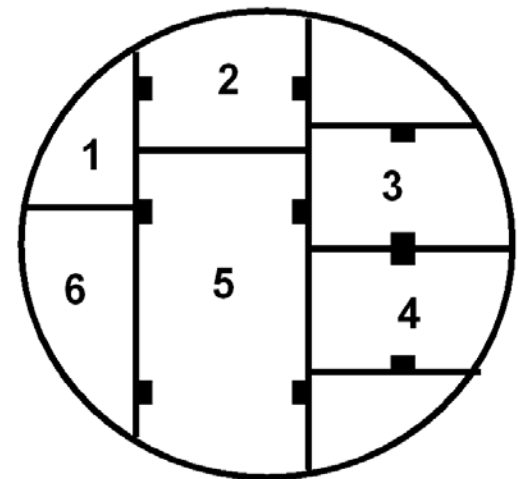


# Shaft Compartment Inspection: Proposed Research Project to Automate Shaft Inspection

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# Shaft Inspection Research

- While researching hoist rope inspection, it was realized that shafts also experience intensive inspection
  - Worker safety was critical
  - Production was often curtailed
  - Inspection reduced shaft time
- Initial work done at Inco in 2005
  - Joined cage compartment inspectors
  - Also joined skip compartment inspectors

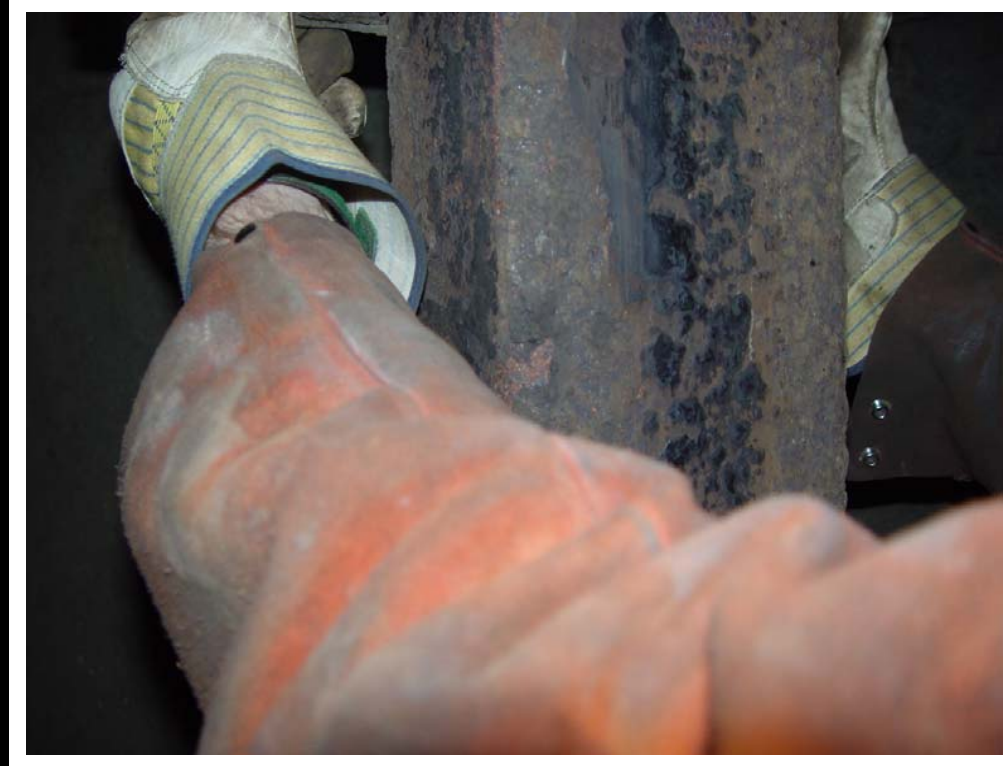
# Initial Observations

- Wooden guides tapped for sound



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- Inspect for loose metal guide bolts



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- Visual inspection
  - Set connections



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  - Wall cracks



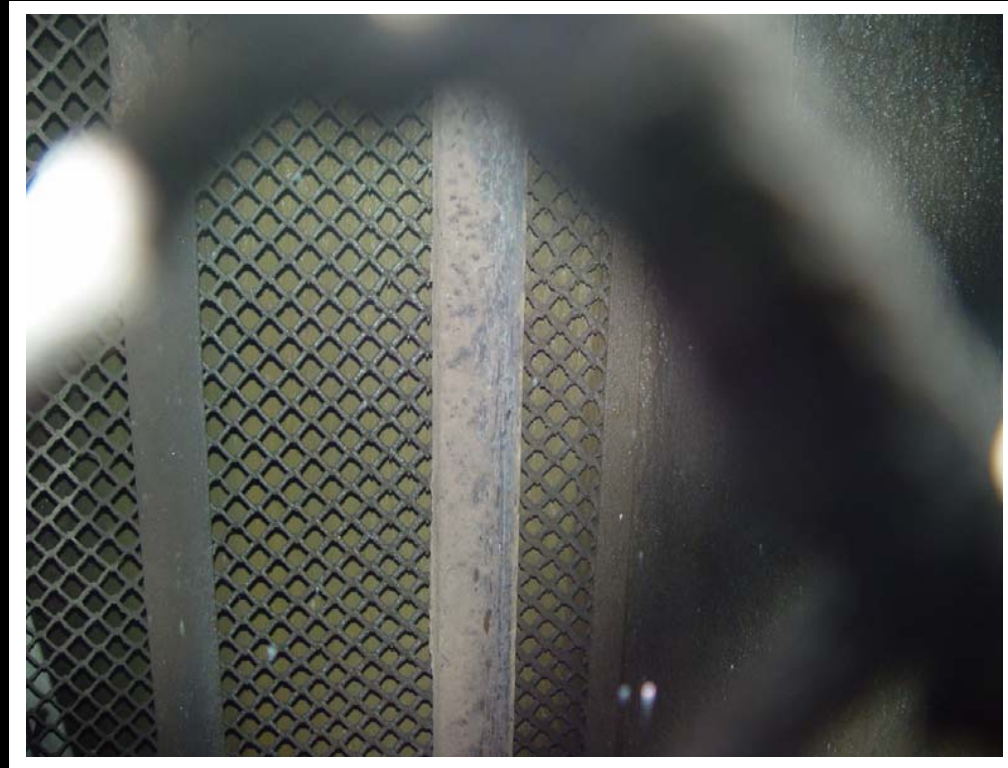
# Initial Observations

- Wooden guides tapped for sound
- Inspect for loose metal guide bolts
- Visual inspection
  - Set connections
  - Material on sets
  - Wall cracks
  - Brattice



# Initial Observations

- Wooden guides tapped for sound
- Inspect for loose metal guide bolts
- Visual inspection
  - Set connections
  - Material on sets
  - Wall cracks
  - Brattice
  - Other spaces



# Initial Conclusions

- Current manual process is
  - Slow and not always effective
  - Provides limited trend analysis
  - Has limited historical memory
- Manual activities could be automated but
  - All shafts are different
  - Research would not be trivial
- If research successful, potential for
  - increased safety
  - Commercialization

# Projected System Benefits

Increased safety due to automation

- No one on conveyance during inspection
- Complete compartment coverage
  - Guides (steel, wood, cable)
  - Brattice
  - Sets
  - Lining (cement, steel)
  - Openings off the shaft
  - Services (piping, cabling, etc)

Automated inspection at increased speed

Increased opportunity to hoist muck

# Status of Research Project

- Project is being defined in detail
- Mining companies have expressed interest
- AMIRA International to organize participation



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