Projects

- Rail
- Road
- Port
- Process
- Pipeline
Safety

OK in factory – perhaps

Not for Infrastructure – we often invite patrons to use

The rule of reciprocity, states that one should treat others as one would wish to be treated.
Pretty Concrete Tube
Useable Spaces !!

- Habitable?
- Breathable?
- Temperature Limited
- EMC

- SAFE!

- Codes and Standards barely apply – Sort-of – Or do they?
Discipline

• Not Bondage, but Team
  • Mechanical
  • Fire
  • Hydraulic
  • Electrical
    • HV
    • LV
    • Traction
    • Lighting
  • Comms
  • Acoustics

• Civils
• Structural
• Architectural
• Human Factors

• INTERFACES
• Traceable
Why service the space?

- Functionality
- Life Safety
- Maintainability / Reliability
  - RAMS
  - FMECA

Longitudinal Sectional View of an EMU car

Figure 4.2.2.1: Temperature Profile above the Air-condensers of EMU at ETS Station Platform (80% Make-up air from LTS with Reused Train-borne Air Condenser Load)
Different Systems
Key Difference

- Size
- Durability
- Programme
- Provision / Spaceproofing
- Code/Standard
Commissioning
RAMS – Not a wooly animal?

• Reliability – More than just design life
• Availability
• Maintainability – How long does it take to maintain – Not just to fix
• Safety

• By design!
Typical Redundancy
Proper Redundancy
FMECA

• Failure mode, effects and criticality analysis

• What can go wrong, how does it go wrong
• What does it do
• How big a Poo Pile are you in

• Savings !!!
Durability

• Design Life
  • Corrosion
  • Hours of operation
  • Replacement

• Reliability
  • Criticality
  • Redundancy
  • Single point failure
Not much space
Design it to minimum
Trackway vent
Size Matters Guys!

Vertically mounted Large JM Aerofoil fan.
Mine Vent

Ultra-robust technology for durable, controllable performance

PF Variable Pitch Axial Fans
Aerodynamics

• Pay attention to Concrete Farmers
• Plenums must be designed
• %age on 12kW or on 950kW
Programme

• Civils Works start early
• Provisions required early
• Mountings
• Thrust loads
• Waterproofing details
• Fire stopping
• Access to install

• Commissioning
Codes / Standards

- Different codes - NOT - No codes
- Mixture Internationally – NOT compatible
- Fire Engineering
- Programs
  - SES
  - CFD
Rail Tunnels

- Drainage
- Hydrant
- Lighting
- Emergency Lighting
- Comms
- Signalling
- Traction
- Ventilation
Road Tunnel
Jet and Axial Fans
Control Centre
Cable Tunnel

Heat
EMC
Fire
Drainage