

## Ventilation on Demand Project

### MDEC Conference

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## What is Ventilation on Demand?

- Ability to direct ventilation air in an underground mine to the area that requires it, at the quantity need for the local activities at the time.
- Requires fan and louvers controls, sensors to measure workplace environment, “tags” to identify where equipment is operating, and a computer control to manage air flow.



## Background

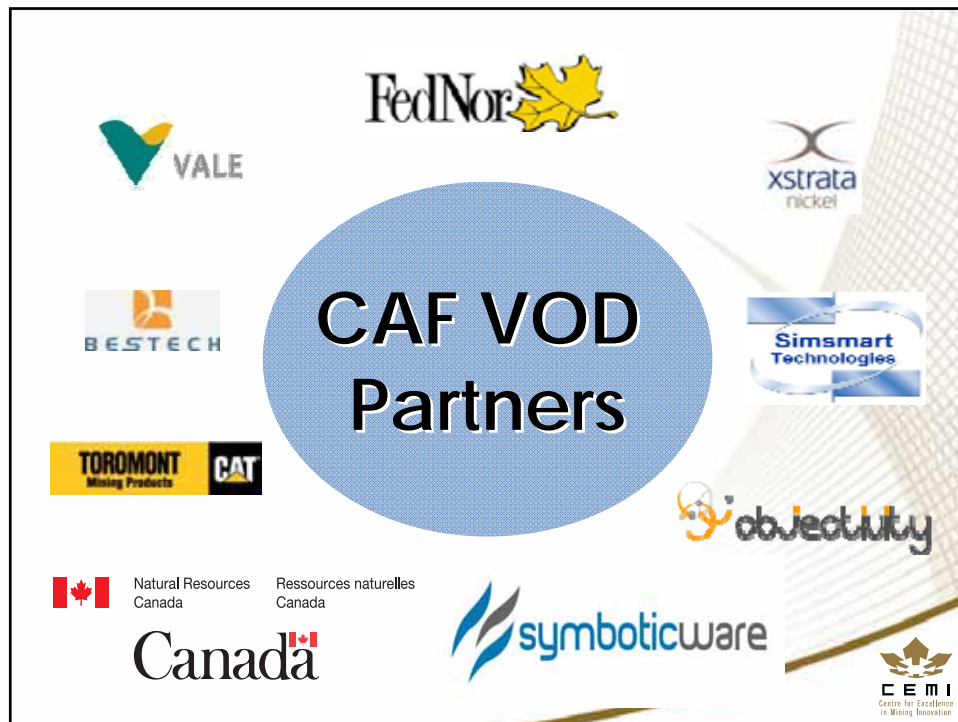
- Discussions with NRCan in May'09 regarding suitability of a Ventilation on Demand project for Community Assistance Fund (CAF) program
- Note from CANMET with a rough outline of a VOD project and suggestion for CEMI to proceed with an application to the CAF program
- CEMI with assistance from CANMET, Vale and Xstrata Nickel submits application to CAF on June 12, 2009
- Aug 24, 2009 announcement that CEMI awarded funding



## Project scope

- Purchase and install equipment at:
  - Vale Inco's Coleman Mine
  - Xstrata Nickel's Nickel Rim South Mine
- Undertake 3 "Demonstration Projects"





## Technical Team

- Purpose: to ensure all the objectives of the technical projects are achieved
- Objectives:
  - Contribute to development of detailed scope of work for the demonstration projects
  - Recommend resources required to collect and analysis data which support the demonstration projects
  - Review on-going work and make recommendations for any changes required.
  - Advise on future research activities that could arise from this project
- Team: S. Hardcastle, E. Bartsch, C. Allen, D. O’Conner, K. Bullock, A. Dasys, G. Lyle



## Demonstration Projects

- The purpose of each is as follows;
  1. To Validate Ventilation on Demand Objectives
  2. Analyze data to support the ventilation of mines using air quality criteria
  3. To develop guidelines for sensors used to measure underground air environment
- Budget for the projects is \$1.3 Million and the work will be undertaken at both mine sites
- The extra sensors installed at both locations are to support the work of the projects



## Project Details

- Field Study
- Model/Business Case
- VOD Justification Study



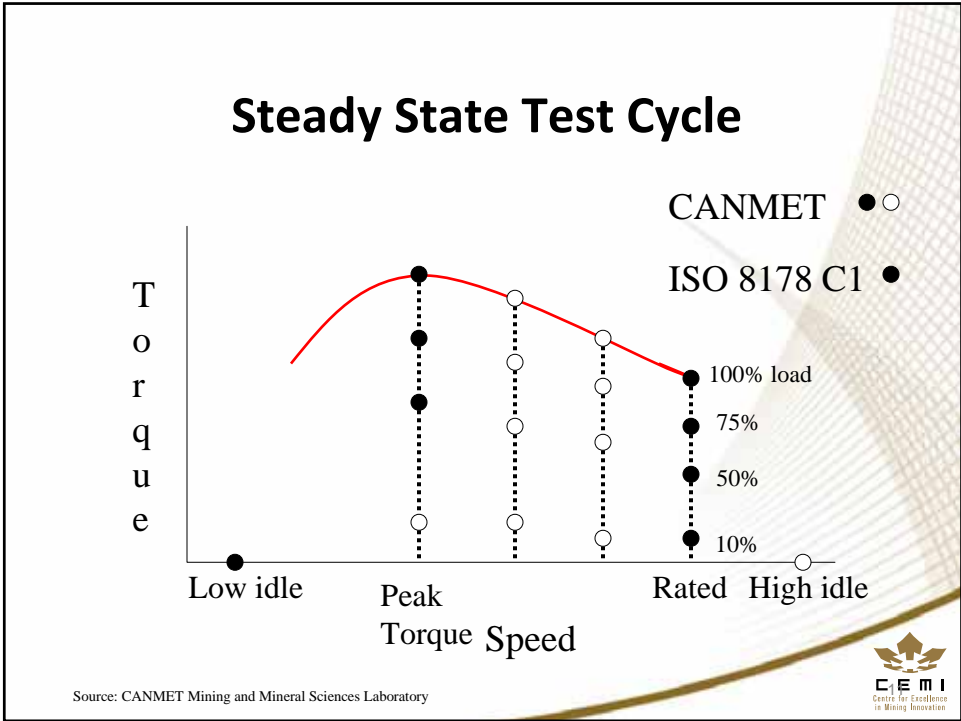
# Bridging Underground and Laboratory Testing



# Laboratory Testing

- Controlled environment
- Controlled cycle - repeatability
- High level of monitoring precision
- Controlled intake
- Controlled exhaust





### Underground Reality

- Difficult to Control
- Difficult to Monitor
- Unpredictable
- But REAL

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## CAF VOD Field Studies

- Project to determine financial benefits of VOD investment to mining operations
- Determine the benefits of a Quality Criteria



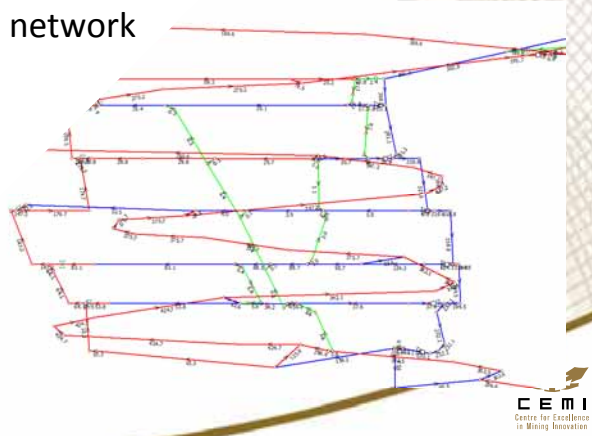
## CAF VOD Methodology

- Perform in field testing in operating mines
  - Nickel Rim South Xstrata
  - Coleman 153 Vale
- Validate in production/ventilation model

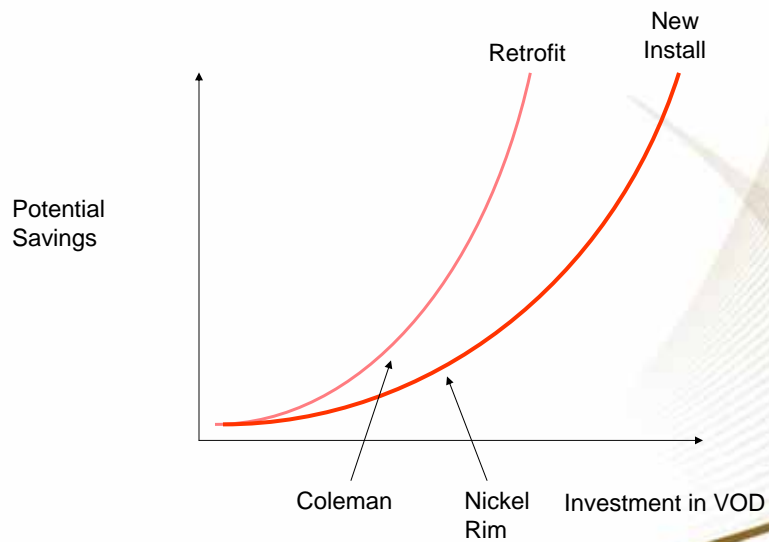


## Current Mining Ventilation Models

- Focus on determining Airflow (Static)
- Specifying Fan requirements
- Focus on primary network

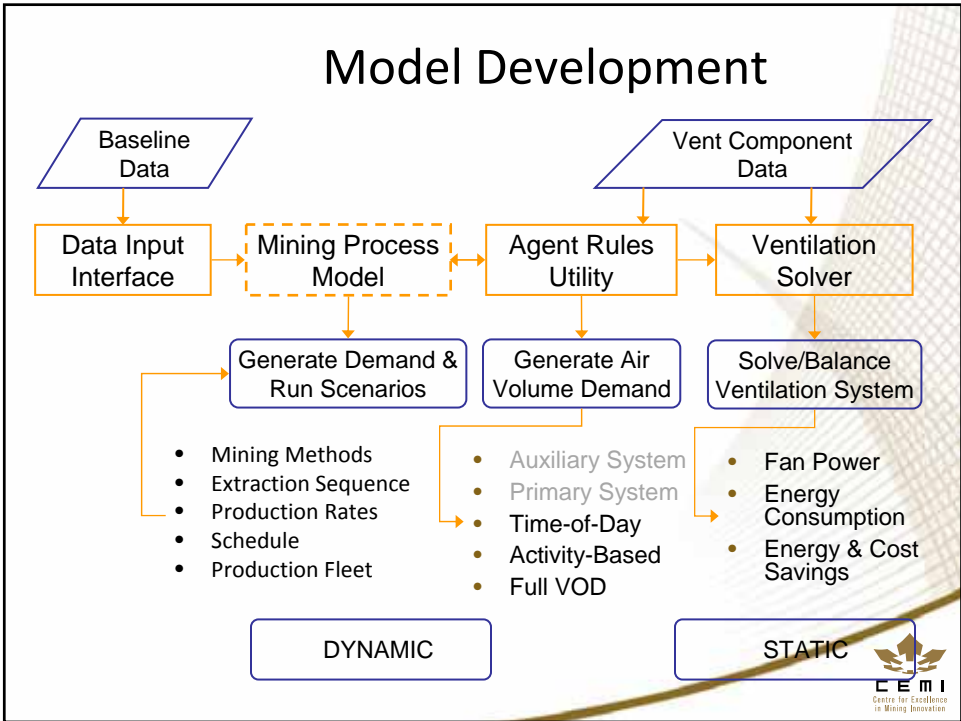



## Investment vs. Savings



# WHY MODEL?

- Excel cannot capture dynamic nature of mining
- Allow scenarios that we have not yet thought of



## Dynamic Vent Modeling

- Models production
  - Including load on production equipment
- Includes primary/secondary
- Provides changes over time



## In-Field Monitoring

Symbol

- Real time data collection
- Wi-Fi Transfer
- Open data transfer

Interface to Engine Controller

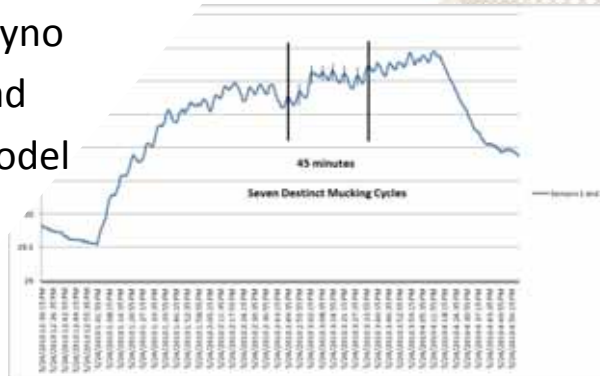
Provide ambient sensors

Provide exhaust monitoring



## Goals

- Measure actual U/G production cycles
  - ECU data
  - Ambient gas monitoring
- Replicate on Dyno
- Determine Load
- Integrate in model



## Peer Review

- Held June 17, in conjunction with the Ventilation Symposium
- Attended by
  - Rick Brake, MVA, Australia
  - Keith Wallace, MVS, US
  - John Vergunst, MOL
  - CAF Technical Team

## Peer Review

- Key Points
  1. A systematic major hazard review is required
  2. Will need to re-evaluate future contaminants (not NO<sub>x</sub>, more heat or DPM)
  3. Objectives optimistic, given timeframe
  4. World moving to quality from quantity
  5. Quality based system will require significant control/monitoring
  6. Analysis of data will occur mainly after project
  7. Did not identify others doing similar work



## Development of Best Practices Guide

- Draft of topics developed with the Technical Team
  - Reference working document



## Current Status

- System Installation nearing completion
- Ventilation Model nearing completion
- Ready to begin the detailed field studies



## Why Project is Relevant?

- Demonstration projects will provide useful information for any underground mining company
- Funding of equipment purchase that will improve the energy usage at 2 local mines
- Support of local companies
- Building of local capability and capacity
- Recognition opportunity for CEMI



## Next Steps – VOD 2

- Need to start the planning for the next phase of the work
  - Mine energy savings?
  - Continue the Quality vs. Quantity project?
  - Enhancements to VOD systems?
  - Detailed study of the data?



## Acknowledgements

- Vale and Xstrata Nickel
- CANMET
- FedNor
- Bestech and Simsmart



# Thank You

- Questions

