



Plant Safety in the Mining Industry Risk Management

SP Solutions – May 2007



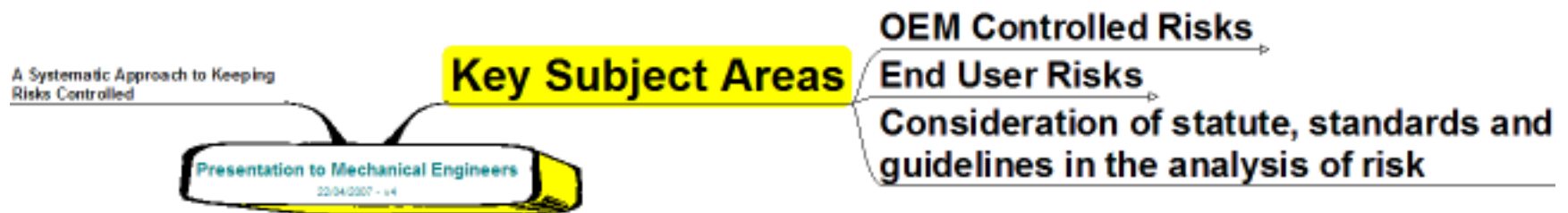


Overview of Presentation

- Key Subject areas to cover
- How to meet the requirements of statute
- A systematic approach to controlling risks



Key Subject Areas





OEM Controlled Risks

- Design
- Fabrication
- Transfer of knowledge



Design

- Concept – typically a textual description with minimal engineering undertaken.
- Draft Plan Analysis – the next phase, once a concept is “launched” – a set of general engineering analyses applied to the concept that allow for more rigorous review.

Concept

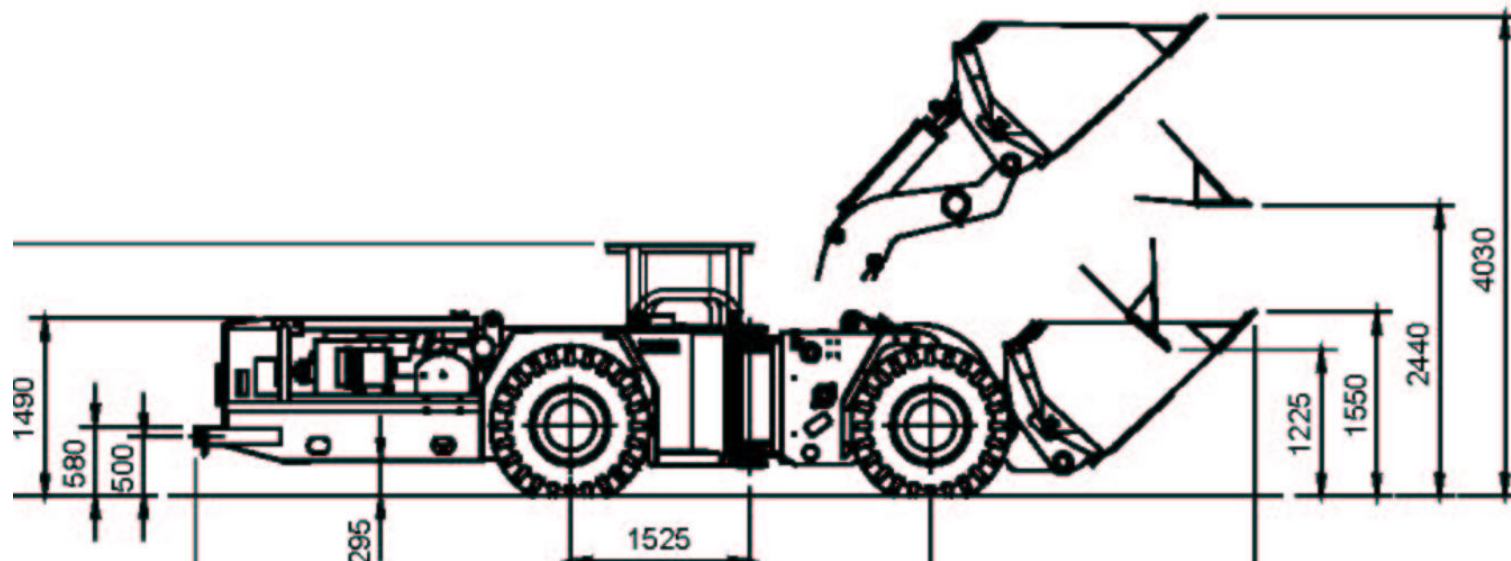
- Pro-active recognition of threats:
 - Start from basic energies
 - Consider the application of the plant
- Define hurdle points:
 - Set minimum performance requirements that, if not met, lead to cessation of development
- Needs to stay high level – and provide guidance on the more detailed work to follow.

Example – Slide 1

- Concept - We're thinking of building a rubber tyred machine to move bulk material in underground coal mines.
- Energies present – mechanical, chemical
- Hurdle points –
 - Stability
 - Fire control
 - Stop & Steer

Example – Slide 2

- Draft Plan



Draft Plan Analysis

- Apply some “purpose built” risk management tools:
 - HAZID / HAZOP – generates a “punch list” of items to resolve or refine.
 - FMEA – helps confirm the rigour of the study, and can be conducted at either the component or the module level.
 - High level RA – confirms the likely loss scenarios that need to be addressed in the design.

Example – Slide 3

- HAZID / HAZOP – focus on the module level of the machine
- FMEA – detailed review of the engine (and fuel), mechanical, hydraulic and ground engaging devices.
- High level RA – identified the potential major loss scenarios:
 - Mis-use
 - Exceeding lifting capacity
 - Initiating a fire / operate in hazardous atmospheres.

Fabrication

- Maintainability – once constructed, can the item of plant be safely maintained
- Operability – once in service, what hazards are faced by the operator(s).
- ??Constructability?? - A step that can occasionally be missed – this is the process and pattern of thinking that helps to minimise losses in the manufacturers facilities.

Example – Slide 4

- Maintainability study:
 - Involvement of team including typical end user maintenance personnel
 - Process map – considering listing of the required tasks, and the hazards that could arise as a result of conducting them
 - Take losses identified in the earlier studies related to maintenance and confirm controls likely to be in place (and document)

Example – Slide 5

- Operability
 - Involvement of team including typical end user operations personnel and their supervisors.
 - Process map – considering listing of the required tasks, and the hazards that could arise as a result of conducting them.
 - Factor in predictable mis-use or abuse scenarios and document a control process (or engineer out identified issue(s)).
 - Take losses identified in the earlier studies related to operations and confirm controls likely to be in place (and document).

Example – Slide 6

- Fabrication –
 - Use the basis of safe manufacture
 - Identify the state of the plant during the construction to identify potential loss scenarios:
 - Injury / Health
 - Build Quality
 - Develop controls and monitoring systems (aligned with QM / QA processes).
 - Increased level of scrutiny for identified Safety Critical aspects of the Loader.

Transfer of knowledge

- Training for personnel - operating and maintenance
- Ongoing support
- Clear articulation of threats that remain after all engineering is complete

Example – Slide 7

- Training manuals
- OEM documentation on parts requirements and work shop requirements.
- Safety file – that references the life cycle risks identified and the controls considered as critical.
 - Clearly states the requirements for the end user's risk management systems

End User Risks

- Training
- Safety Management System Linkage
- Revisit higher level risk analyses (clashing effects)
- Environmental threats
- Residual risks (after OEM engineering controls implemented)
- Misuse / Abuse risks

Meeting Legislative Requirements

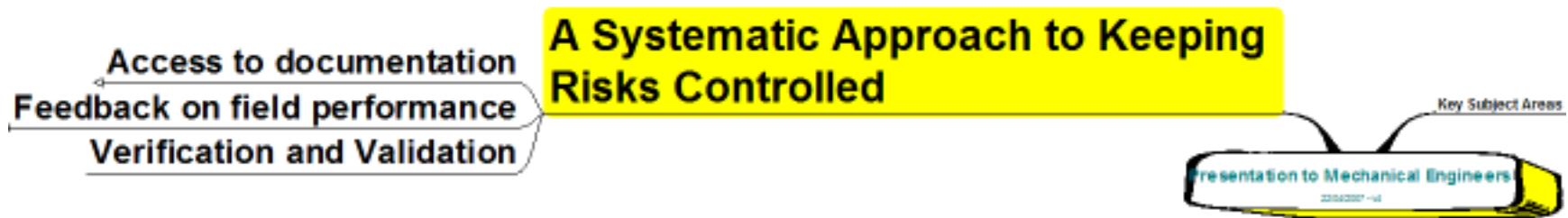
- Determine active requirements:
 - Identify risks
 - Implement controls:
 - Design out
 - Engineer protection
 - Consider specific requirements:
 - Registration
 - Guarding
- Document and communicate.

Example – Slide 8

- Conformance appendix in the Safety File.
- Documents each active clause and how the item of plant is intended to comply.
- References other information sources as appropriate.



A Systematic Approach to Keeping Risks Controlled



Example – Slide 9

- Establish a web-based information resource – with log on enabled for purchasers of items of plant. E.g. www.riskmentor.com (login nswdpi password nswdpi).



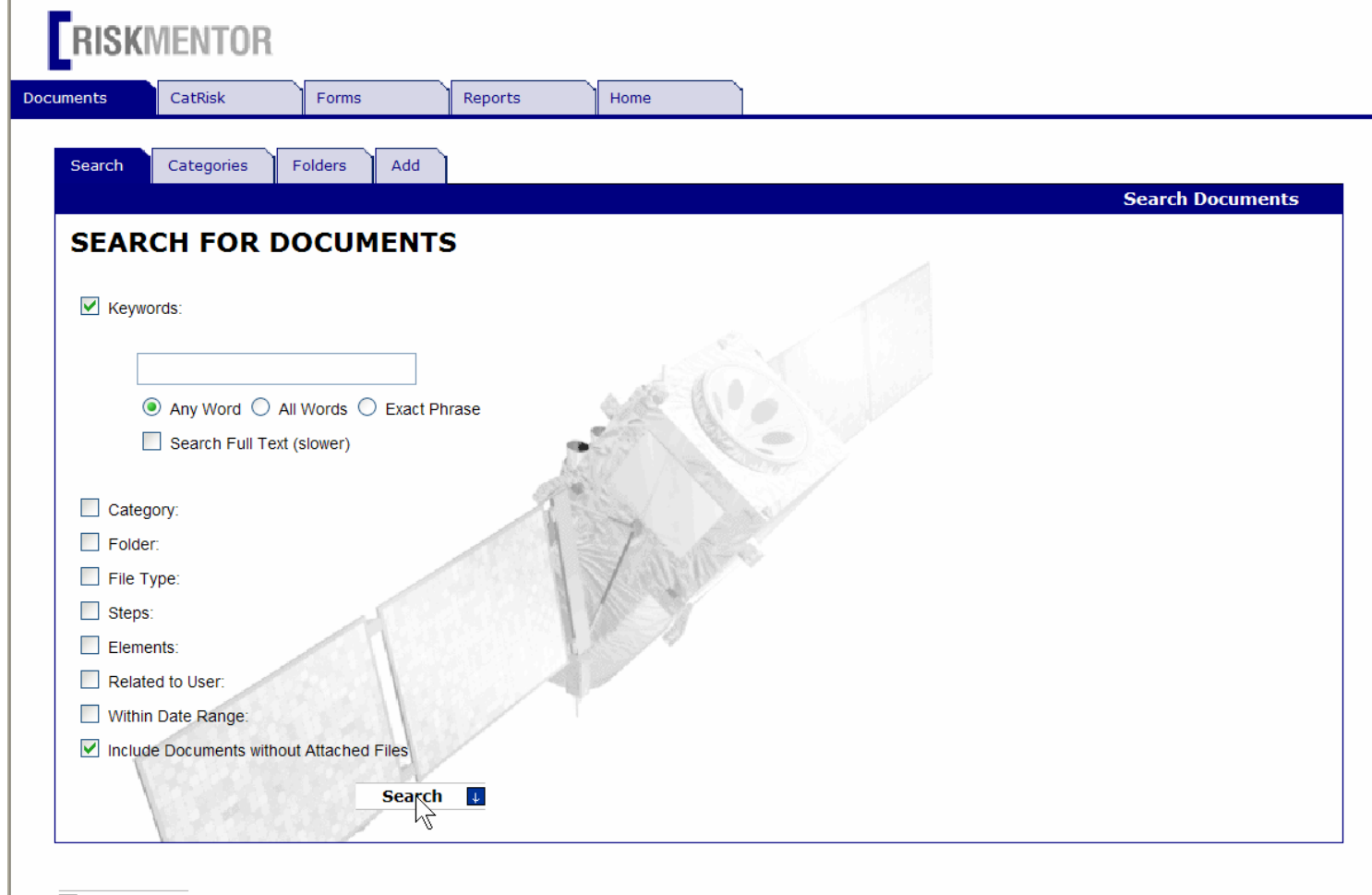
Plant Safety Seminar



- [01 Sample Risk Results](#)
- [02 Sample Control Information](#)

Example – Slide 10

- Sourcing documentation on the unit



RISKMENTOR

Documents | CatRisk | Forms | Reports | Home

Search | Categories | Folders | Add

SEARCH FOR DOCUMENTS

Keywords:

Any Word All Words Exact Phrase

Search Full Text (slower)

Category:

Folder:

File Type:

Steps:

Elements:

Related to User:

Within Date Range:

Include Documents without Attached Files

Search ↓

Search Documents



Access to documentation

- Currency of versions
- Configuration information (versions)



Example – Slide 11

RISKMENTOR

Documents

CatRisk

Forms

Reports

Home








Search

Categories

Folders

Add

Search Documents

id	document	size	on disk
 D1037	Plant Safety File	0kb	0kb
 D1038	Workshop Manual	0kb	0kb
 D1039	Maintenance Training Manual	0kb	0kb
 D1040	Changing Ground Engaging Tools	0kb	0kb
 D1041	FMEA - Hydraulics	0kb	0kb
 D1042	Operating Risk Assessment	0kb	0kb
 D1043	Fabrication Guideline - Connecting Motor End and Tool End	0kb	0kb



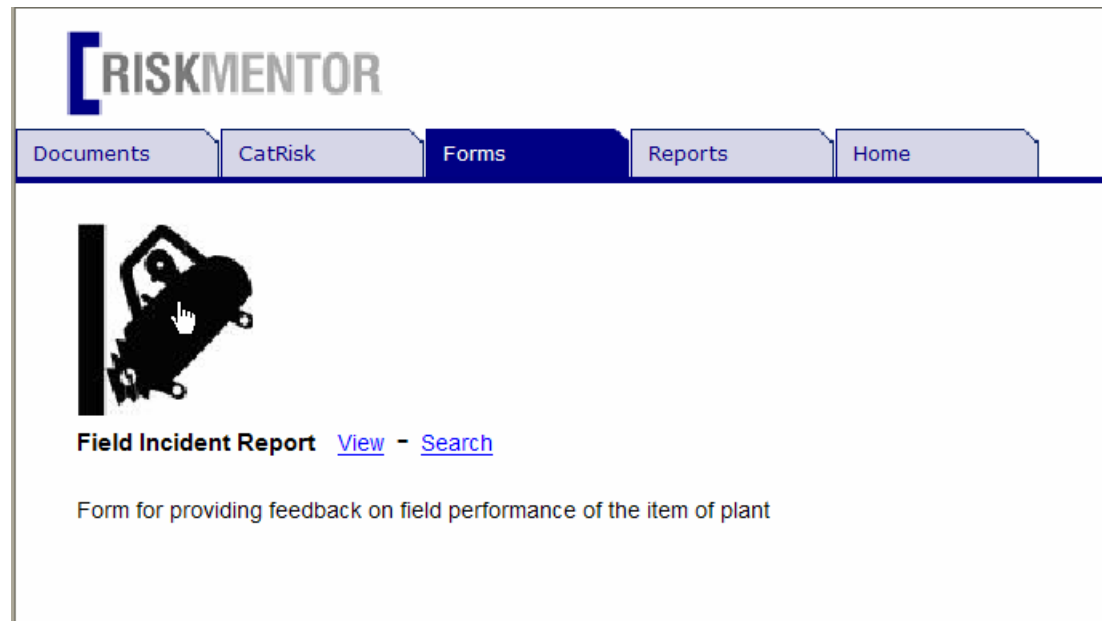
Feedback on field performance

- Trigger Response systems



Example – Slide 12

- Obtaining feedback



The screenshot shows the RISKMENTOR web application interface. At the top, the word "RISKMENTOR" is displayed in a large, bold, blue font. Below this is a navigation bar with five tabs: "Documents", "CatRisk", "Forms", "Reports", and "Home". The "Forms" tab is currently selected and highlighted in a darker blue. Below the navigation bar, there is a large black icon depicting a person operating a piece of machinery, possibly a tractor or a similar agricultural vehicle. Underneath the icon, the text "Field Incident Report" is followed by two blue links: "View" and "Search". Below this text, a short description reads: "Form for providing feedback on field performance of the item of plant".

Example – Slide 13

RISKMENTOR

Documents CatRisk Forms Reports Home

Form for providing feedback on field performance of the item of plant

FORMS

FORM

NEW FIELD INCIDENT REPORT

Details

To:

From:

Date:

Customer:

FIR Number:

Product:

Serial Number:

Incident Details

Fault:

Possible Cause:

Comments:

What Did we Cover

- OEM and End user risk management
- Meeting the requirements of statute
- Making sure your risk management approach “stays alive” for the life cycle of the item of plant.