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Integrating
management and
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Safer by Design - The Practicalities

by Rory Graham

Director, IM&S Solutions

on behalf of:



Why do want design changes?

Some facts

- 1% of the worlds population is in mining/quarrying (or at least related to mineral extraction).
- Accounts for 8% of the worlds occupational fatalities.
- The Cement Sustainability Initiative (originating from the worlds top 22 Cement Companies) state 47% of their 200 fatalities a year are related to Mobile Plant, both on and off site.



Why do want design changes?

Sometimes it's our fault!



Inattention, falling asleep,
driving to fast for the
conditions, overloading



'Sometimes' it has nothing to do with poor design!

We just break the rules...., or we turn a blind eye!!!!



More often than not it's ordinary guys just trying to get the job done with no hassle!

- How else can he clean the windows so that he can see out safely?
- Where is the safe working platform or handrail?
- Better still why are there not better designed mudguards to reduce mud splatter in the first place?



More often than not it's ordinary guys just trying to get the job done with no hassle!



Stupid way to top up a radiator yes, but why not design all fluid checks and top up points from ground level.

Note also the gap in the handrail when the door is open!



Why do we want design changes?

- There is hardly a quarrying company in the land that does not have these type of Incidents / Safety Alerts.
- Too easy to say 'I told the operator to take more care next time'!
- Often the root cause is Poor or inadequate design.

Hanson UK

Aggregates & Asphalt SAFETY ALERT

Mobile Plant Access & Egress

While leaving the cab of his loading shovel an operator jarred his back. He did not secure the door & also did not realise that the fixed handrail was wet causing him to lose balance & fall from the bottom step.



To ensure safe access & egress:

- Inspect steps & handrails
- Ensure that doors with handrails attached to them are safely secured
- Ensure steps & handrails are clean
- Always maintain 3 points of contact
- Be extra vigilant when entering or exiting mobile plant in wet or cold conditions

safe work healthy life

Why do we want design changes?

EXAMPLE:

- You can open this cooling fan cover, which only has a rubber latch securing it, whilst the fan is still rotating!

Case 921E Wheeled Loaders

ANY SITE CURRENTLY USING ONE OF THE ABOVE MACHINES SHOULD CHECK FOR THE FOLLOWING

A Joint Venture site has recently purchased a brand new Case 921E Wheeled Loader. It has been found that the guard covering the large cooling fan is made so that it can be swung open to allow cleaning of the radiator matrix. The guard is secured by a simple rubber latch and can easily be opened with the fan running.



If you have any Case machines on your site you should check if the guards are secured correctly. If they are similar to this example you should take immediate action to reduce the risk and seek advice from your supplier about having the guard suitably modified. All guarding should be securely fixed in such a way that a tool is required to remove them.

Problems arising from poor design!

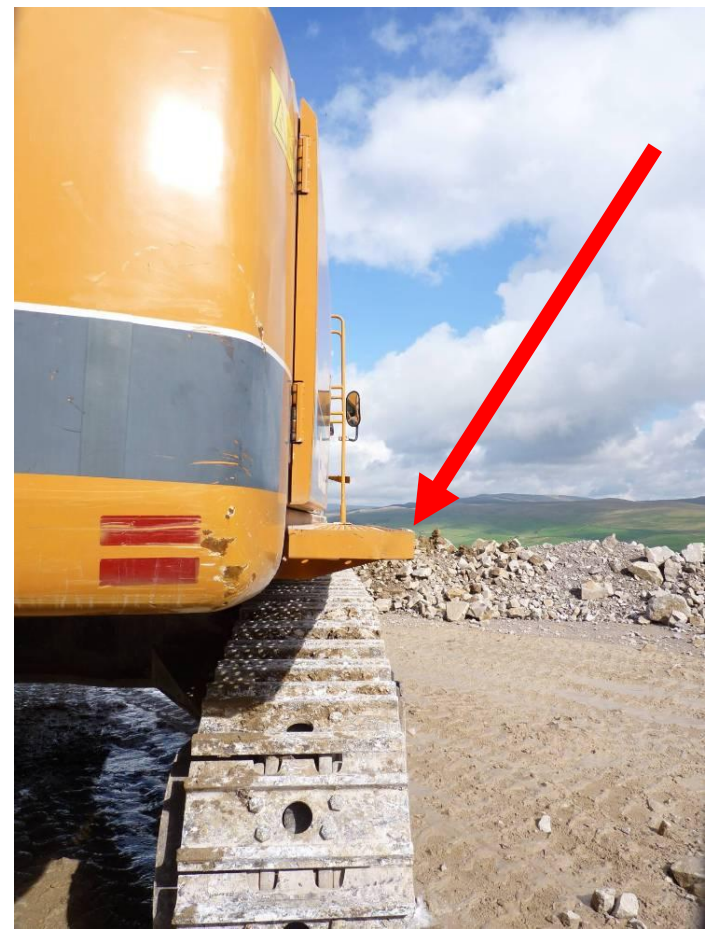
- How do you Access the inspection points, without contravening the working at heights regulations?
- No fall protection provided!
- Is there satisfactory fall protection ?
- Who will be held accountable for a life threatening head injury to an employee?



Pick up truck stands 1.8 metres to the roof, how high does this make the top of the access ladder?



What prevents operator from falling off these walkways?



Why do we want design changes?

The operator of this machine fell and broke his right heel bone!

I would suggest this was an accident waiting to happen!



Why do we want design changes?

Engine covers:
Accident waiting
to happen?



Why do we want design changes?

VISIBILITY:

You all know the dangers of Mobile plant blind spots. But mirrors and CCTV, should be designed and fitted correctly, not have to be retrofitted by contractors.



Bolt on equipment issues can cut down on visibility!



Even Well designed safety items like air bags can cause unforeseen problems!!



Machines new in 2007

Examples of Design Challenges



Easy access to cab?
NO! (Man is 2m tall)
First step is 500mm high and far too flexible

Safe to clean the windscreen? **NO!**
Slippery, sloping surfaces
– unsafe foothold

Safe access to fuel filler?
NO!
Tracks should not be used as access
Fuel filler should be accessible from the ground

Easy access for checking fluid levels?
NO!

Unfortunately when Humans fail, they fail to danger!



It's a joint effort, Users and Machine Designers need to work together to reduce accidents.

Hence 'Safer by Design': *Objectives*

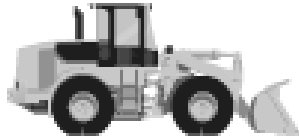
- To **collate**, from Users, **voluntary Best Practice Guidance** on health & safety features for new and re-engineered mobile plant.
- To **work within** the European/International **standards** framework.
- To **ensure** 'Safer by Design' is **communicated** effectively to all stakeholders.
- To **involve** the employers, employees *and* the 'supply chain' in working together towards achieving **Zero Harm**.

'Safer by Design': *Spin Offs*

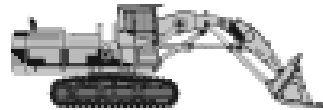
- **One source** for **agreed 'core'** items for each size and type of plant (i.e. the quarry industry, to sing from the same hymn sheet).
- For Manufacturers' and Suppliers to see what the users want as **standard items (we call them core items)**.
Standard means fitted as standard within the price, not added extras.
To be included within the machine warranty.
For manufacturers to supply 'spares and repairs'.
- To act as a forum for Users and Manufacturers' **to talk to each other** about our ideas and requirements.
- **Information tool**, to give you the users an opportunity to see that there are good design options out there, and preventive controls measures are possible.

'Safer by Design': *Plant Categories*

➤ Loading Shovels



➤ Excavators



➤ Bulldozers

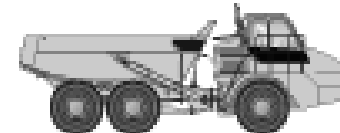


➤ Dump Trucks

✓ Rigid



✓ Articulated



➤ Mobile Crushers and Screens



(Thanks, Caterpillar!)



Web pages accessed via:



In 2009,  adopted 'Safer by Design' as a UEPG Project





Stay Safe, Stay Alive, Stay Healthy
Who is Responsible for Safety?
Everybody On Site & Around Us



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Welcome to Safequarry.com



Intro demo video
➤ [Click here to play](#)

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Awards won by safequarry.com





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- ▶ BULLDOZER
- ▶ EXCAVATORS WHEELED
- ▶ EXCAVATORS TRACKED
- ▶ DUMPTRUCKS ARTICULATED
- ▶ DUMPTRUCKS RIGID
- ▶ MOBILE CRUSHERS AND SCREENS
- ▶ MACHINE INDEX



- Access Systems
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DUMPTRUCKS RIGID

[MACHINE SIZE](#)
 S
M
L
 CHECKLIST FOR MY PLANT

Maintenance		<input checked="" type="checkbox"/> = core ? <input type="checkbox"/> OPT↑ or <input type="checkbox"/> OPT↓ = optional ?			
1	Service points - All daily checks capable of being carried out at ground level (electronic readouts can be located in the cab)	✓	✓	✓	
2	Service points - All daily checks capable of being carried out from a safe working platform (electronic readouts can be located in the cab)	N/A	N/A	N/A	
3	Service points - All daily checks capable of being carried out at a grouped service point at ground level	OPT↑	OPT↑	OPT↑	
4	Service points - All daily checks capable of being carried out at a grouped service point from a safe working platform	N/A	N/A	N/A	
5	Service points - All service points to be adequately lit and switched from ground level	✓	✓	✓	
6	Lighting - Engine bay to be adequately lit for servicing with options to switch on or off	✓	✓	✓	
7	Fuel points - Refuelling from ground level	✓	✓	OPT↑	
8	Fuel points - Refueling from a safe working platform accessed from a stairway requiring only three points of contact	N/A	N/A	✓	
9	Fuel points - Refuelling point from ground level fitted with formula 1 type fast fill and connection point, such as Wiggins/Banlow type	OPT↑	OPT↑	OPT↑	
10	Service points - Machines to be fitted with an autolube system for all greasing points (except rotating prop shafts)	✓	✓	✓	
11	Service points - Machine fitted with a facility to remove oils to enclosed containers to prevent an inadvertant spillage	OPT↑	OPT↑	OPT↑	
12	Service points - Maintenance hatches shall be designed such that once opened they can be retained in the open position and require positive pressure to close, i.e. they can not slam shut unexpectedly	✓	✓	✓	

- ▶ BACK TO TOP
- ▶ PRINTER FRIENDLY VERSION

**There are sound safety
designed items out there!**

We start work early and
sometimes finish late.
We need to have lights
particularly when getting on
and off machinery.
Cost approx: £235
New ISO Standard will only
fit when cab height is
above 3 metres!!!



More equipment to prevent injury/damage



More equipment to prevent injury/damage



More examples of side and rear sensors



Sharing best practice and lessons learned

- Mineral Products Association, MPA
www.safequarry.com
- GB Health & Safety Executive, HSE
www.hse.gov.uk
- Safety Alerts internally and from our competitors!
- Accident reports, route cause analysis and panel of enquiry
- Operator knowledge, skills and experience



The screenshot shows the Safequarry.com website interface. At the top, there are navigation links for 'Home', 'About this site', 'BEST PRACTICE', 'INCIDENT ALERTS', 'HOT TOPICS & GUIDANCE', 'TOOLBOX TALKS', 'CPD reports', and 'Links'. A prominent banner reads 'Welcome to Safequarry.com' with a background image of quarry workers. To the right, there is a 'REGISTER for email alerts' button and a 'SAFER BY DESIGN Mobile Plant' logo. Below the banner, there are several promotional boxes: '2010 BEST PRACTICE AWARDS ENTER NOW!', 'mpqc Click here for training', and 'Awards won by safequarry.com' featuring 'winner 2007' and '2007' logos. A 'CPD MATERIAL' badge is also visible. At the bottom of the banner area, there is an 'Intro demo video' button with the text 'Click here to play'. A small disclaimer at the bottom of the page states: 'This site has been produced by the Mineral Products Association, its members and partners and supported by the Mineral Industry Sustainable Technology (MIST) Program. The Minerals Products Association hereby grant visitors to this website access to these pages conditional upon your agreement to indemnify us and not hold us liable for the result of any actions you may take based on the information contained herein. While every effort is made to ensure the accuracy of the content of this website, this cannot be guaranteed. Click here for full terms.'

Examples of best practice . . . *but all are retro-fits!*



Mirrors; Guard-rails; fuel fast-fill

'Blind-side' camera

Protected from damage

Brilliant design idea by Metso

Panel that slides out giving excellent access to the engine compartment, whilst providing 'Fall Protection' to the rear and can be slid away when travelling.



Brilliant design idea by Marubeni Komatsu



Fixed bottom step operated hydraulically by the operator, with fail safe should the engine stop plus a warning sound when it moves, if requested to be fitted

These might have been prevented by an inclinometer!





These can be fitted to both rigid and articulated dumpers, even shovels to assist in levelling out quarry sites.



Earth Moving Equipment Safety Round Table

RioTinto



With friends like these . . . !

Australia's



+

Europe's



together . . . address

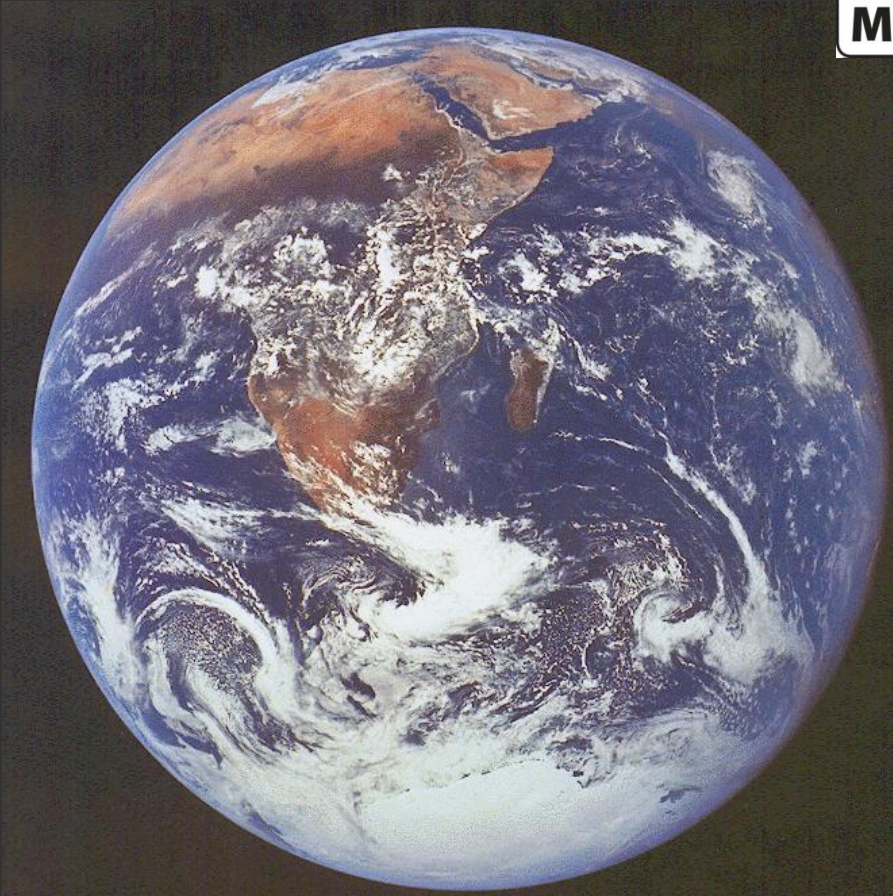




+



*a single
convergent
global issue*



UNIFIED AIM: ZERO HARM

*Thank you for
listening . . .*

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