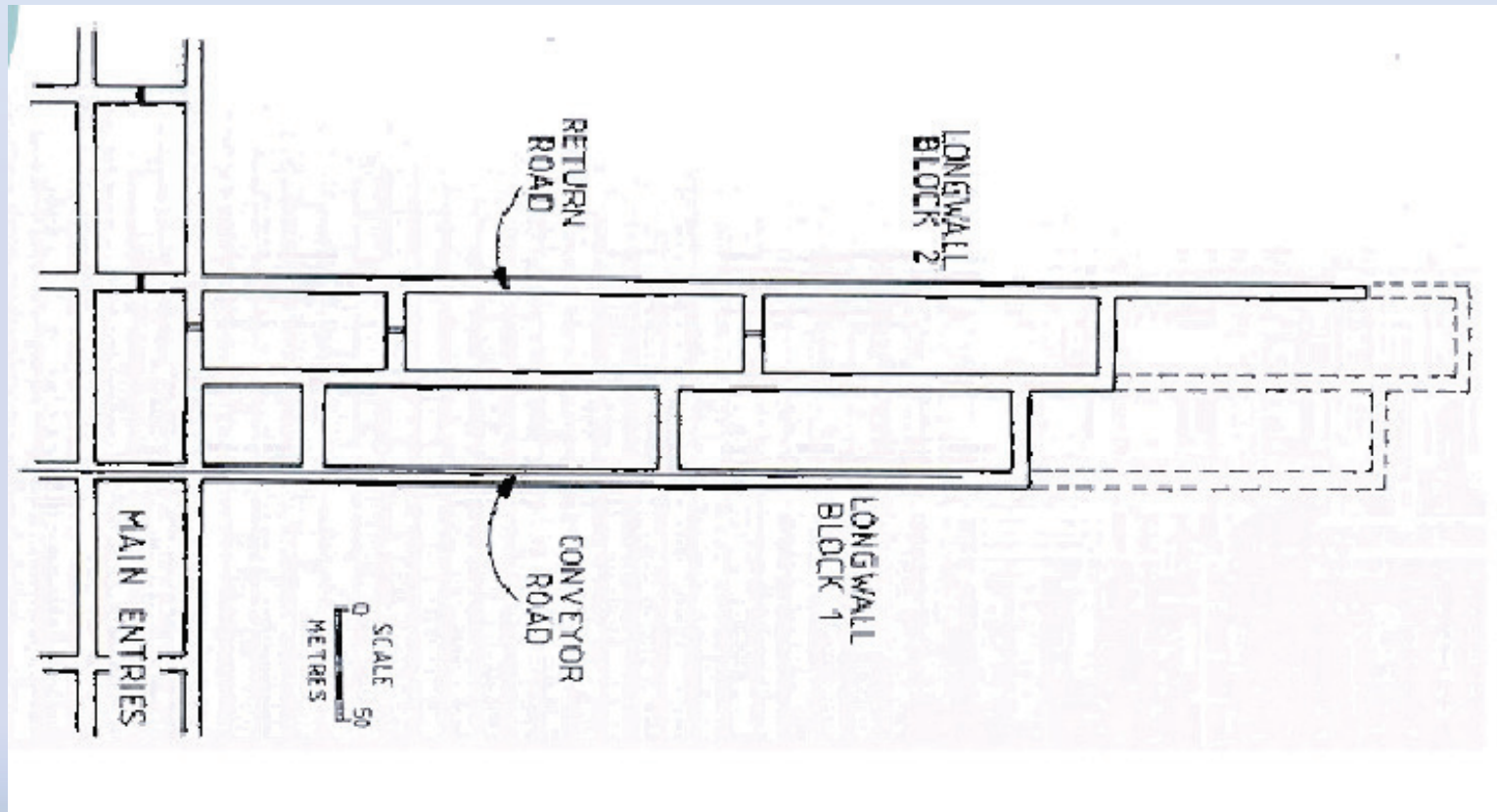
- Predictive tools

- Fragmentation
- Waste slope angle
- Flow analysis
- Coal arch behaviour
- Coal breakage angle
- Particle size
- Hard to model



Development

- Larger roadways
- Consider support needs
- Entries for vent
- Services



Roadways

- Specialist support
- Sliding roof bar supports
- Keep roadways open longer



Self advancing hydraulic supports to keep roadways open

The equipment

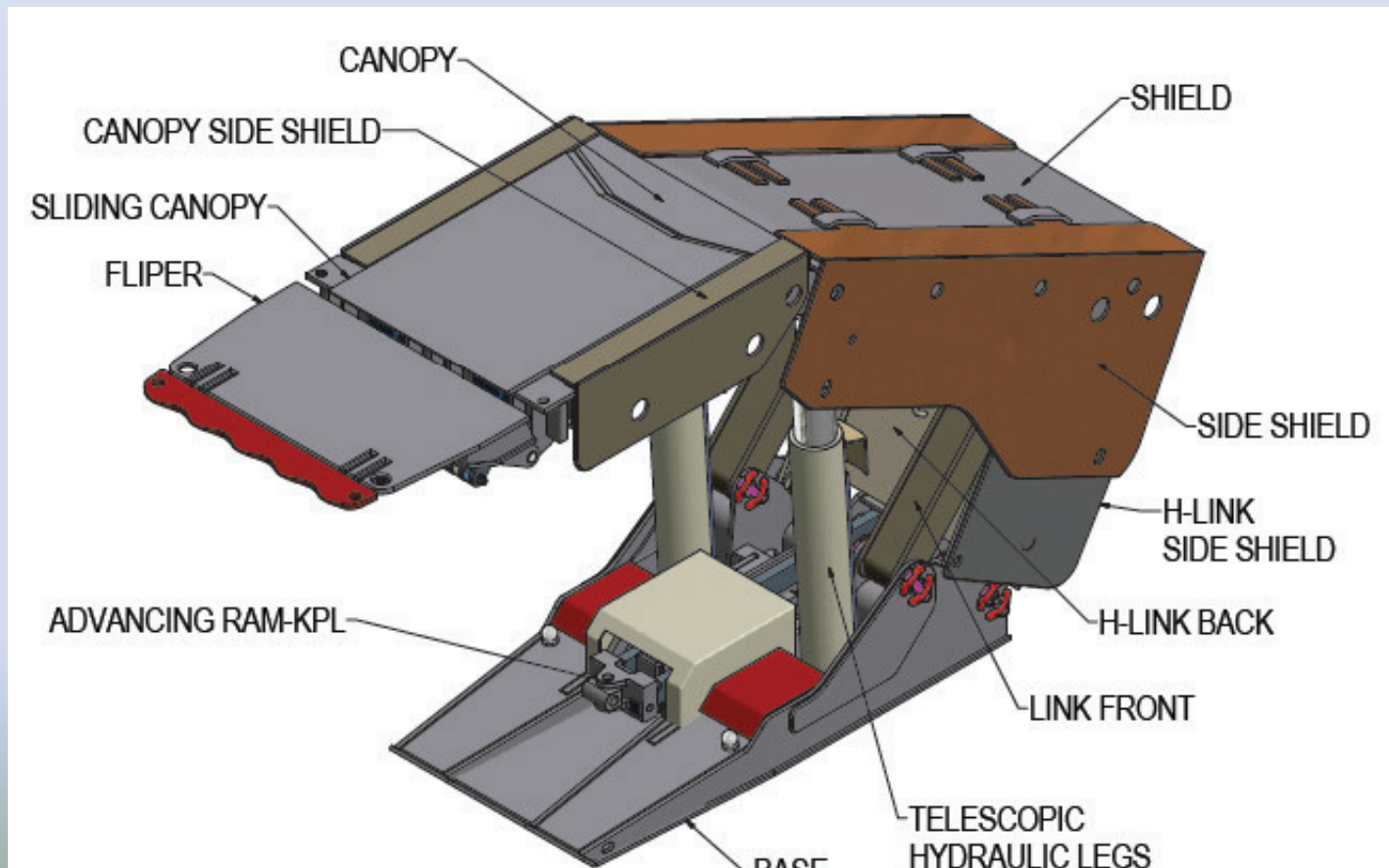
- Conventional Longwall

- Powered face supports
- Shearer
- Armoured Face Conveyor
- Conveyor System
- Electricals and communication

- LTCC

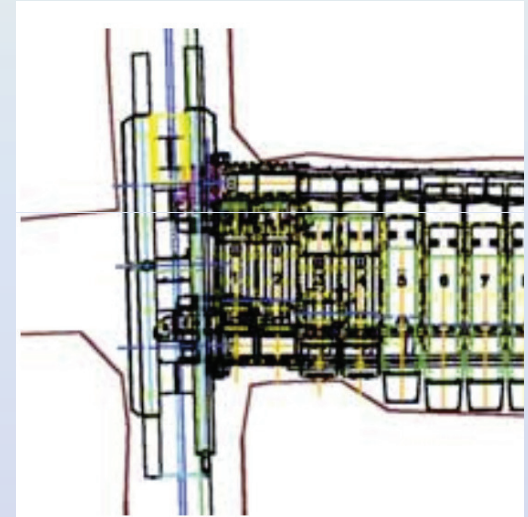
- Same equipment modified to suit

<http://www.rlv.si/en/files/default/ANG%20BROSURA%20VOM.pdf>



The equipment

- Maingate support to the rear BSL –
Case study Austar



A schematic plan view of the main gate end shows



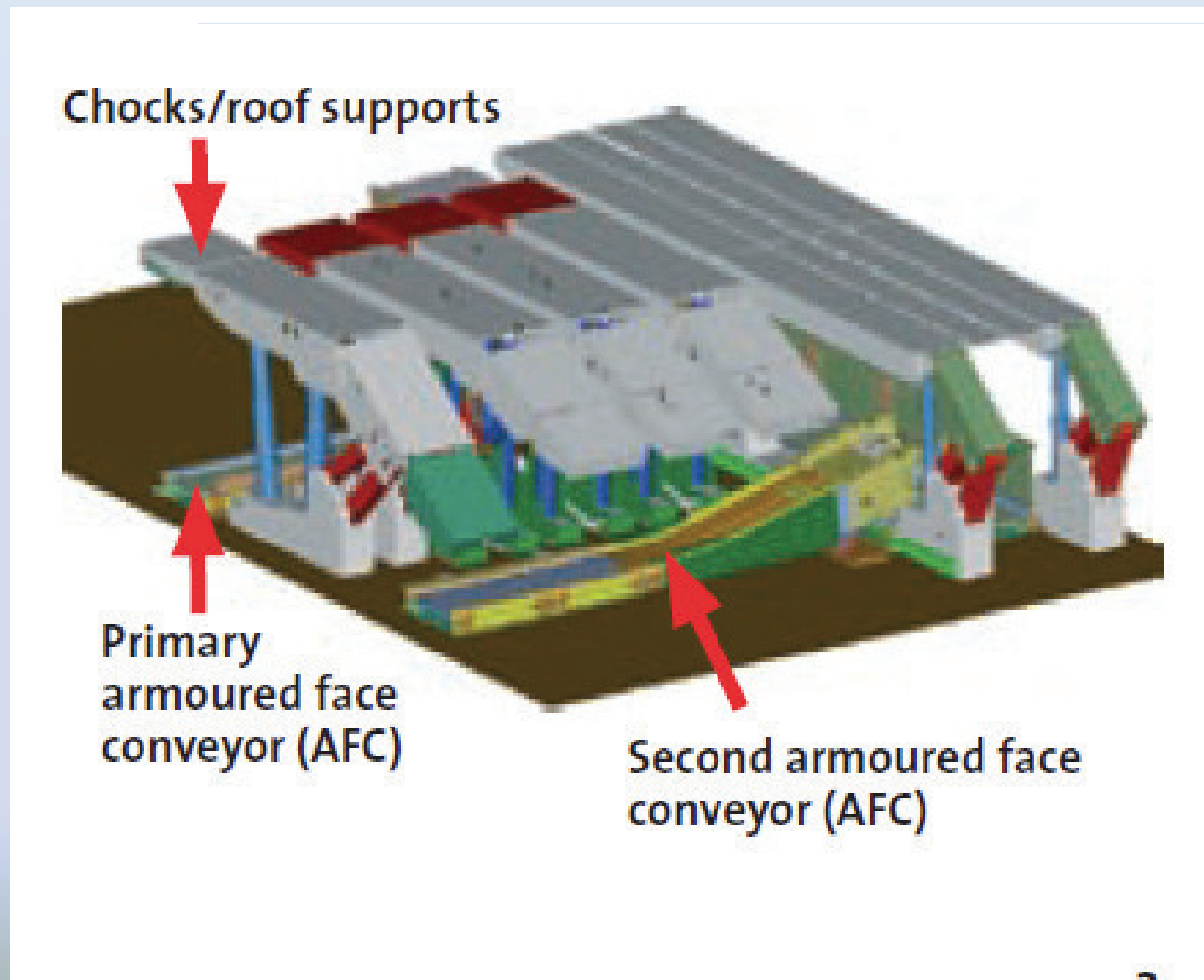
The equipment

- Commissioning
- Caving – Case study Austar



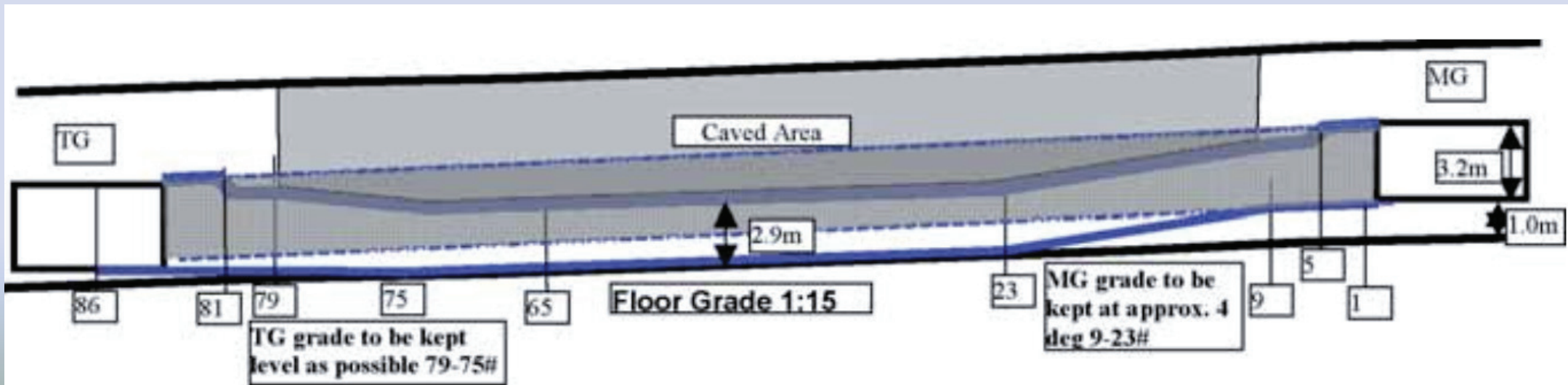
Is new technology available?

- Moving forward -
Case study Austar
- Recovery sequence
- Roof support
- Anticipated increased stress and floor heave



Is new technology available?

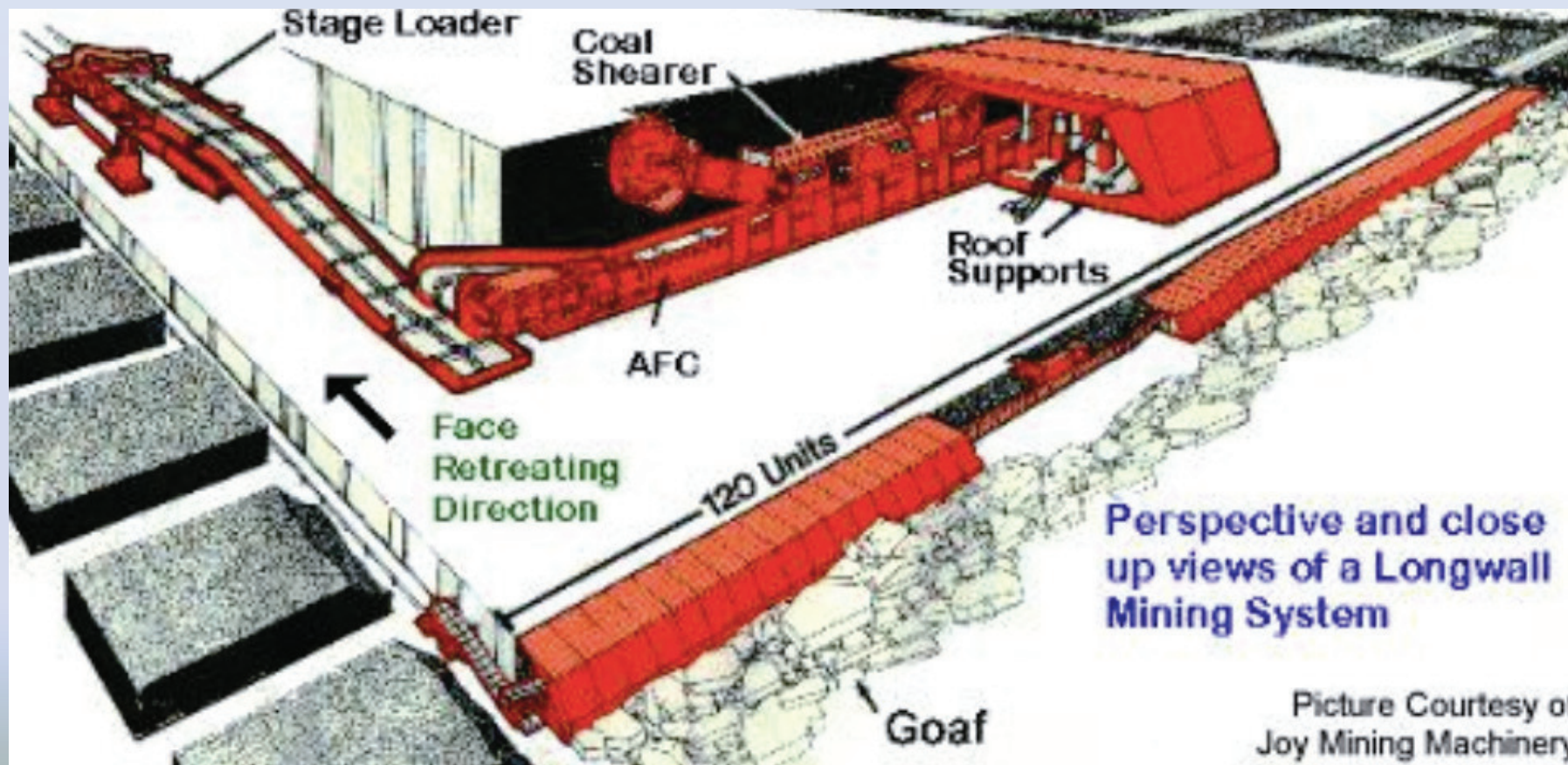
- Moving forward - Case study Austar
- Increased roadway size
- Increased valve functions to supports
- Maintenance engineering
- Ventilation – gas/heat
- Automation



cross-section of the longwall face demonstrates the importance of horizon control.

New Technology

- Vibration
- Automation



Skills?

- Base skills same as LW
- Equipment operation
- Caving behaviour
- Strata behaviour
- Gas and dust



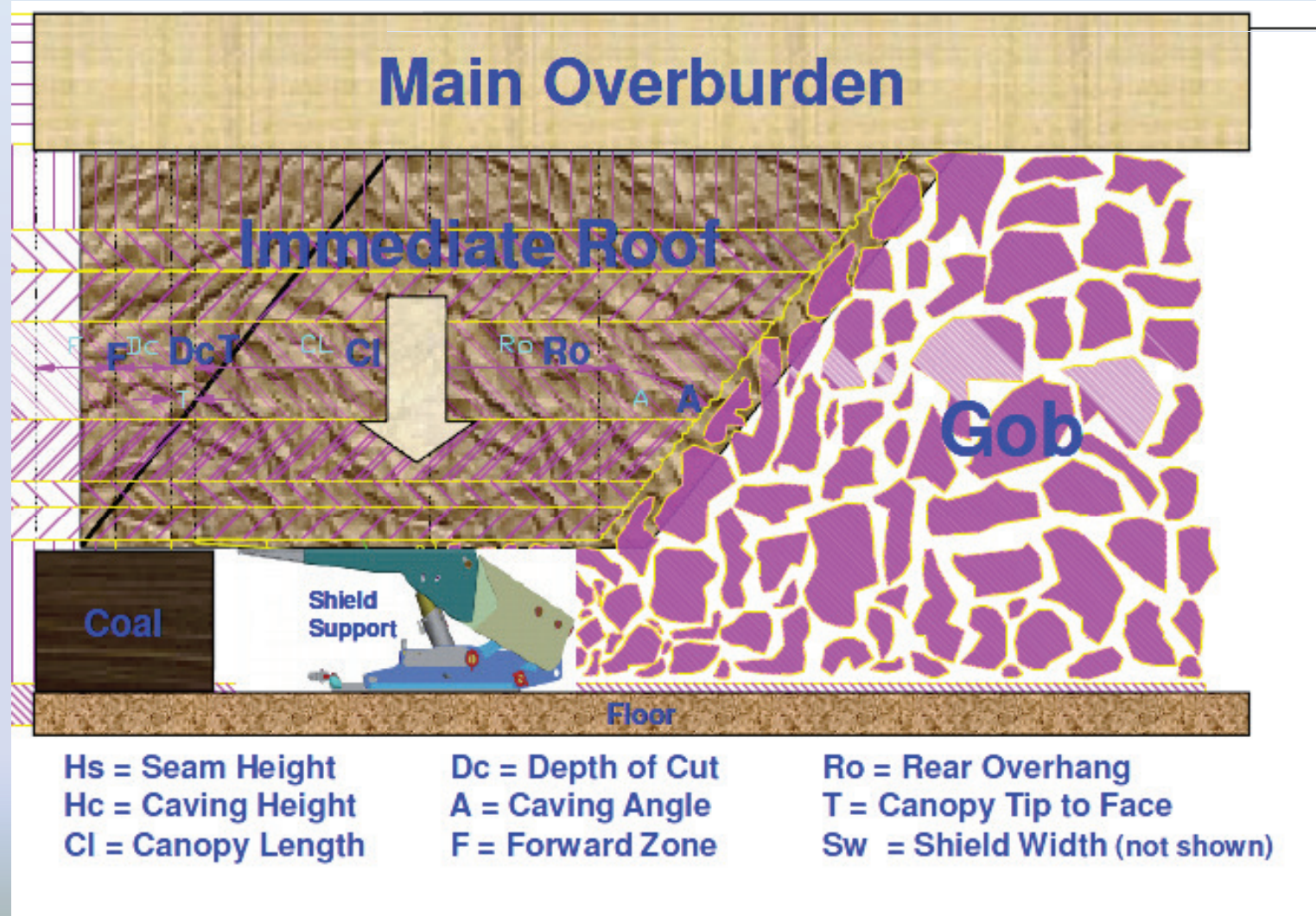
Training?

- Change management
- Engineering experience
- Bench marking
- Operational training
- Change in equipment
- More manual use of the LW
- Development cutting and set up needs
- Gas and dust management
- Engineering knowledge



How does it all work?

- Systems
- Experience
- Training
- Management
- Analysis
- Change management
- Culture
- Continuous improvement





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Thank you.
Any Questions?

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