SAFETY
as applied by Metso Minerals
on mobile and stationary crushing and screening equipment

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Safety on MM mobile equipment

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Safety on MM mobile equipment
Our safety philosophy

• Conformity with standards, directives and regulations - in all market areas we serve. This concerns:
  • the way we work
  • the products and services we deliver

• Functionality - safety equipment must
  • provide full protection
  • must be functional - not prevent the machine to be used for its purpose or maintained

• Innovation
  • always search for ways to improve the safety - in details, and in larger scale
Safety on MM mobile equipment
Standards and directives - Current

• Still today, there is no safety standard specifically for mobile crushing and screening equipment

• General machine safety standards are applied - which is challenging sometimes
Safety on MM mobile equipment
Standards and directives - Coming

**ISO/DIS 21873**
Building construction machinery and equipment - Mobile crushers
- Part 1: Terms and definitions
- Part 2: Safety requirements

- The new ISO standard will standardize the safety related definitions and their interpretation
- Metso Minerals has been participating the work
- Approved as DIS* Early 2008
- To be published September 2009
- Scope Track and wheel mounted crushers
- ISO standards are applied globally
- This ISO standard is most likely to be published as European EN/ISO standard as such at a later date

*DIS - Draft International Standard
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Our safety philosophy - Innovation

Detail 1.
Hydraulic locking of the hopper walls
• Safety hazard eliminated

Detail 2.
Moving platform
• Safe and easy access to maintain the diesel engine and its accessories
Safety on MM mobile equipment
New solutions available - IP Process Display

IP Process Display installed to the excavator cabin

Reduces the operator presence on the machine
=> improved working safety

Helps the operator to run the machine steadily and constantly loaded
=> maximized capacity
Safety on MM mobile equipment
New solutions available - IP Process Display

Camera view
• Visual observing of the material flow
• Combined with remotely controlled hydraulic breaker, enables remote release of feed material blockage

Feeder and crusher log
• Feed instructions: more/wait/stop
• Feeder and crusher load history
• Event history
Safety on MM mobile equipment
New solutions available
High Pressure Dust Suppression System

Three Stage Lokotrack Plant equipped with HPDS
• Water pressure 30 bar / 450 psi
• No of nozzles 20 pcs
• Water cons. 650 l/h / 170 gal/h

Benefits vs conventional (4 bar / 60 psi) suppression system
• Fine water particles eliminate dust much more efficiently
• Lower water consumption, as the conventional system would consume about 3000 l/h / 800 gal/h
Safety on MM mobile equipment
On going developments - Noise reduction

• Features - such as mufflers, noise insulated engine hoods, feed hopper rubber liners - have been part of MM offering for many years
• Further noise reduction is still required to improve working safety, and to get work permissions in urban areas
• Promising test results achieved with the mobile noise cover:
  • 4,2…4,5 dB(A) reduction
This presentation is to give the viewer a brief overview of what is entailed in the design and implementation of safe operating practices of process machinery.

The boundaries to make a safe and successful delivery of either a single piece of machinery or an entire turnkey system entails a myriad of factors. The single most important item, and the one that drives any item listed in the following pages is this tenant: A safe workday gets you home to your family every single night.
NAM Systems Safe Operations Design Practices - Workflow

The following workflow chart defines major considerations as they apply to safety implementation.

- Customer
- NAM Systems Process Equipment
- Process Flow
- Operator/Maintenance Accessibility
- Budgeting
- Original Design
- Presentation to Customer
- Acceptance
- Redesign
- Delivery/Vendor Organization
- Implementation
- Site Safety Risk Management
- Delivery (Equipment Only)
- Construction
- Post Construction Audit
NAM Systems Safe Operations Design Practices – Considerations

Dust, noise and vibration must be kept in mind while designing the control system. The plant or equipment operator must keep alert and informed as to the processes that surround them.

An example of operator comfort to maintain these parameters are shown in the picture below.

This control structure is separated from the crushing tower foundation and electrical wiring is connected via flexible conduit between the two structures.
NAM Systems Safe Operations Design Practices – Lead Agency Considerations

On governmental levels, safe practices pertaining to mechanical and electrical controls have established and evolving guidelines. Customers will parallel or exceed these guidelines in some instances. Below is an example of some of those guidelines on NAM Systems conveyors.

Mechanical Guarding
Pinch Points
Pulleys

Electrical
Motor Disconnects
Emergency Stops
System Interlocks

Rotating Drives
Return Idlers
Walkways and Stairs
Providing the equipment is sold by NAM System, risk management of the site at the onset of the project takes precedence. This management ensures the customer and all trades are well aware of the risks involved at the process. A customer’s ongoing operations are almost always present and will be ongoing during construction. These photos show the value of planning.
The following photos detail the necessity of a clean work environment. Scope can take on any size and shape. Once a safe and clear working area is established, layout of equipment minimizes the risk of equipment and personnel interface during the initial stages of construction.
Once construction begins, an NAM Systems site manager continues their role of risk management by knowing his contractor tasks and paying strict attention to methods of safe work practices. The following construction photos are samplings of co-operation required between all parties involved in a project.
NAM Systems Safe Operations Design Practices – Implementation (Cont’d)

Although engineering endeavors to incorporate safe design in all aspects of the process, it is virtually impossible to mitigate those risks in the design phase. Therefore during construction and at the commissioning phase, audits are performed to ensure the spirit and intent of the lead agencies and customer. NAM Systems refuses to accept an unsafe work area and will discuss additional safe work practice options with customers during these audits. The photos reflect some of those additions.

Define and Mark Work Areas

Define Mobile Equipment Access and Exit Work Points

Protect Workers

Affix Hardware for Additional Handrail Stability
THANK YOU!
…and safe crushing!