



Mine Managers Association of Australia

2012 MMAA CPD Seminar
7 June 2012 - 8 June 2012
Caves Resort, Caves Beach. NSW Australia

Presentation: Simulating and Scenarios: Ventilation for Improved Expansions, New Mine Development, and Continued Excellence

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Scope

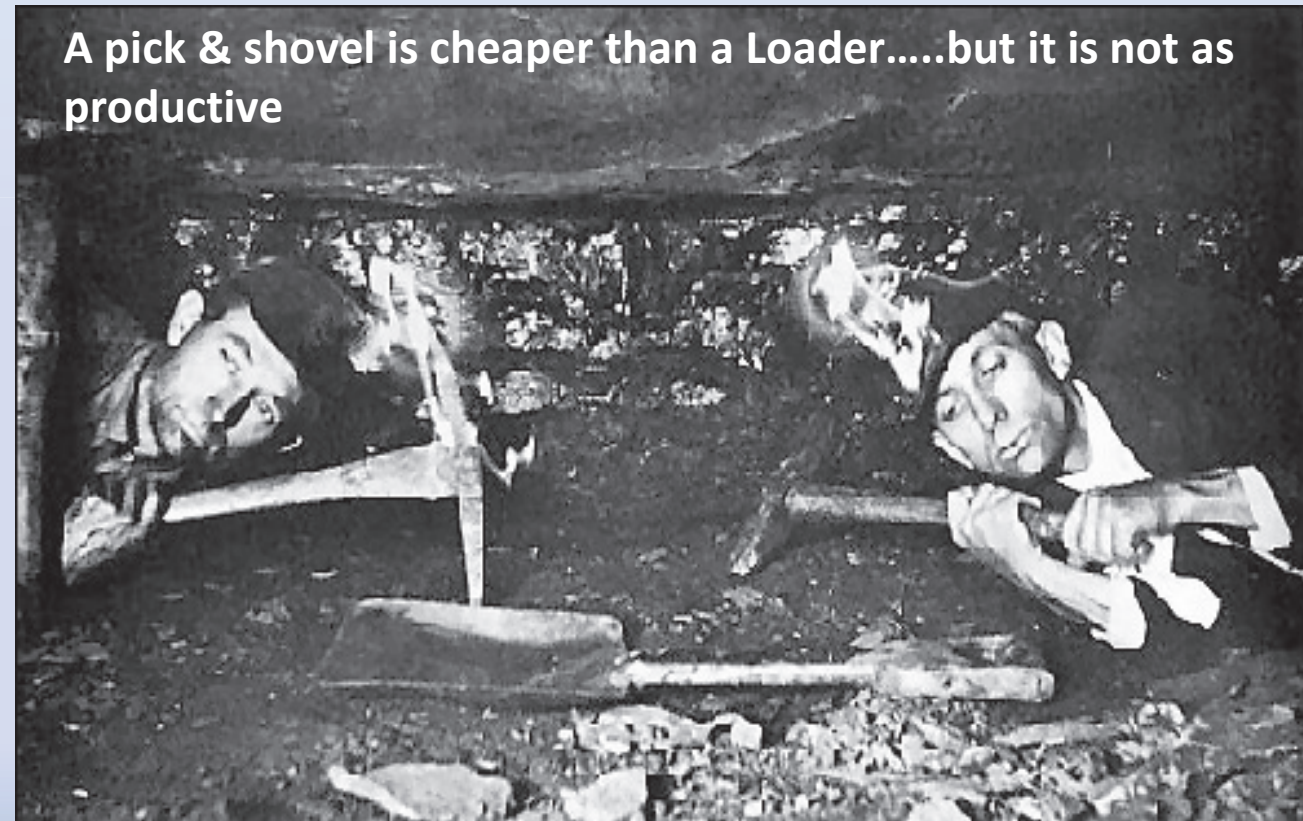
Ventilation planning and simulation is an essential part of the ventilation officer and mine planner roles.

Examining the various methods used to increase airflow efficiency for underground mining during upgrades

- Evaluating ventilation issues on site: essential vs. peripheral needs
- Using seals, stoppings and brattice barriers for directing air to where is needed
- Planning for improvements during mine upgrades

Increasing Air Flow

- Every year the Australian mining industry spends millions of dollars on underground ventilation systems.
- In the U.S., fan systems used for mine ventilation **12,000 million kWh annually** (Xenergy, 1997, 1998).
- Mining accounts for 22% of Canada's total industrial energy consumption (Jaccard & Willis, 1996).



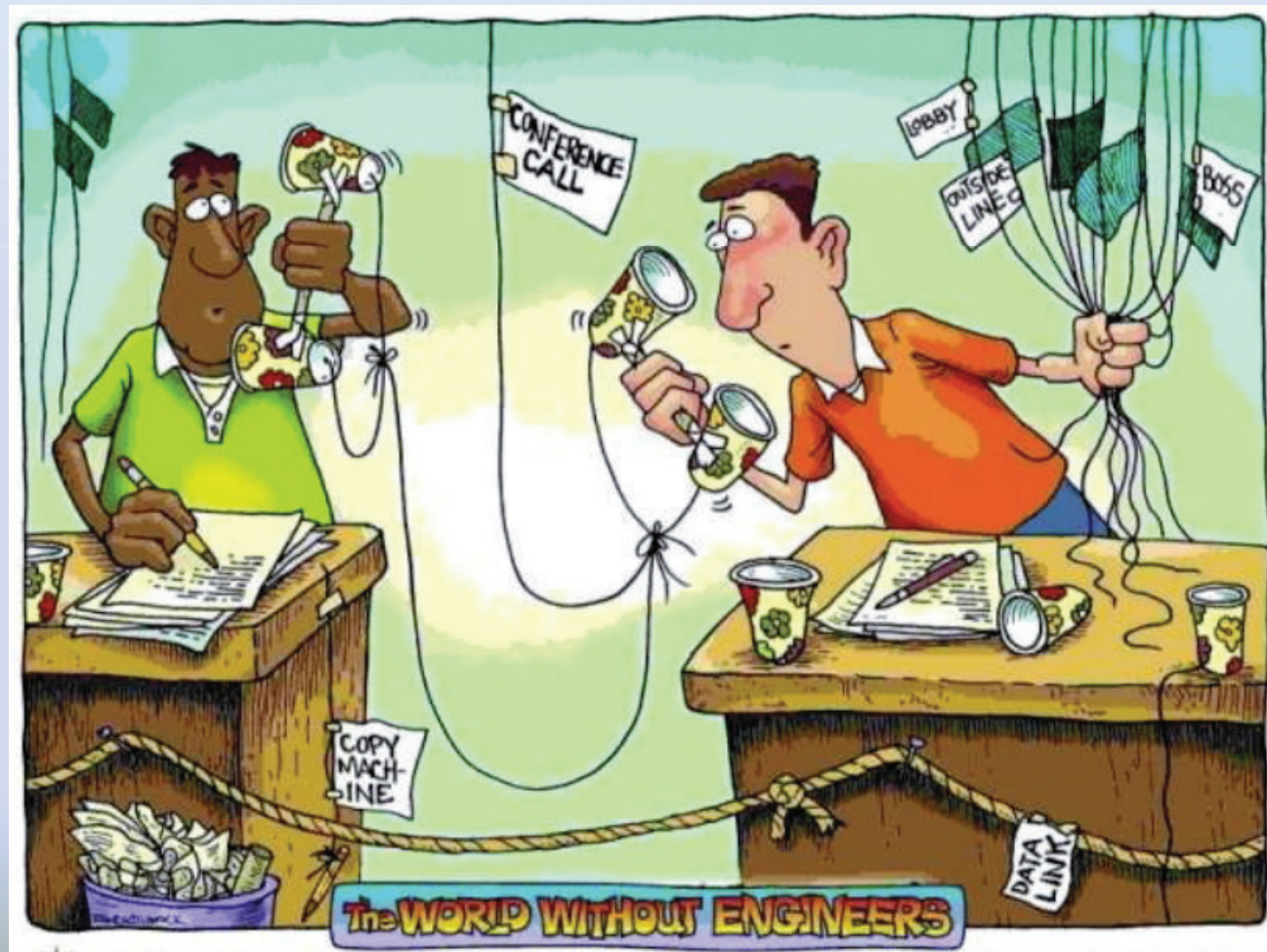
Ground Support Services 2007 Self Drilling Rock Bolt – Advanced solutions

...it is all about productivity

Efficiency during upgrades

Overview

- Ventilation system design are often based on a fully developed mine scenario and no considerations for part load has been accommodated
- Very little attention is paid to energy efficiency during ventilation system operation



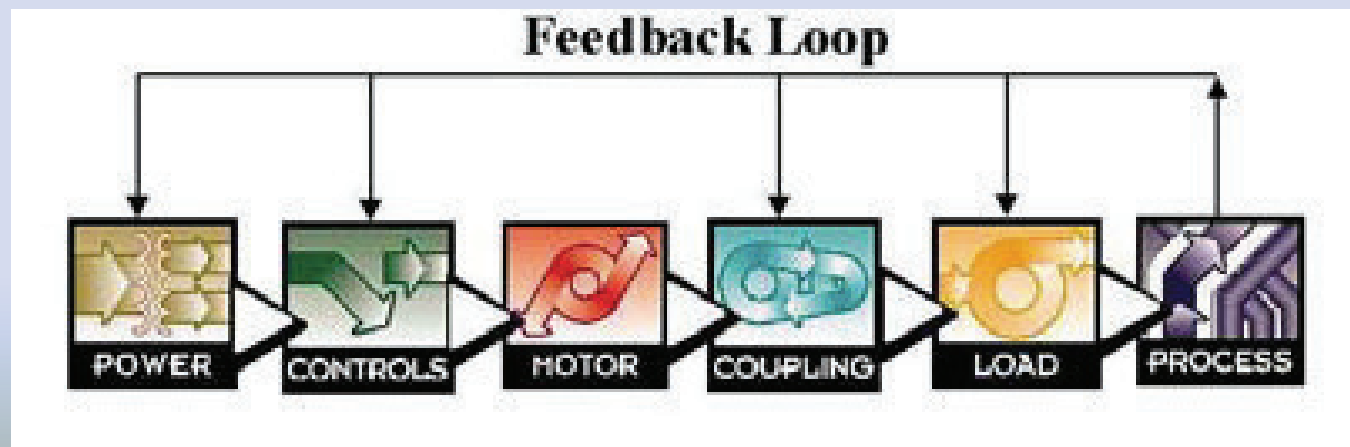
Evaluating issues on site

- A Case Study -



Essential Vs Peripheral

- System rather than Component approach
- Energy saving opportunities exist at all places in the system
- Not all savings opportunities are cost effective
- Optimise
 - Sizing of fans
 - Streamline systems
 - Energy efficient motors
 - Use speed controls
 - Reduce air wastage

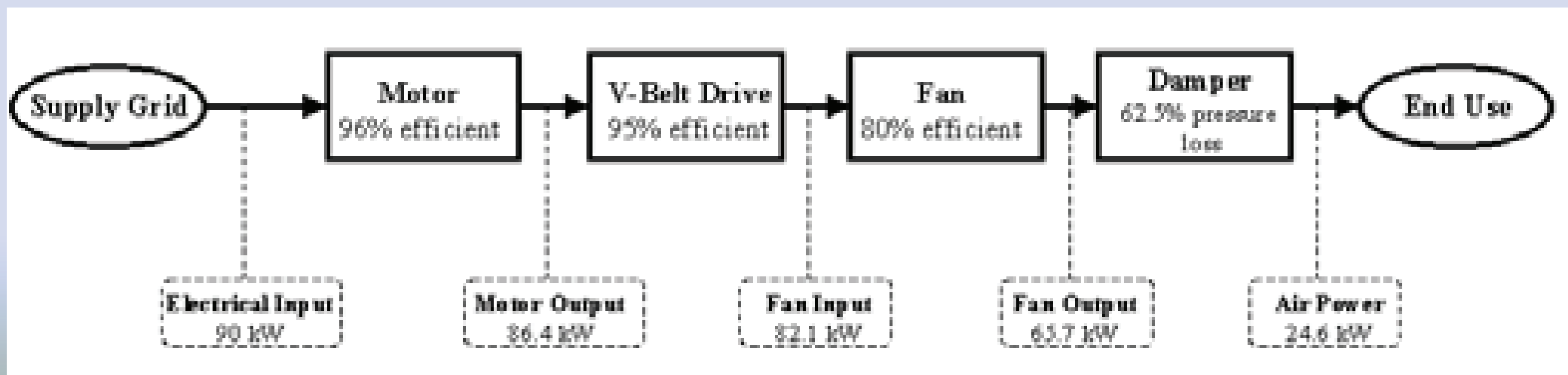


Essential Vs Peripheral

- System approach
- Wire to air losses

➤ Benefits

- Better equipment reliability
- Longer equipment life
- Reduction in maintenance costs and downtime
- Improved work environment
- Reduced emissions
- Lower costs



Directing Air

- Use of brattice
- Flexible Stoppings
- Parachutes
- PVC Stoppings



Acme Ventilation System for mining Tunnel Industrial Operations,

Planning for improvements

- Monitoring
- Inspections
- Design
- Sign off after construction
- Reporting
- Regular measurements
- If you can not measure it,
you can not fix it.



Mine planning

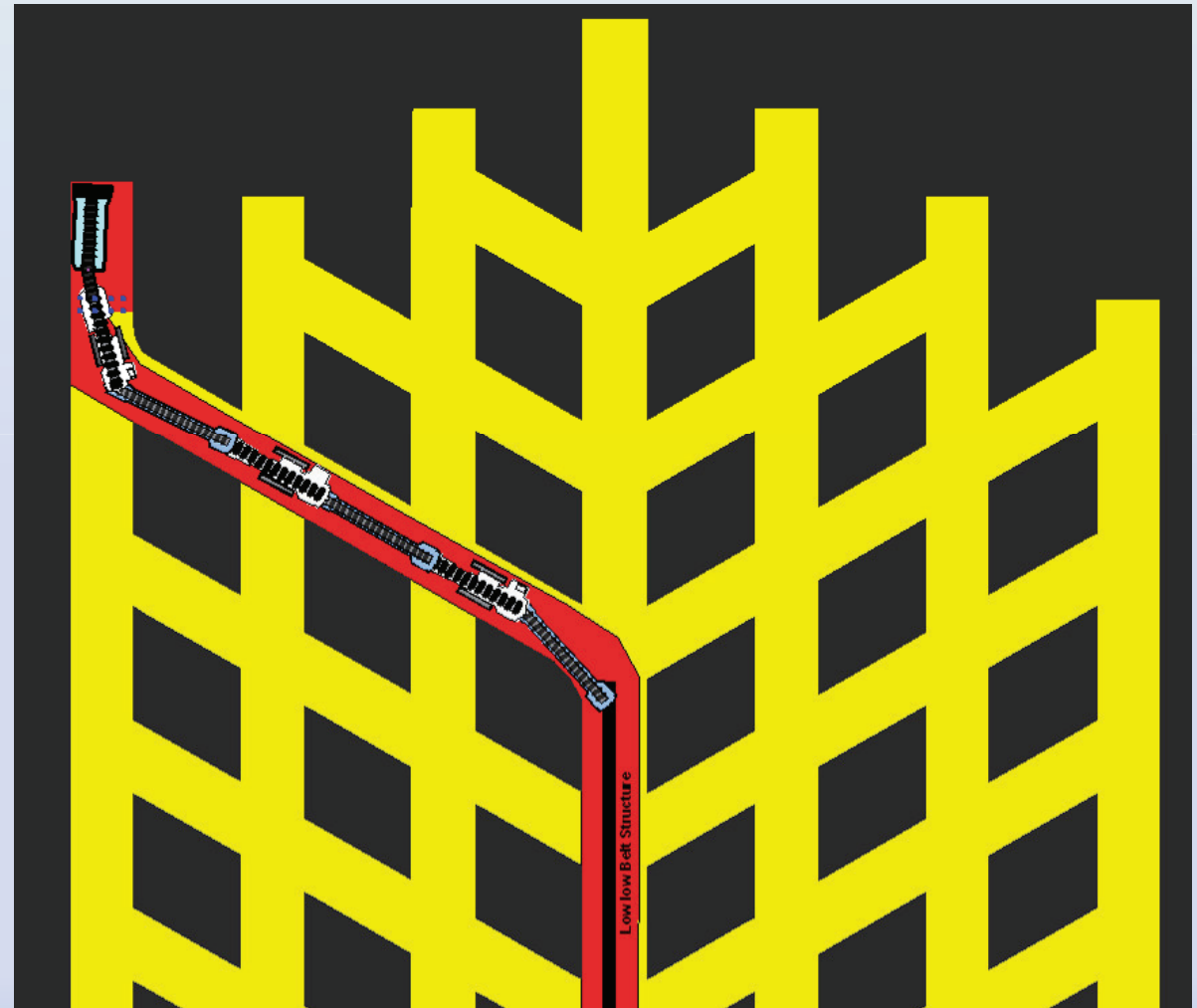
- Mine planning
- Panel design, sequencing, productivity, recovery, utilisation for system and ventilation requirements.
- Selection process of ventilation optimisation
 - Matching mining equipment to vent
 - Production compatibility with ventilation
 - Optimise ventilation – blasting, heat, dust, volume, radiation
 - Process driven culture – ventilation installs
 - Ventilation awareness for operational teams
 - Mine planning with ventilation in mind
 - Audits
 - Synergies in systems
- Ventilation systems can assist operations

Legislation

- Those Australian States that have adopted the Commonwealth *Work Health and Safety Act 2011* (Cth) as part of the drive towards harmonisation of workplace health and safety, have restricted the scope of the *Work Health and Safety Act 2011*(Cth) in their State so as not to include mining.
- Queensland has for coal mining the *Coal Mining Safety and Health Act 1999* (Qld) and for quarries and hard rock mines, the *Mining and Quarrying Safety and Health Act 1999* (Qld). Most other States have similar laws.
- Western Australia has the *Mines Safety and Inspection Act 1994* (WA) which uniquely amongst Australian States applies to quarries, hard rock mines and coal mines.
- In Qld and NSW Ventilation Officers are a statutory position in underground coal mines and hard rock mines.
- In Western Australia Ventilation Officers are a statutory position in underground and open cut, coal mines and hard rock mines. Adopting the WA legislation may have prevented recent incidents in open cut coal mines that have led to workers being overcome by fumes and hospitalised.

Bench Marking

- Bench mark with similar mines
- Employ Consultants
- Attend conferences
- Peer review
- Mine design to assist ventilation
- NSW alone requires coal mine & hard rock ventilation systems to be audited annually by an independent registered ventilation auditor.



Continuous Haulage Aquila Colliery 2009

- This may change, so as to apply to all States and all mining methods and resources.

Inspections vs Audits

- An inspection is defined as a planned, systematic appraisal of the workplaces which can help identify hazards, assess and control risks, ensure a safe and healthy working environment and assist in complying with occupational health and safety legislation.
- An audit is defined as a systematic examination against defined criteria to determine whether activities and related results conform to planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve the organization's policy and objectives. (AS4804)

Ventilation Arrangements

- Arrangements need to be developed based on an evaluation of the risk. (A documented risk assessment).
- The risk at each mine is different. So should be the controls.
- It is important that the Arrangements describe “HOW” the hazard is going to be managed, not just “WHAT” the Regulation states.
- You must be very careful with the words you put in the Arrangements - detail.

Summary

- Auditing of the Arrangements is very good. Great way to improve.
- Be careful what you say, make sure you do what you say.
- Make sure the control is relative to the risk.
- Ensure that the Arrangements state “HOW” you are going to control the hazard, not just “WHAT” you want to do.
- Industry need for improved ventilation monitoring.
- Inadequate or ineffective monitoring has the potential to miss unplanned changes.

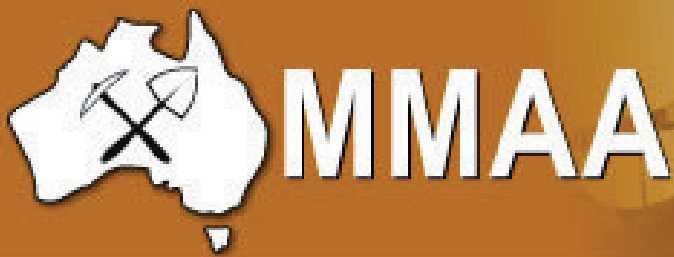
Recirculation

Most mines just repeat the Regulation without providing any guidance on “HOW” they intend to achieve this outcome. There are no performance measures for the mining supervisor to do what is required, other than an inspection to check for recirculation.

The Ventilation Arrangements should state:

- Capacity requirements,
- Use of a baffle to limit exhaust velocity,
- Location of the fan,
- Interlock and shutdown arrangements,
- Booster fan considerations*.

* Whilst booster fans are not generally considered auxiliary fans they have the capacity to generate recirculation.



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**Thank you
Any Questions?**

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