Earth Moving Equipment
Safety Round Table

Improving Safety through Better Equipment Design: A Global Industry Project

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on behalf of the EMESRT

The burning platform

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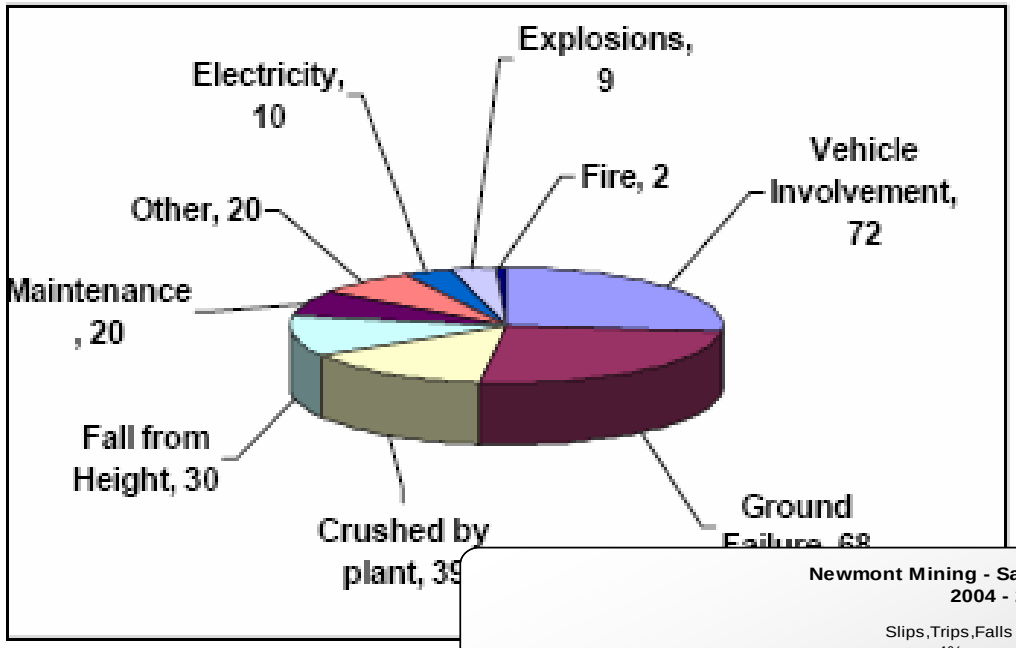
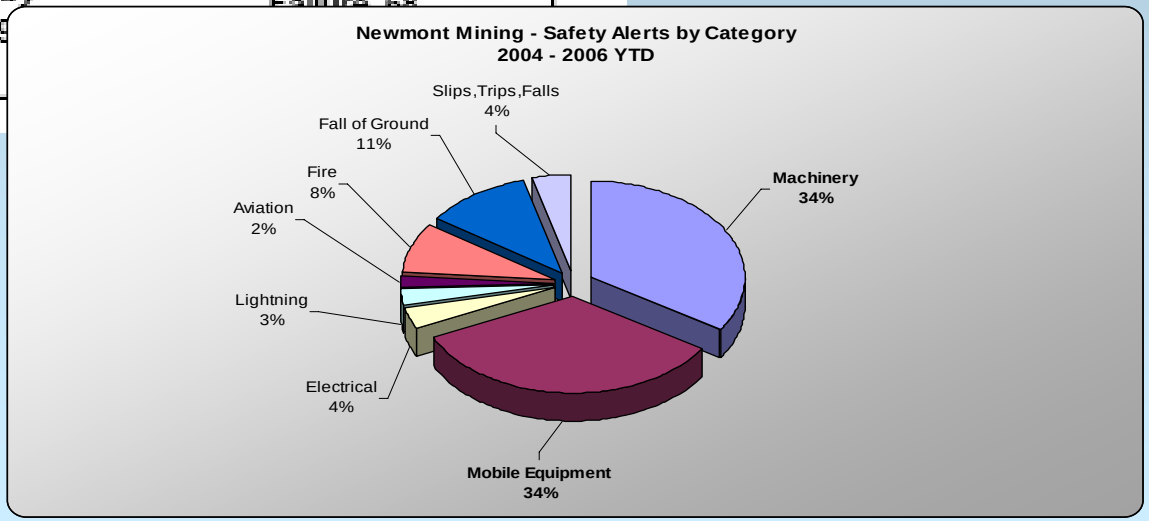
Figure 1-Profile of Fatal incidents in the Australian minerals industry 1990 to 2004





Access Risk – As Low As Reasonably Practical?

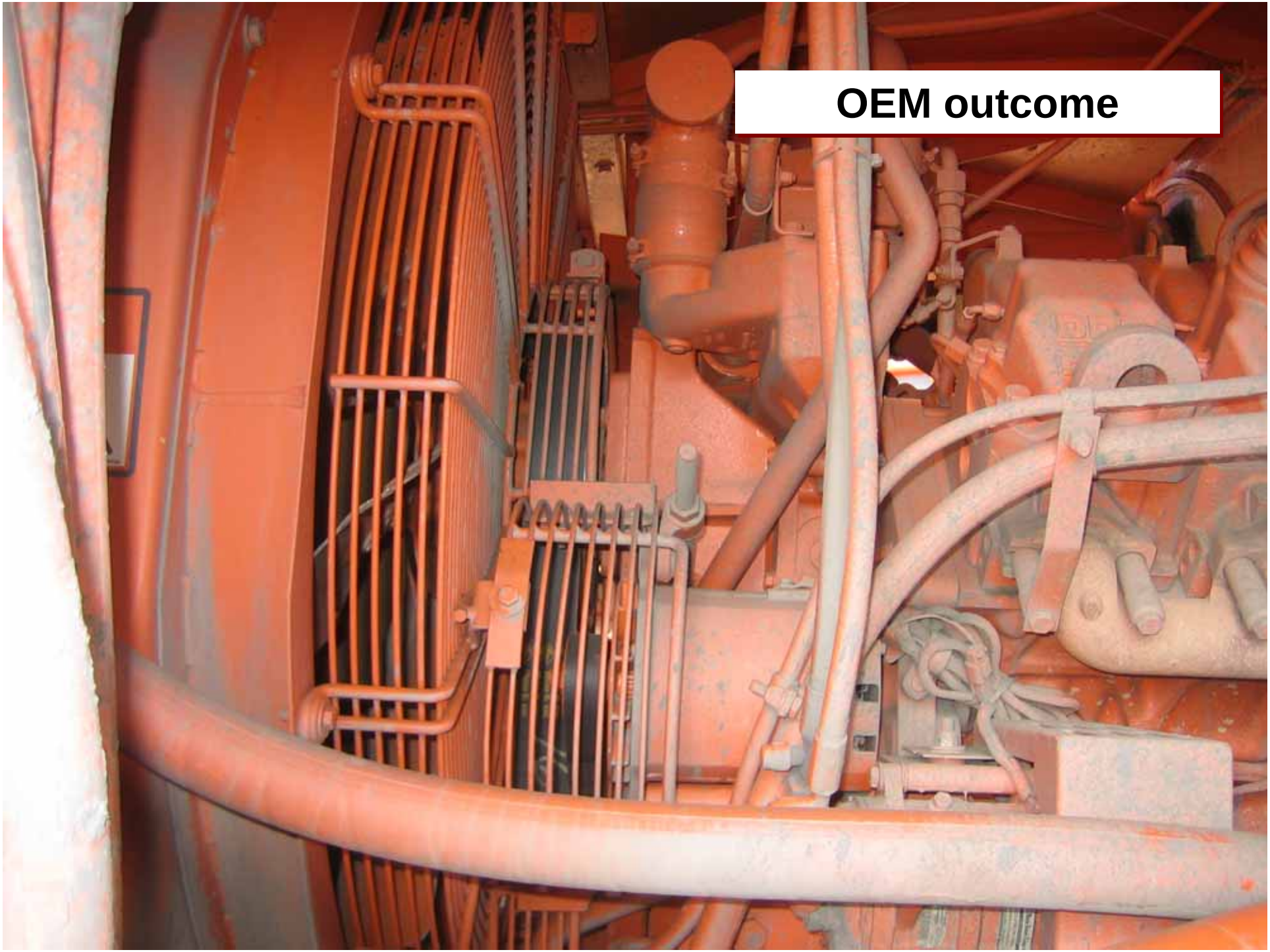

35
Do it yourself outcome

Dealer outcome

Dealer outcome

OEM outcome


Accessible moving parts risk – As Low As Reasonably Practical?


OEM outcome


Working at height risk
– As Low As
Reasonably Practical?

Dealer outcome

Customer Issues

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- Health and Safety performance – requiring improvement
- Duty of Care model – Systems Approach
- HSEC expectations have steadily increased
- Mining Companies have expanded globally
- Minimal alignment between companies

CUSTOMER ISSUES

OEM issues

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ANGLO AMERICAN
BARRICK
bhpbilliton
NEWMONT
phelps dodge
RIO TINTO
xstrata
MISHC

OEM ISSUES

CUSTOMER ISSUES

- **Base level with minimal safety options**
- **No alignment of the broad customer needs**
- **Major Supply agreements have forced some design at the factory level**
- **Too much “Static” in the message from customers**

The Design Vacuum

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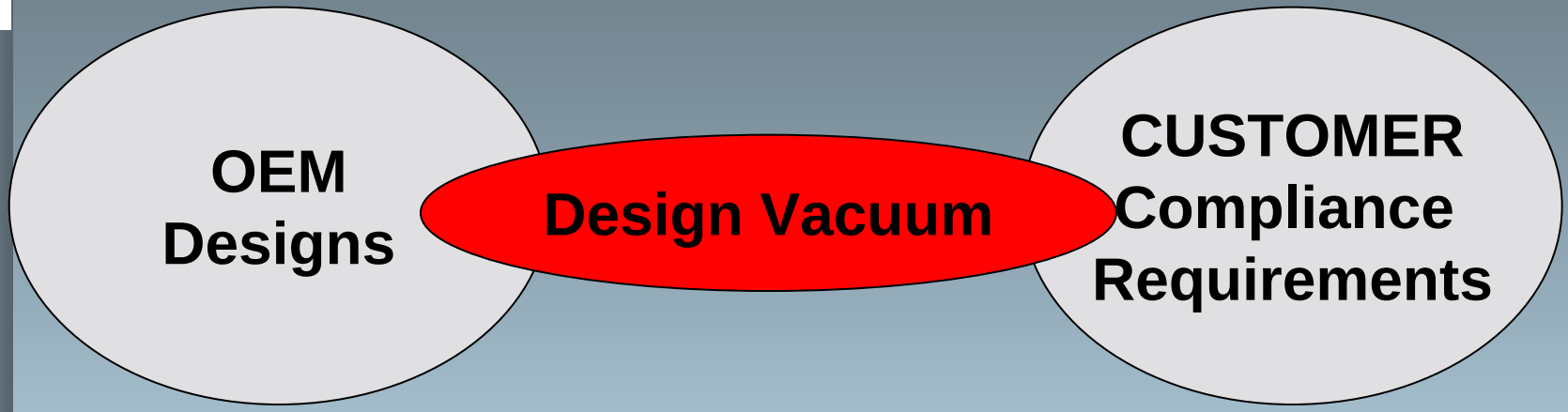

- Customers have committed resources to designs
- Customers have encouraged 3rd party designs
- Potential conflict between add on designs
- Residual risk not always identified

Local Dealer Issues

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- Lack appropriate design resources
- Not core business
- Liability not fully understood
- Long lead time to Users
- Higher costs and low level of support from dealers

Current Situation Summary

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- Customers still dictating add on solutions
- Poor integration of multiple solutions
- No consistency in application globally
- Hierarchy of controls is not applied effectively
- Major Customers trying to influence OEM designs
- OEM's are in the best position to provide a quality solution

How EMESRT came to be

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- July 05 to Apr 06 - various meetings & alignment sessions between Anglo, BHPB, Xstrata, Rio on key areas of concern , MISHC facilitated
- July 06 - Design Philosophies drafted & improved
- Aug 06 – Phelps Dodge & Newmont involved
  - Strategy for OEM engagement developed & proposed
- Oct 06 – Formal "rules of engagement" developed
  - Adoption of name EMESRT
- Late 2006 – OEM engagement commenced & Barrick involved

EMESRT Terms of Reference

EMESRT
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Vision:

- An industry free of fatalities, injuries and occupational illnesses associated with operating and maintaining surface earth moving equipment

Purpose:

- To accelerate development and adoption of leading practice designs of Earth Moving Equipment
- To minimise the risk to Health & Safety through a process of Original Equipment Manufacturer (OEM) and user engagement

EMESRT Terms of Reference

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Scope: We will:

- Focus on design of EME in surface mines
- Provide aligned design expectations based on risk
- As member companies provide resources and funding for EMESRT activities
- Share openly with all interested OEMs and companies in the industry
- Listen, consider and value OEM contributions
- Provide information on leading practice to OEMs
- Assist users with achievement of HSEC goals through sharing leading practice

EMESRT Terms of Reference

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Scope: We will <u>not</u>

- Discuss commercial issues or anything of an antitrust nature
- Provide approval for OEM or third party design
- Share OEM confidential information with other OEMs
- Impose adoption of solutions on member company sites

EMESRT Engagement Process

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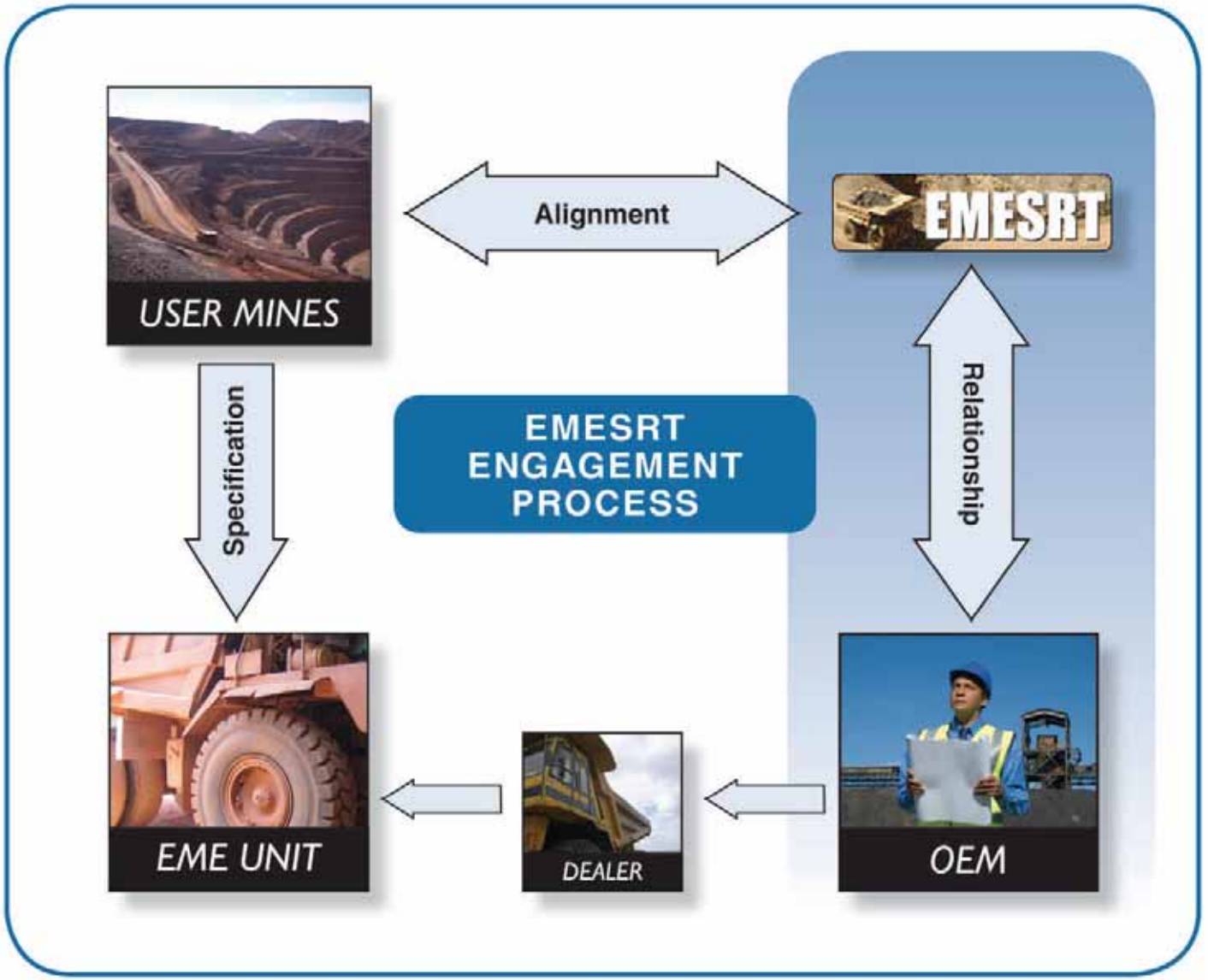

Design Philosophies – Thinking at Another Level

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- We needed a critical mass to influence OEM's
- Define the "Problem" not stipulate "Solutions"
- Let the OEM designers develop solutions
- Critique solution's ability to address the "Problem"

Design Philosophies

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1. Access & Egress
2. Working at heights
3. Noise
4. Vibration
5. Fire
6. Dust
7. Isolation
8. Visibility / collision detection
9. Machine stability / slope indication
10. Guarding
11. Displays, controls, including labelling
12. Tyre & rims
13. Manual materials handling
14. Work postures
15. Confined space

Risks to be mitigated

1. Equipment Access & Egress	
Objective	The objective is to minimise the risk of operator or primary access events related to approach, access & egress of equipment; as well as slip/trips, sprains/strains, falls from height and failure to egress in an emergency events to ALARP, including consideration in design for foreseeable human error.
General outcome	The intended design outcome should include the following: Adequate/suitable stairways, walkways, access platforms, railings, steps/grab handle combinations and boarding facilities including an alternate path for disembarking in case of emergency. Specific to hauling trucks, a priority outcome would also be ground entry to access on driver's side, with the opportunity to locate isolation and other service points (hydraulic, air) near the operator access.
Risks to be mitigated	1. Risk of collisions due to persons and small vehicles being positioned on the operator's blind side 2. Risk of collisions due to restricted operator vision from the cabin being restricted by machine access and other structures 3. Risk of slips trips and falls during access to service points and work platforms due to lack of fall from height protection, slippery surfaces, accumulations of dirt or other material or poorly lit at night 4. Risk of sprains and strains due to ergonomically difficult body positions during accessing equipment 5. Risk of entrapment should normal access be blocked 6. Risk of entrapment from a fire in the engine bay 7. Risk of explosion injury due to tyre heating on positions 1 & 2 tyres 8. Risk of injury to persons on the ground caused by objects being kicked off the access platforms 9. Risk of injury caused by fasteners, brackets and fittings that protrude into the walkways
Examples of industry attempts to mitigate risks	For haul trucks a. Ground entry to access from driver's side, with the opportunity to locate isolation and other service points (hydraulic, air) near this operator access All equipment b. Sufficient independent egresses, one of which is the normal access stairway c. Emergency egress free and unencumbered with path-to-ground as rapid as possible d. Non-slip surfaces and edges suited to operating conditions (ice, mud, etc.) e. Adequate access lighting with two-way switching from cab and ground level, step tread highlighting f. Steps designed to minimise damage in operation, minimise impact on operator visibility and minimise accumulation of material g. Guardrails that protect for fall during access h. A stable, bottom step on the access that is not greater than 400m (16 inches) from level ground i. Specialised powered access systems designed for primary access only that fail to a safe position and can only be able to lower when the machine has been parked with all implements lowered and the park brake applied. j. Kickboards that prevent objects from falling from platforms onto persons that may be below

Industry attempts to mitigate risks

2007 – 08 EMESRT Work Plan

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ALIGN COMPANY POSITIONS

- Gather issues & develop alignment expectations
- Draft 15 design philosophies (8 in 2007)
- Consider and influence relevant Standards

INPUT / ENGAGE

- Send Design Philosophies to OEMS
- Develop and transfer Operability and Maintainability Risk Assessment
- Develop a MIRMgate segment for EMESRT
- Visit and discuss all with OEMs (and monitor)
- Develop an ongoing, long term relationship

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