

# Operator Protective Structures in Mining Applications



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Roll  
Over  
Protective  
Structures

**SAVE LIVES!**



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**ROLL OVER PROTECTION  
SAVED THIS OPERATOR!**



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**ROLL OVER PROTECTION  
SAVED THIS OPERATOR!**



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**FALLING OBJECT PROTECTION SAVED THIS  
OPERATOR!**



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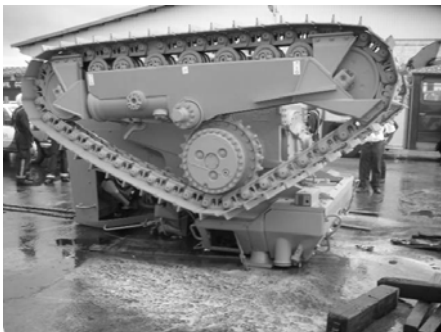
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**A ROPS WOULD HAVE SAVED  
THIS LIFE!**



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## OHS REGULATORY REQUIREMENTS

All earthmoving/surface mining equipment with a mass of 700 - 100,000 kg must be fitted with a structure that conforms to AS 2294 Earthmoving Machinery - Protective Structures, and protects the operator from the risks associated with a machine overturning or objects falling on them.



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## MDG 15 OVERVIEW

GUIDELINE FOR MOBILE AND TRANSPORTABLE EQUIPMENT FOR USE IN MINES



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### History:

- MDG No 15 was created due to the lack of standards applying to Earthmoving and Mining Equipment design that addressed commonly occurring incidents and accidents that occurred in open cut coal mining.

- 3yrs before MDG 15 - 156 fires reported.
- 3yrs after the introduction of MDG 15 fires reduced by 28% to 113
- MDG 15 - used throughout the coal industry and has significantly reduced incidents and improved availability of equipment.



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**Risk Management:**

- Risk management techniques must be used to identify risks to health and safety of people.
- To identify the risk to equipment.
- To determine if the recommendations of the guideline be adopted or not.



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**Documentation:**

All documentation provided by the Manufacturer/Supplier must be for the 'As Built' equipment.

**As Built** drawings should include after market components installed by the Supplier.

The manuals shall include the relevant **As Built** electrical, hydraulic, pneumatic schematic diagrams, parts lists, major components ratings and a section on recommended maintenance periods and procedures, including safety precautions to be taken.



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**Documentation (cont.)**

**Documentation shall also include:**

- Installation, Testing and Dismantling
- Procedures and Results
- Operation and Maintenance Instructions
- Synopsis of Plant
- Towing Instructions
- Modifications to Standard Equipment
- Safety Devices



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**Operator's Cabin & Protection:**

ROPS, FOPS and TOPS:

ROPS and FOPS shall be fitted to all earthmoving equipment in accordance with AS 2294.

TOPS should be fitted should be fitted to Excavators in accordance with AS 4987 and AS 4988.

Compliance with equivalent SAE or ISO standards is an acceptable alternative.

Cabins not protected shall be subjected to a risk assessment to determine if they require protection.



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**Operator's Cab & Protection (cont.)**

The headboards/spillboards of rear dump trucks are **NOT** considered as an effective ROPS.

At least one means of exit shall be useable in the event of a roll over of any type of equipment.

Where equipment is involved in an incident, which has resulted to impact on either the ROPS or FOPS structure, then replacement and or repairs shall be carried out in accordance with AS 2294.1



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**EXCAVATOR  
ROPS**



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# WHY HAVE ROPS ON EXCAVATORS?



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Analyzed "typical"  
Hydraulic excavators  
tip-over, roll-over  
and/or fall-down  
accidents in Japan.



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## 23 Fatalities 18 Injuries

Caused by Excavator  
Roll Over/Tip Over  
Accidents  
3 year period



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# Typical Roll Over Tip/Fall Over Scenarios



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## Working Next to Ledge or Pit



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## FACE LOADING



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## LOAD FILLING



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## Excavator ROPS are coming

- Q1: When will the new standard be released?
- Q2: Will the ISO standard be the same as the Australian Standard?
- Q3: Will the standard be retrospective?



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## ROPS TESTING.



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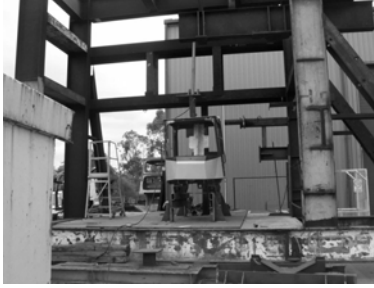
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### Set up before testing



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### FULL LATERIAL LOADING



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### FULL VERTICAL LOADING



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### DLV IN CABIN



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### FULL SIDE LOADING



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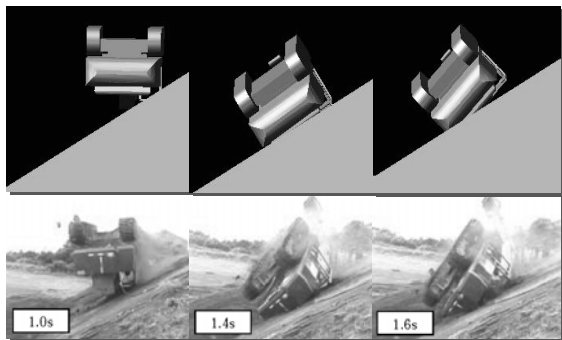
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### PHYSICAL TESTING



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# ROPS DESIGN AND TESTING



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## SCOPE

- To design, test and install an overfit ROPS rated to 125Tonne to a CAT 793C Dump Truck.
- Truck to be used for Tow Haul applications.
- Original ROPS under rated in this application



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## ROPS DESIGN



**Destructive Testing Caterpillar  
793 Dump Truck O/Fit ROPS**



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**Installation of the Overfit ROPS  
Caterpillar 793 Dump Truck**



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## **TYPICAL ROPS/FOPS APPLICATIONS**



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### **TRUCK ROPS**



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**ROPS/FOPS AND CABIN**



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**ROPS/FOPS & SAFETY RAILS**



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**UNDERGROUND MINING MODIFICATIONS**



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**UNDERGROUND MINING  
MODIFICATIONS**



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**QUESTIONS??**



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**THANK YOU.**



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