Safe Access & Egress on to Earth Moving Equipment. Atlantic Alliance Symposium, Orlando

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Background

- Quarry Hard Target Initiative
- High incident rates associated with use and maintenance of Mobile Plant
- No set specifications by the Quarry Industry
- No one authoritative coherent voice from the Users to the Suppliers/ Manufacturers.
Background

- Working party convened under the auspices of the QNJAC. It’s AIMS:
  - To develop best practices and solutions to minimise the risks associated with the:
    - Cleaning
    - Maintenance
    - Inspection
    - Use of Quarry Mobile Plant.
QNJAC meeting in June 2003 decision to set up a working party.

October 2003 Cannock meeting looked at scope of problem.

January 2004 at Volvo’s HQ Duxford, working group to look at Access problems.
What are the Problems?

- Perception was that poor access caused most of the accidents. Fact or Fiction?
- What Types of Mobile plant caused these incidents?
- Were the root causes operational, design related or other causes?
- If they were access related exactly how were they caused?
The following graphs are reproduced from Matthias Konnecke’s (Dipl.-Ing) presentation to the QNJAC from the Steingruchs-Berufsgenossenschaft collaboration with the Department of Surface and International Mining of the Technical University of Clausthal.

Data of accidents from 2001-2003
Accidents by Machinery Group

- Loader: 32%
- Excavator: 11%
- Trucks: 3%
- Dozer: 2%
- Other: 3%

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Distribution of Accidents Based on Design and Operation

1125 accidents in total reported in the years 2001-2003

- 57% design-related
- 33% operational
- 10% not clearly to assign
Percentage of Accidents Caused by Design

- Access system: 79%
- Cabin: 2%
- Windows, hatches: 3%
- View: 2%
- Steering and controlling systems: 3%
- Door: 6%
- Teeth loading tool: 2%

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What caused the Access Accident?

- Slipping: 48%
- Stepped on obstacle: 15%
- Twisted one's ankle: 12%
- Ice / slipperiness on ground: 3%
- Get stuck: 3%
- Ice on machine: 1%
- Jumped off: 1%
- Technical defect: 1%
- Oil, grease, dirt: 1%
- Others: 15%

Total number of accidents: 521
Access problems with Front End Shovels

- 85% of shovel loading accidents are related to Access systems
Access problems with Front End Shovels

- First step too high off the ground
Access problems with Front End Shovels

Falls from height when accessing Lights, Windows and Rams.

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Access problems with Shovels

- Access to lights and Windows
- Possible fall if using mudguard to clean off lights
Access problems with Shovels

- Unsafe Access to clean windows
- Unsafe access or system to repair ram or hydraulic pipes if maintenance required on site or at a remote location.
Access problems with Shovels

- Unguarded Landing. Have to balance on steps to open door.

- In high winds door can pull a man out of the cab
Access requirements for Shovels

- Vertical steps, not rigid & height from ground.
- Poor access to the front of windows.
- No safe & handrailed landing.
Access Requirements for Shovels

- Replace vertical ladders with inclined stairs.
- Have fixed retractable bottom step of equal rise to the other stairs.
- Have a handrail at least to one side for the whole length of the stairs.
- Provide safe hand-railed landing.
Shovel Access lowered and raised
Access Problems for Dozers

- 81% of accidents on Dozers are attributable to access problems.
Access Problems on Dozers

- Footholds become clogged with debris and damaged.
- Step spacing is ad hoc.
- Steps can be sloping rounded and slippery.

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Access Problems with Dozers

- No standards or specifications on steps.
- Access is via tracks which wear smooth or become slippery.
- Need both hands for balance or gripping handrails, carrying something can lead to a fall.
Access Problems with Dozers

- Handholds are spaced out and not continuous.

- Handrails are not present on smaller machines.

- Intended access systems are so poor they often encourage jumping to the ground when dismounting.
Access Solutions with Dozers

- One possible solution: The Safe-Away stairs by Hedweld Eng. Ltd.

- Access system folds away and machine can not be started until it has been.
Dozer Access

Stairway stowed away safe from damage.

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• Another possible solution by Hedweld to more safely access a large Dozer
Access Problems on Excavators

- 77% of accidents related to Access on 360 Excavators.

- Note: requirement to position cab so as to allow first step onto tracks.

- No landing, door opens outwards, poor handholds, dirt clogged footrest.
Access Problems on Excavators

• Imagine risks if carrying something such as fuel hose see fuelling up point

• Note: footstep unusable Handhold out of reach.

• Offside access is often required.
- Note height of first step and where tracks would hit shins of the leg.
- A vertically extended cab modification exacerbating access difficulties.
Safe Access on to Excavators

- Retrofitted safe access system allowing rigid steps without need to use tracks.
- Limit switch fitted to prevent slewing mechanism when steps are down.
- When steps are raised they become an extension of the walkway handrails.
Access Problems on Dump Trucks

- 67% of accidents on dump trucks are access related.

- Most are concerned with steps below bumper level.

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First Step onto a Large Dumper

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Access on Dump trucks

- Examples of poor Access

- Width of door too wide to clear handrails so gap left to fall through.

- Door webbing strap is the control measure to prevent door opening even further.
Access Problems on Dump Trucks

- Possible solutions:
  - Weld on secure door stops.
  - Strengthen walkway supports and make them wider to allow door to open
Access Problems on Dump Trucks

- It is possible to gain access to the engine side of truck or to clean windows with insufficient width for foot placement and only widow grab rail to prevent a fall.
Access Problems on Dump Trucks

• Articulated dump truck with better access but still first step too high, vertical steps, no continuous handrail.

• No moulding to prevent foot slipping sideways off the steps

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Access Problems on Dump Trucks

- Again reasonable walkway width around engine compartment but nothing provided to prevent a nasty fall 1.5m from a careless step backwards.
Safe Access on Dumpers

- Industry looking for the same basic principals on safe access as for Shovels I.E.
- Stairways, instead of vertical steps (less than 80 degrees) from the front or sides of the machine, and retractable.
- Step risers at regular intervals, first step equal to the others fixed not flexible, non-skid treads with sideways slide protection. Tread depth for steps 130mm min, for stairways recommendation 300mm.
- Handrails continuous at least on one side and ergonomically positioned.
- Access from cab on to a safe hand-railed landing.
- Stairs able to be lit from ground level.
Safe Access on other Mobile Plant

- No Handholds on moveable parts such as doors and hatches
- Safe access to be able to clean windows lights or reach fluid top up points, most should be reached from ground level.
- Suggest railings around all maintenance walkways above say 2metres.
- Suggest kicking boards around walkways to prevent slipping sideways and tools falling during maintenance.
- Anti slip material on all walkways and maintenance areas
Improved Access from Hedweld Eng.Ltd.

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Dumper Access system
Access on to Drill Rig.

- Drill Rigs seem to be notorious for poor access.
- Extra landing has been retrofitted.
Access to Drill Rig Mast

- No safe system designed to access drill masts stuck in the raised position.

- Photograph depicts retractable locking wire to assist fitters climbing the mast to prevent a fall.
Drill Rig.

Access System in raised position

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Access system lowered.

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Safe Access on Vehicles

- Trucks/Lorries

- No official statistics but local contacts with other Companies indicate:
  - 35% of injuries at Depots/Terminals relate to Tipper drivers
  - of which typically 60% are slips and trips accessing cabs and vehicle bodies.
Safe Access on vehicles

- THE TIPPER LORRY
- Question: With almost every site having to sheet their vehicles due to H&S Env. & Planning laws, why are tipper vehicles supplied not fit for purpose and with no safe system for sheeting?
- i.e. Cab or at least ground operated automated sheeting system.

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Poor vehicle Access

- Typical safe access onto vehicles
- First step too high.
- Inadequate handholds
Considerations: Safe Access

- Safe Access systems: Carefully designed. Compatible with the machine. Fit for purpose.

- Assess actuation own risks. i.e. Electrocution, Fire, pinch or entrapment points, wear causing mechanical failure or sudden collapse.

- Assess: Cost of system and extra maintenance, weighed against Injury incidents and possible claims.
Considerations: Safe Access

- Design windows to automatically heat up and de-ice and wipers clean maximum area of glass.

- Suppliers to risk assess and detail to fitters how best to safely maintain equipment.
Considerations: Safe Access

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The Future...

- Realisation by Quarry managers that they are accountable for injury absence and claims to bottom line figures, not just plant efficiency.

- Competition of Manufacturers/Suppliers resulting in more focus on customer requirements.
The Future...

- Improved safe Access will reduce Accidents.
- Automated systems are expensive, but on large new models they should be justifiable.
- Companies to look at retrofitting cheaper access systems on a rolling program for at ‘risk plant’.
- Plea for HSE to join with Industry to increase awareness, disseminate Information on access modifications, & pressure on Manufacturers to redesign new and retrofits for existing plant.