



# 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.

# Scope of QNJAC Working Party.



- 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?



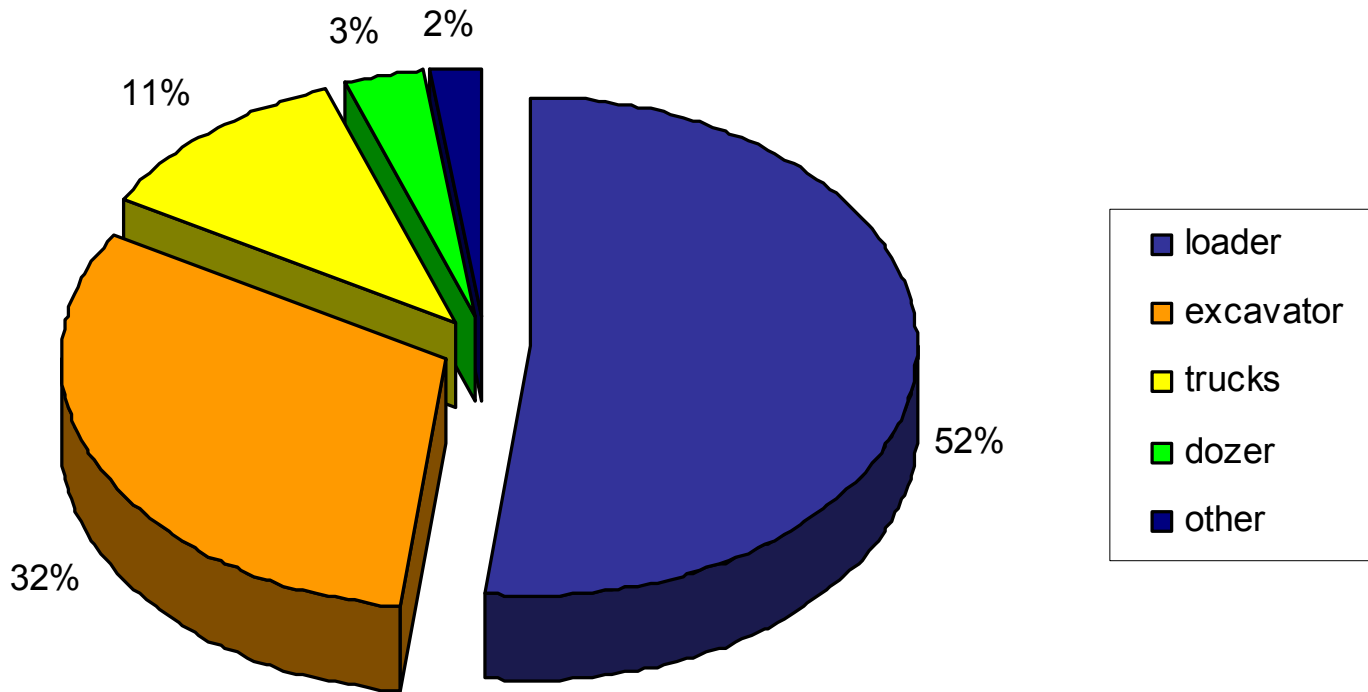
- Perception was that poor access caused most of the accidents. Fact or Fiction?
- What Types of Mobile plant caused these incidents?
- Were the root causes operational, design related or other causes?
- If they were access related exactly how were they caused?

# The Facts on Access Incidents.



- 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

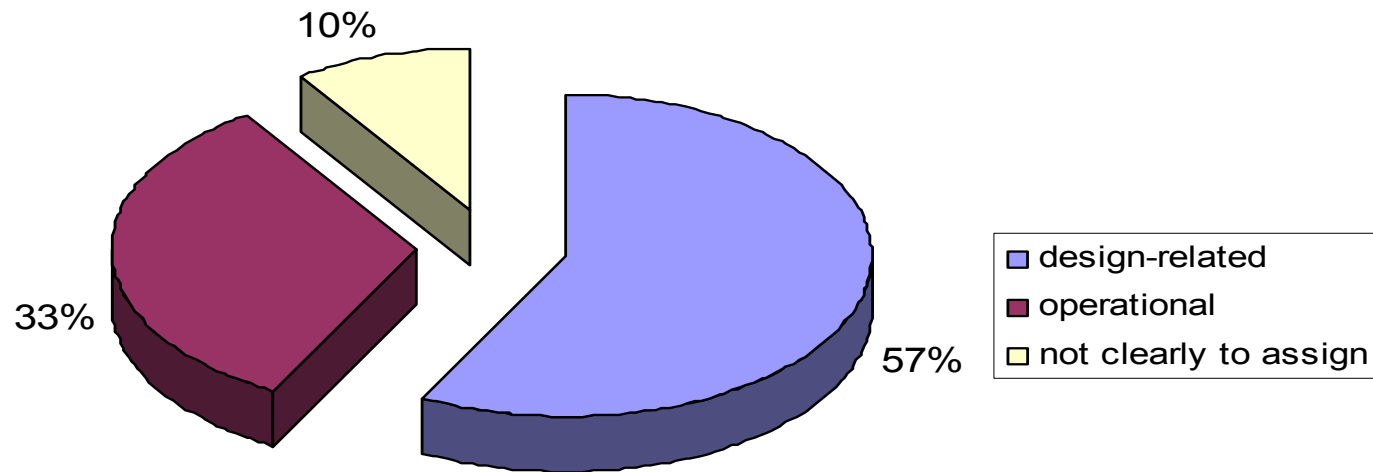
# Accidents by Machinery Group



# Distribution of Accidents Based on Design and Operation

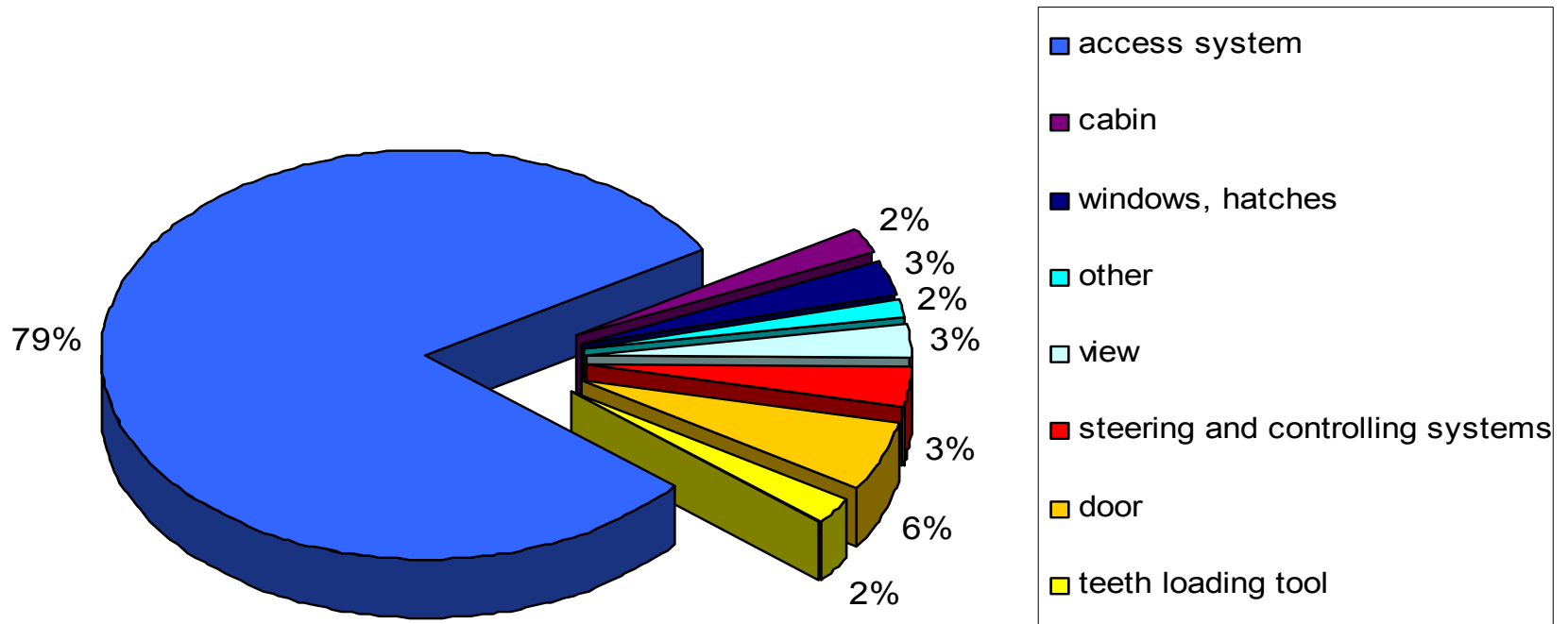


1125 accidents in total reported in the years 2001- 2003

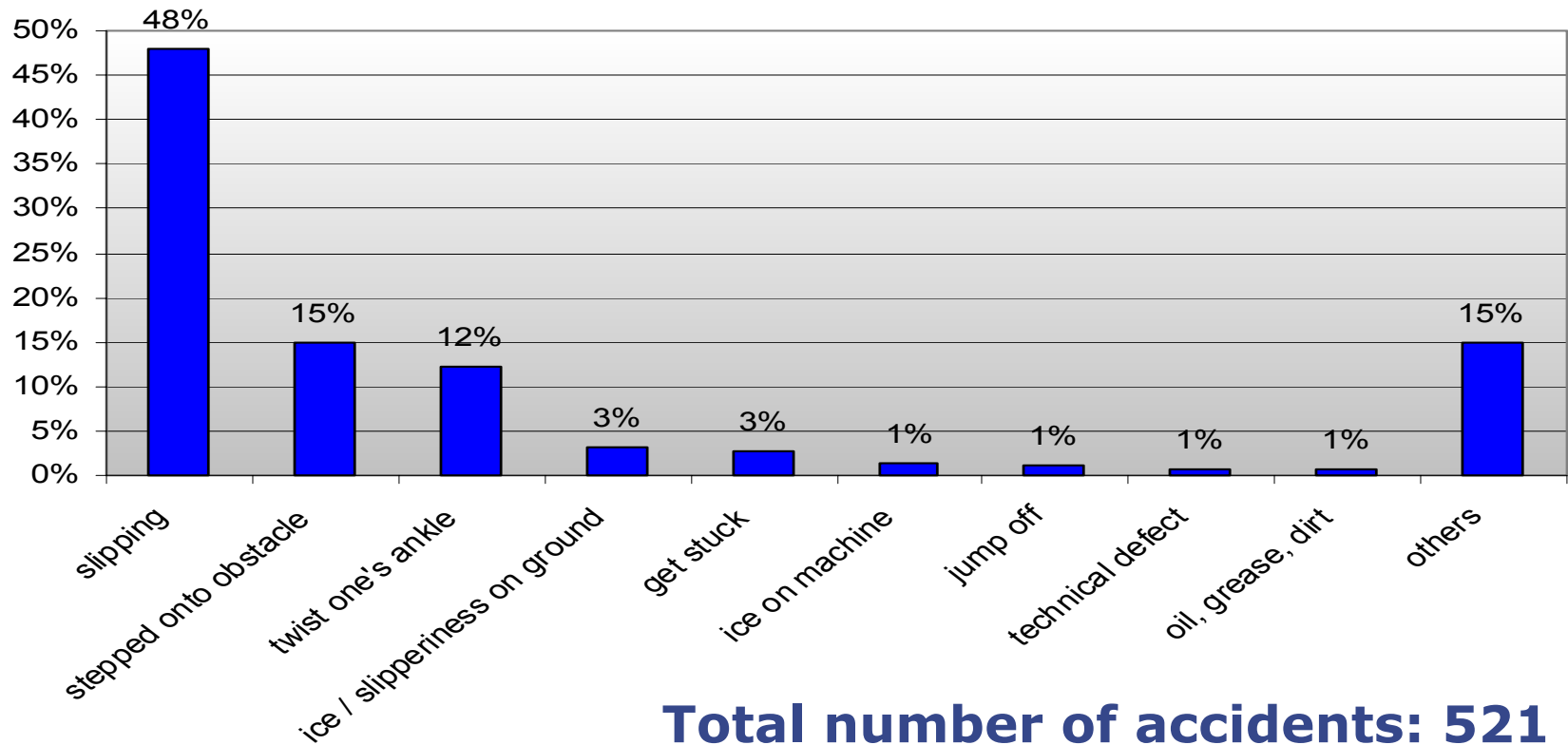




# Percentage of Accidents Caused by Design



# What caused the Access Accident?



**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



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# Access Problems for Dozers



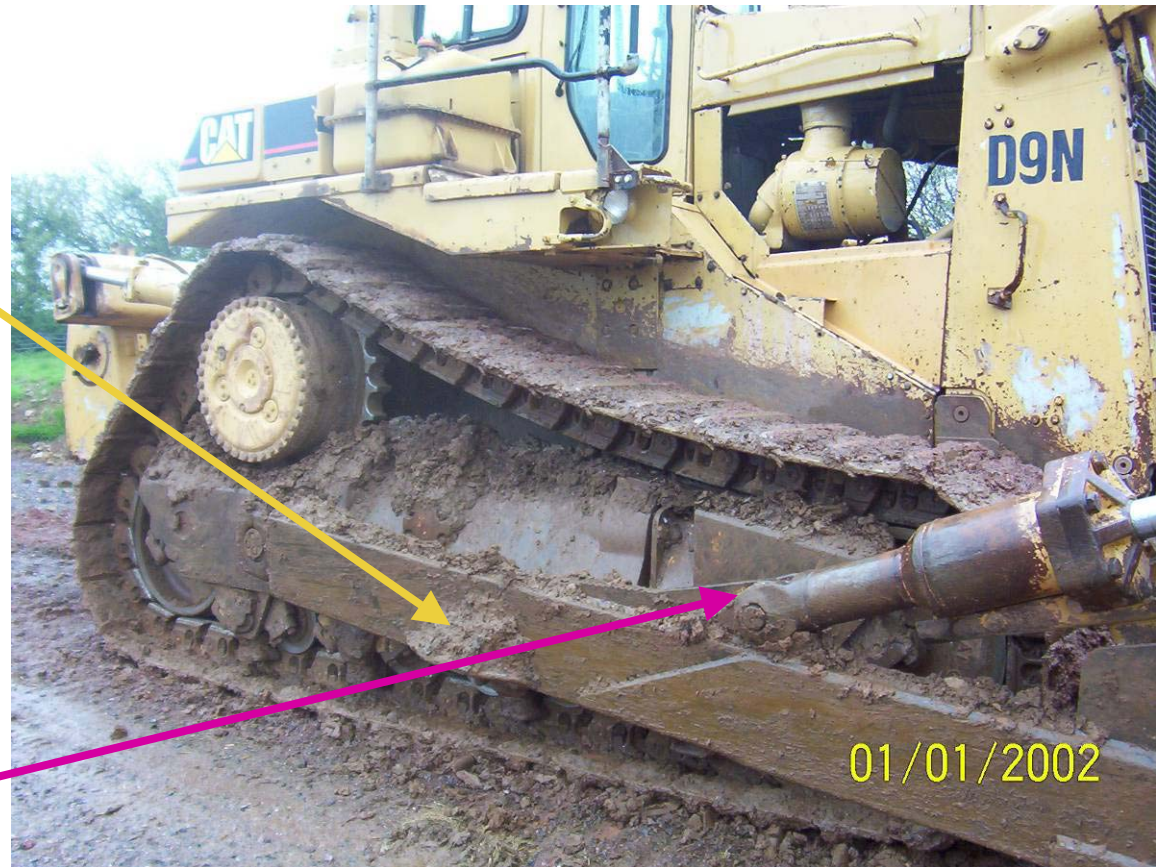
- 81% of accidents on Dozers are attributable to access problems



# Access Problems on Dozers



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



# 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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# Safe Access on to a Dozer



- Another possible solution by Hedweld to more safely access a large Dozer



# Access Problems on Excavators



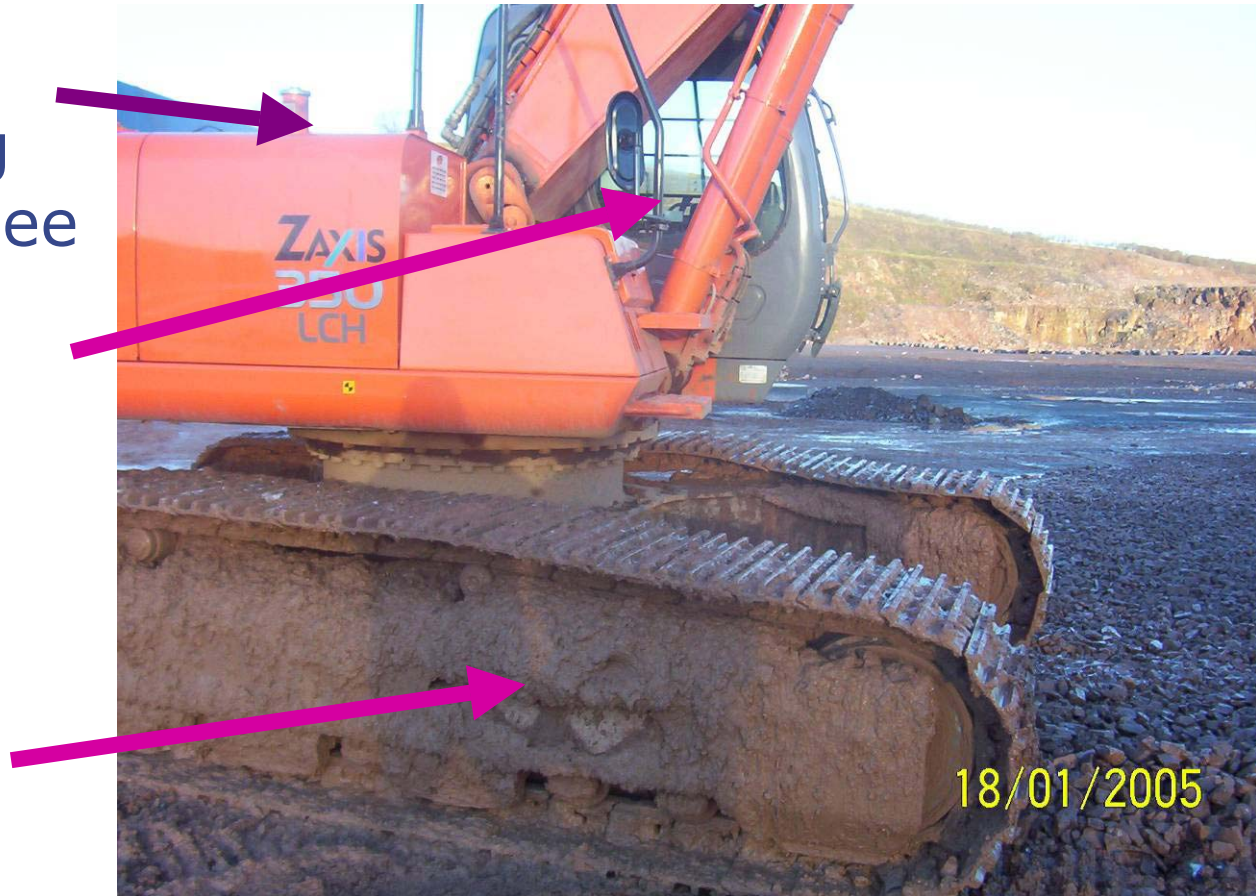
- 77% of accidents related to Access on 360 Excavators.
- Note: requirement to position cab so as to allow first step onto tracks.
- No landing, door opens outwards, poor handholds, dirt clogged footrest.



# 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.



18/01/2005



- 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.



# 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 window 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



# 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.

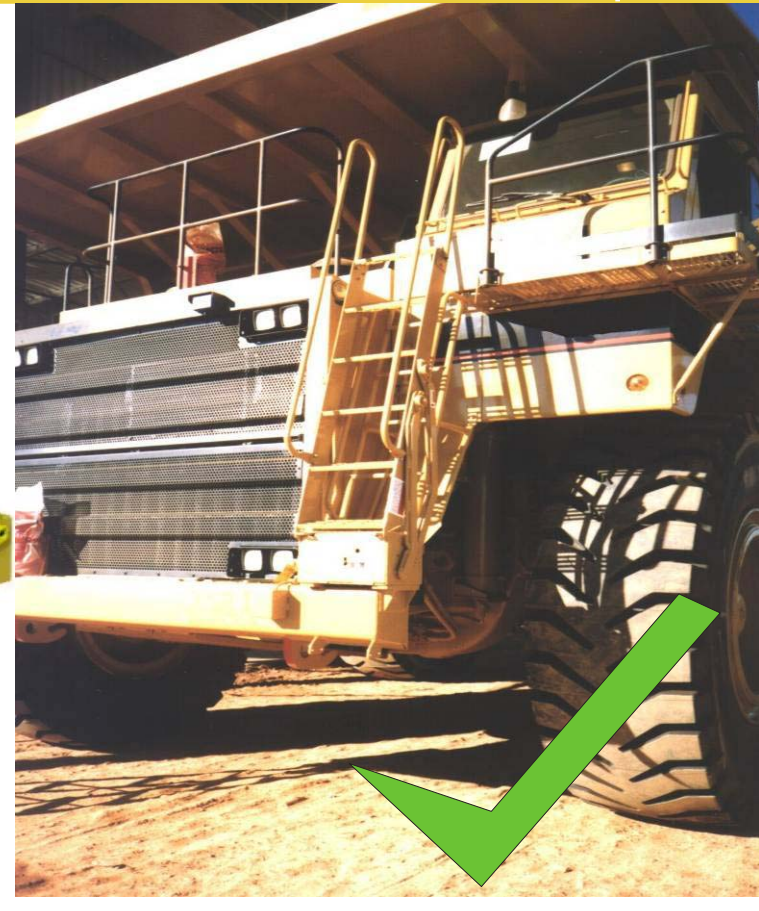
# Safe Access on other Mobile Plant



- 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



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# 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



# Drill Rig



Access system  
lowered.



# 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.



# 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.

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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.