Technology aimed at improving mine safety

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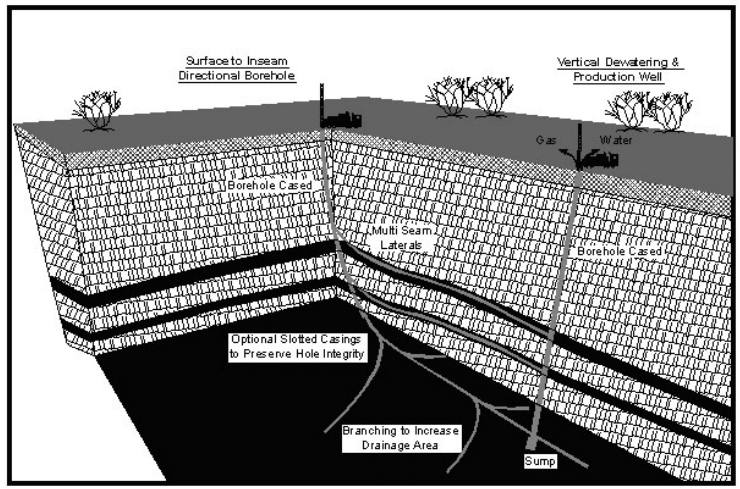
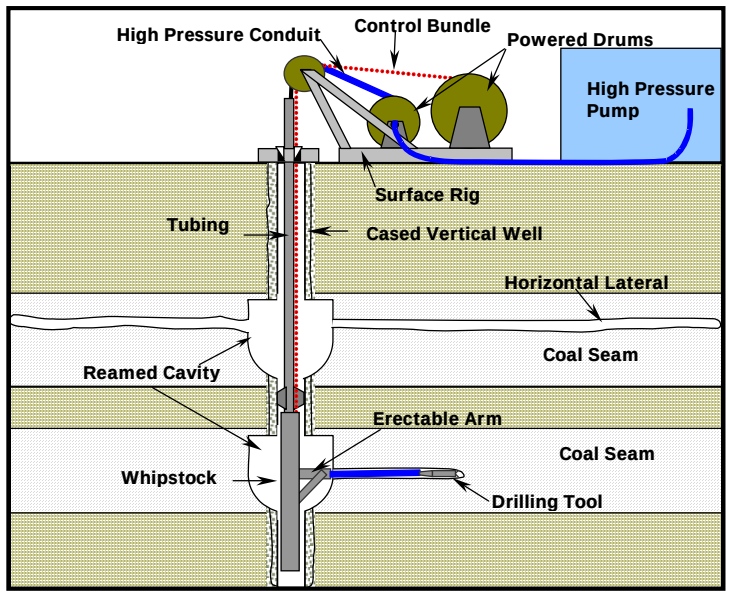
CRCMining

- Technologies can improve mining safety by:
  - reducing mining hazards,
  - reducing physical and mental stress whilst operating equipment and,
  - improving operator training

Reducing mining hazards

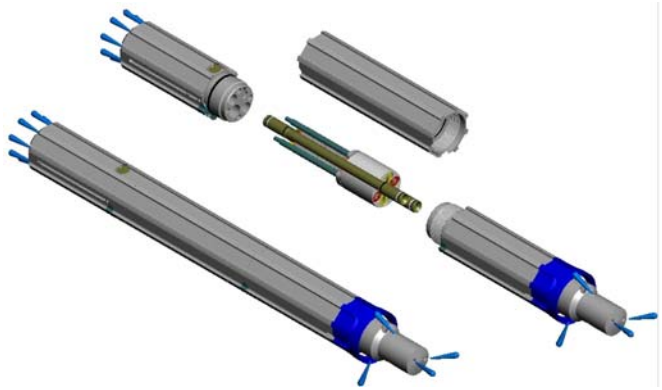
- Gas drainage
  - Holes drilled u/g in Oz = 300 km/yr
  - Surface-in seam alternative to u/g drilling
    - MRD vs TRD
  - Pros-and-cons of MRD and TRD



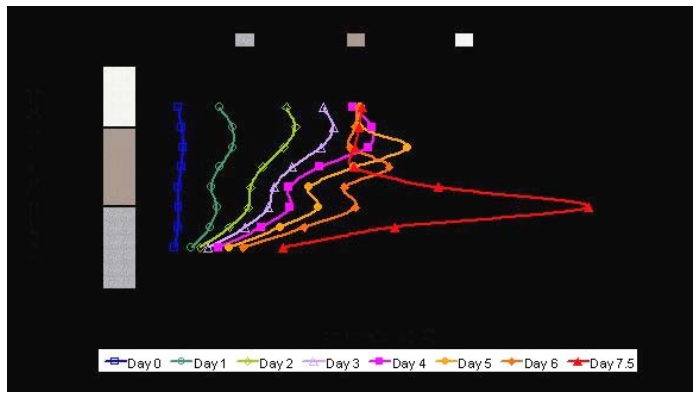


Reducing mining hazards

- improving the effectiveness of gas drainage from coal seams



- improving our understanding of spontaneous coal combustion



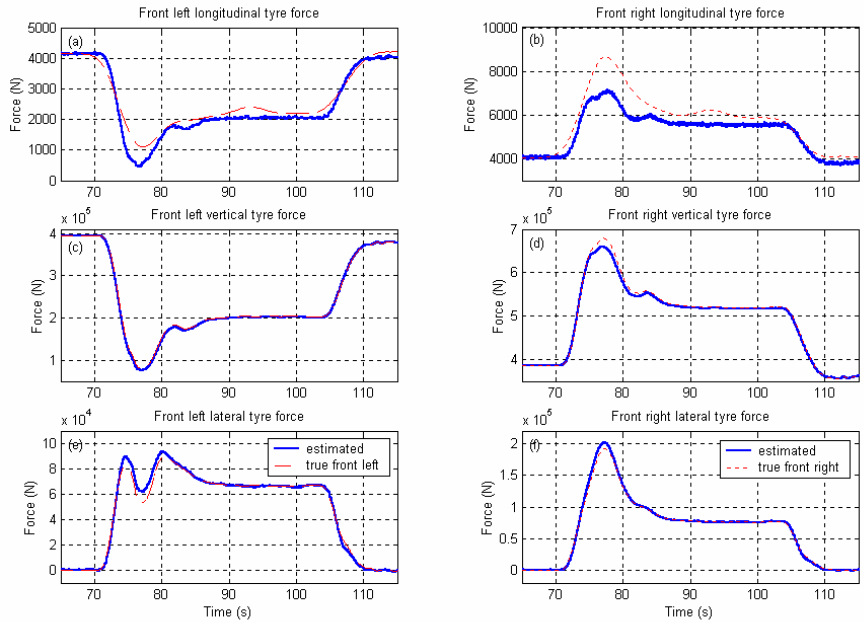
Reducing physical and mental stress

- Truck driver alert system
  - "A 290 tonne truck drifts across the centreline of the haul road and hits another truck head-on. A load of overburden is absent-mindedly dumped into the crusher, shutting down the mine for 12 hours. And yet another haul truck drives through a curve in the road, rupturing a pipeline and dumping 322,000 litres of raffinate on the ground. These incidents, and countless others, had three things in common. First, all the operators were well trained and experienced. Secondly, they had excellent safety records. Thirdly, they were all working the back end of the night shift."
  - (Sirois, W., 2003)

- Full-scale demonstration of laser-beacon system at Comalco's Weipa mine

Reducing physical and mental stress

- Haul road-truck monitoring system
  - road profile can be viewed as a sum of sinusoidal waves of different length, amplitude and phase. The different wavelengths produce different vehicle vibrations ranging from heaving, caused by long wavelengths, to sharp impacts and jarring caused by short wavelengths, such as might be associated with spilt rock or potholes.
  - associated with these vibrations are forces that are initiated at the tyres and which propagate through the vehicle structure, fatiguing components of the truck and reducing ride comfort. As a general rule, the intensity of these forces increases with increasing road roughness, vehicle speed, and vehicle mass (mass here changes when the vehicle is carrying a payload).



- **System output gives**: (i) rolling resistance, (ii) info to engineers on when and where to fix road, (iii) real-time feedback to operators on driving behaviour to minimize tyre and truck damage

Reducing physical and mental stress

- Proximity sensors for trucks
  - NIOSH has reported well over 100 incidents of off-highway trucks driving or backing up over pedestrians or light vehicles occur in the United States each year, resulting in over 20 deaths
  - Current commercial alert systems are expensive and not bullet-proof
  - Uni researchers are developing a systems with Phelps Dodge

Virtual Reality for Operator Training

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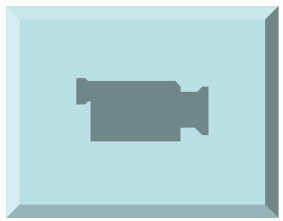

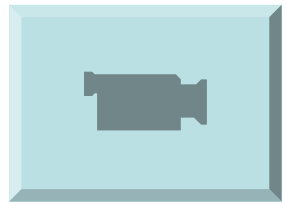

Conclusions

- Researchers at the University of Queensland and its related research centres are developing a range of technologies that are making mining operations safer
- Many of these technologies are at an advanced state of development and are starting to be employed by industry
- Others are in the work-in-progress state