



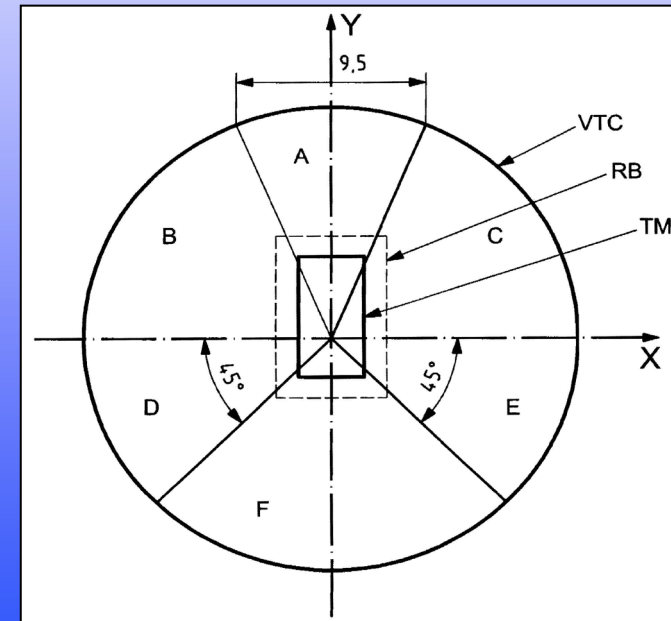
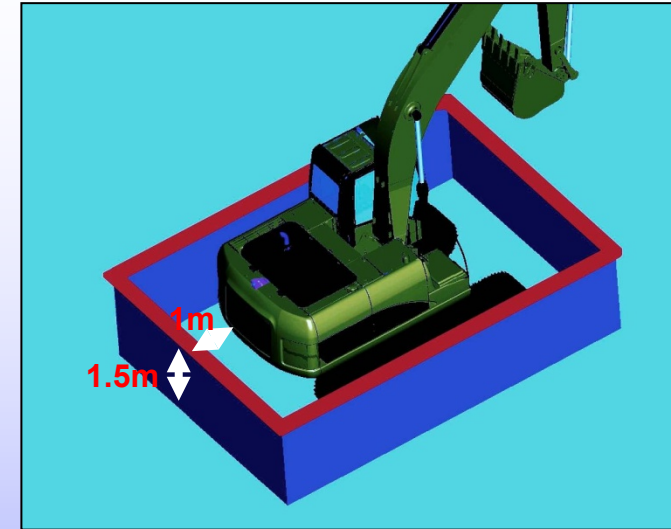
ISO- 16001: VA / HD Test & Performance Criteria.

ISO- 13766: Electromagnetic Compatibility.

# ISO 5006 Earthmoving Machinery- Operators Field of View

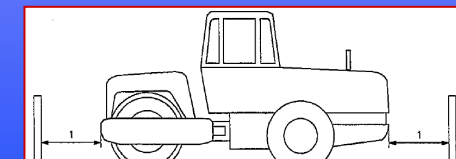
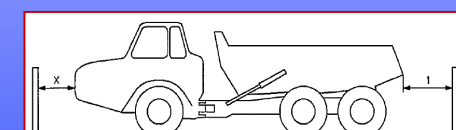
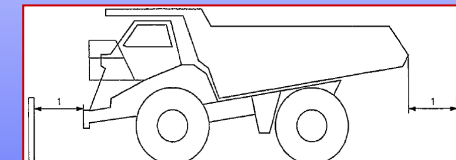
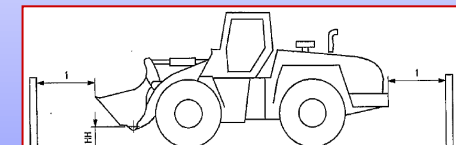
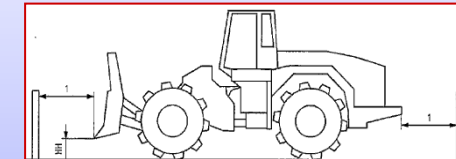
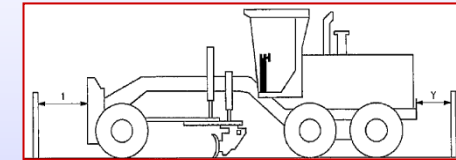
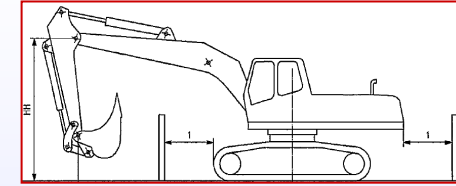


- ❑ Designates required Operators visibility around the machine (360 deg) to enable *proper, effective & safe operation*.
- ❑ Visibility on a Boundary line of 1.0 metre from the smallest rectangle that encompasses the machine & on a circle of VTC 12.0 metre radius.
- ❑ Red line (V1.5 metres & H1.0) area around the machine is to be clearly visible- if not- then VA (Visual Aids) such as CCTV systems are to be used.



- |               |  |
|---------------|--|
| ❑ VTC         | Visibility Test Circle- 12 metre radius. |
| ❑ RB          | Rectangular 1.0 metre boundary.          |
| ❑ TM          | Test Machine                             |
| ❑ Y           | Forward Direction of Machine.            |
| ❑ A,B,C,D,E,F | Sectors of Vision                        |

- ❑ For larger machines upto 24 radius metres or more.
- ❑ Hazard Detection Devices are **non- visual** such as Radar, Proximity Sensors, etc.
- ❑ Hazard Detection (HD) Devices are to be utilised **exceptionally**.
- ❑ Thorough RA of Operator's ability, operating environment, machine, site conditions, etc need to be evaluated to select single device or a combination of both Visual Aids (VA) + Hazard Detection (HD) Devices.





# What are the Primary Uses for CCTV Vision Systems?

## Camera Systems are utilised for two primary uses:

### ☐ Work Area Vision Aid (no Safety Issues):

- ⇒ Security Applications.
- ⇒ Area Monitoring, Stationary Equipment, Fixed Plant.
- ⇒ Equipment Work Area.

### ☐ Critical Safety Device:

- ⇒ Operation of Mobile Plant- *Blind Spots*.
- ⇒ Potential Collision of Plant- *Blind Spots*.
- ⇒ People & Mobile / Moving Equipment- *Blind Spots*.

**CCTV Systems are *Critical Visual Aids providing Operator Visibility of Vehicle “Blind Spots”*.**

What are the Objectives  
for implementing a  
Camera System?



## There are three (3) Objectives:

### **❑ Safety- Health- (primary):**

- ⇒ Collision Avoidance.
- ⇒ Increased awareness- Vision.
- ⇒ Reduction of Driver Fatigue.
- ⇒ Reduction of RSI Injuries- Neck / Back Strain.
- ⇒ Zero harm of personnel.

### **❑ Damage Control:**

- ⇒ Vehicle Damage during operation- loading.
- ⇒ Tyre Wear- Damage.
- ⇒ Berms & Reversing Incidents.
- ⇒ Truck and Excavator Impact.

### **❑ Productivity:**

- ⇒ Increased Fill / Dump Cycles.
- ⇒ Increased Loading Times- Eg Excavator- Dump Truck.
- ⇒ Enhanced Productivity- with increased Safety.

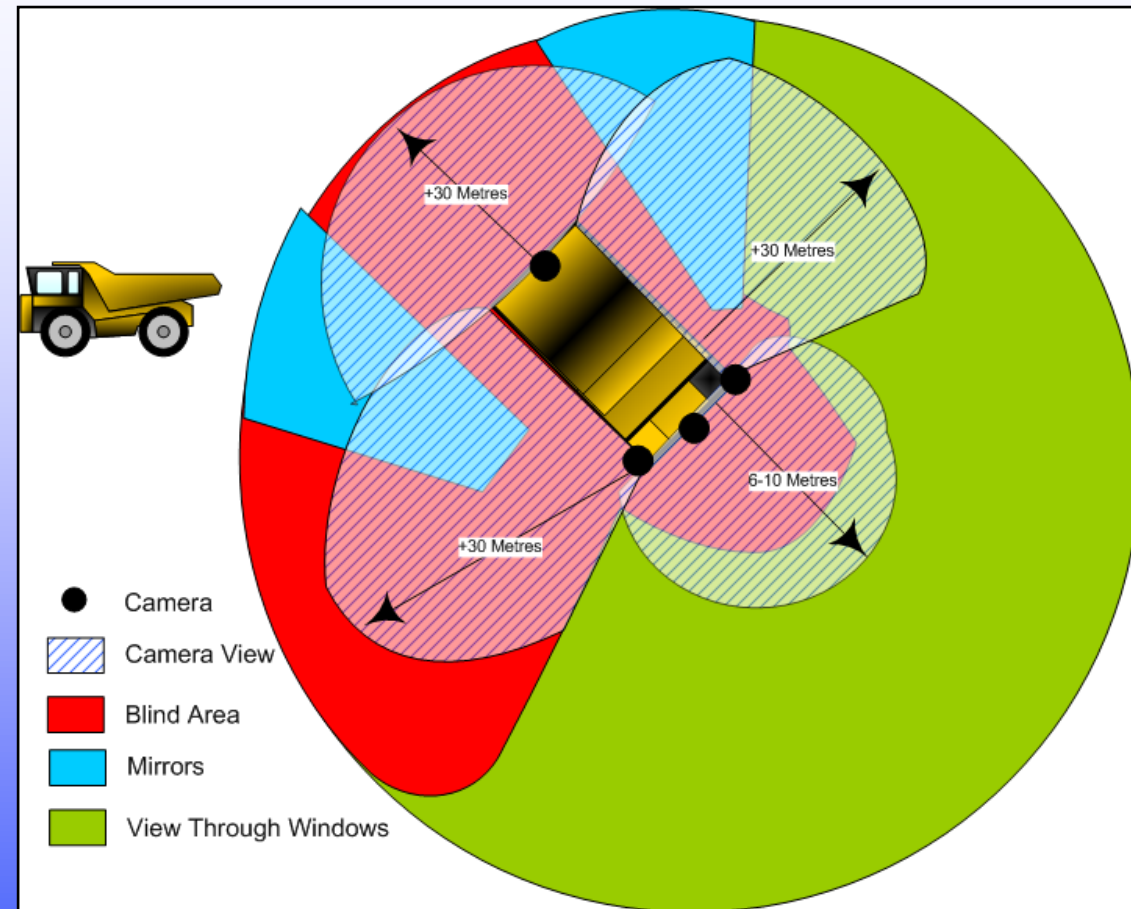
## Dump Truck Fleet- Example

### Virtual 360 Degree CCTV Vision System

## Operators Direct Visibility:

- ❑ **Rear: Blind Spot-** No visibility.
- ❑ **Front: Blind Spot** for upto 7.0 metres.
- ❑ **LHS: Blind Spot** upto 3.0 metres from side.
- ❑ **RHS: Blind Spot.**

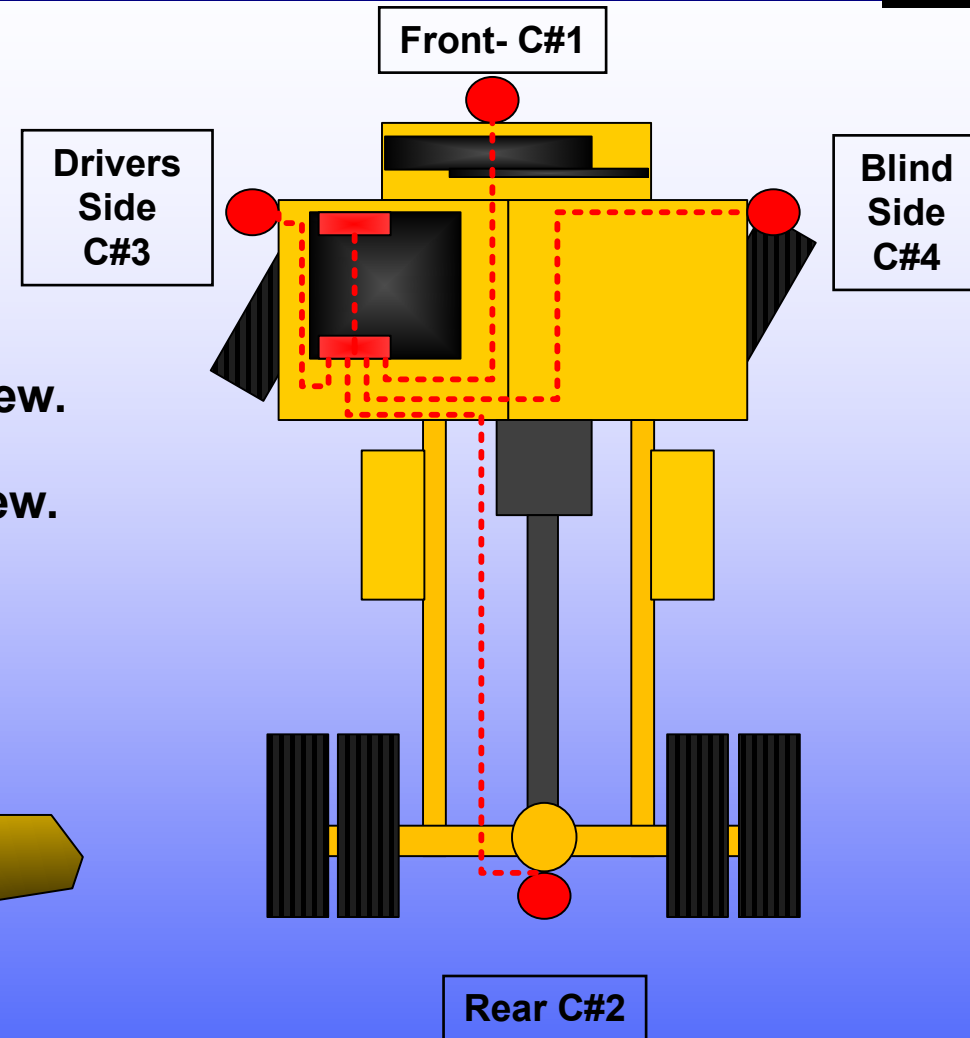
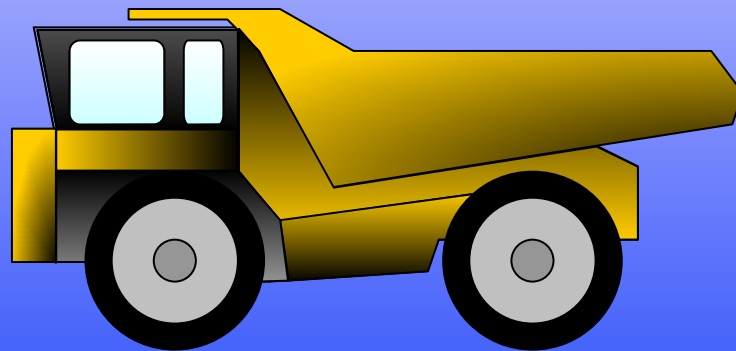
Mirrors are a VA but are limited, easily obscured by distortion, contamination & vibration- at night vision can be “flared” by external lights





## Cameras located on Dump Trucks:

- ☐ Camera C#1:- Forward Travel- Front View.
- ☐ Camera C#2:- Reverse Travel:- Rear View.
- ☐ Camera C#3:- Left Turning:- Drivers Side View.
- ☐ Camera C#4:- Right Turning:- Right Side View.



## Walk Around Dump Truck Camera Views

- ❑ This video clip shows all 4 x Camera Views.
- ❑ It is essential that virtual 360 degree viewing around the peripheral of the machine is maintained.





# ISO 16001- Earthmoving Machinery Hazard Detection Systems- Visual Aids- Performance Requirements & Tests.

ISO 16001 differentiates between a **VA- Visual Aid** and a **HD- Hazard Detection Device**:

## Visual Aid Device (VA):

- ❑ Defined as a device that provides Indirect **Vision** for an Operator & is used where Direct Vision is not possible by the Operator.
- ❑ To provide Operator information / detection of a **Person**.

## Hazard Detection Device (HD):

- ❑ Defined as a device that provides a **Non- Visual** aid- proximity warning.
- ❑ To provide Operator information / detection of an **Object**.

The ISO 5006 states: In most of cases “**acceptable visibility**” can **ONLY** be achieved with the use of CCTV Systems.

**ISO 16001 specifies minimum technical requirements for VA + HD Devices- for CCTV System, some aspects are:**

- ☐ **Auto switching of Cameras- 0.5 second delay.**
- ☐ **Operating Temperatures of -30C to +60C.**
- ☐ **Shock- Vibration 10G.**
- ☐ **IP66 Waterproof for Cameras, Cables & Monitor.**
- ☐ **Resolution of Monitor to be minimum 200 TV lines.**
- ☐ **Recovery from radical changes in light 1.5 sec.**
- ☐ **Camera lens to have upto 119 Deg Viewing Angles.**
- ☐ **Low luminosity (Lux).**
- ☐ **Minimum object definition in LCD at required Distance.**
- ☐ **Other test / performance criteria and also requirements for manuals, training, etc.**



- ❑ An example of just one normal operating condition for CCTV Systems on Mining / Earthmoving Equipment.



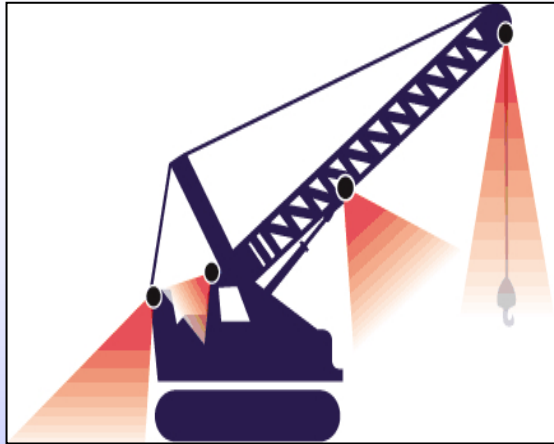
# ISO 13766 Earthmoving Machinery- Electromagnetic Compatibility

The ISO 13766 Standard provides for test methods and acceptance criteria for:

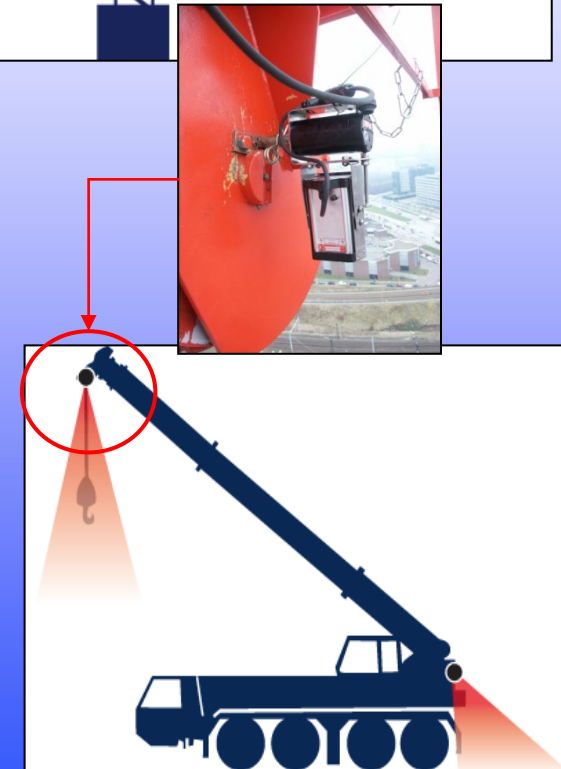
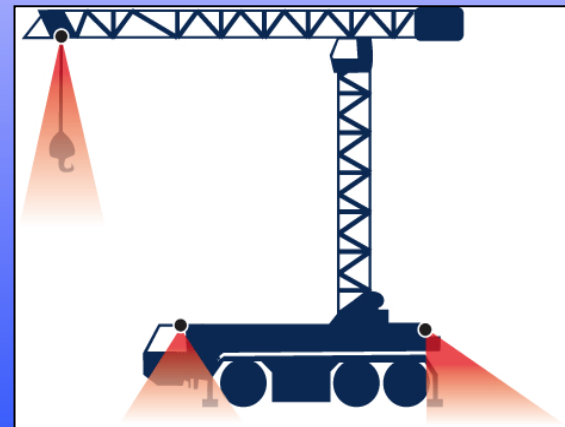
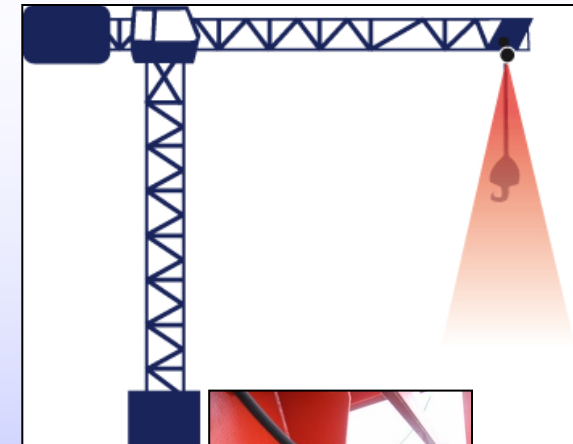
- ☐ The evaluation of the Electromagnetic Compatibility (EMC) of earth-moving machinery as defined in ISO 6165.
- ☐ Was recently upgraded EMC immunity from 30 V/m to 100 V/m for Electronic Assemblies / Sub- assemblies that “control machine movement”.
- ☐ CCTV Systems are still accepted at EMC immunity levels of 30 V/m , however it is proposed that next update to ISO 13766 will include “safety related sub-assemblies” to 100 V/m.
- ☐ Orlaco is an international supplier and has ensured that it meets the next steps for the ISO 13766.
- ☐ CCTV Systems are a Safety Device and so it is unacceptable if EMC interferences were to potentially impair Operators vision during machine operation and / or machine movement is effected when CCTV systems are in operation / switched.

# Operator Visibility

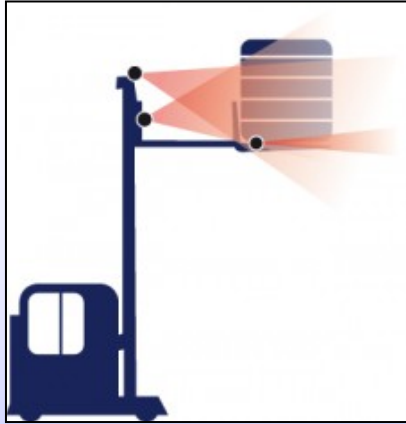
## Not just for Earthmoving Equipment!



- ☐ Telescopic Cranes.
- ☐ Crawler Cranes.
- ☐ Overhead Cranes- Workshop.
- ☐ Gantry Cranes.
- ☐ Tower Cranes.
- ☐ RF Video + Fixed Cable.







- ☐ General Forklifts
- ☐ Telehandlers.
- ☐ Heavy Duty Forklifts
- ☐ Tyre Handlers

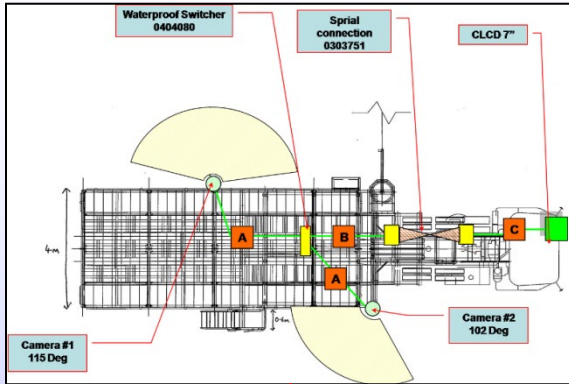




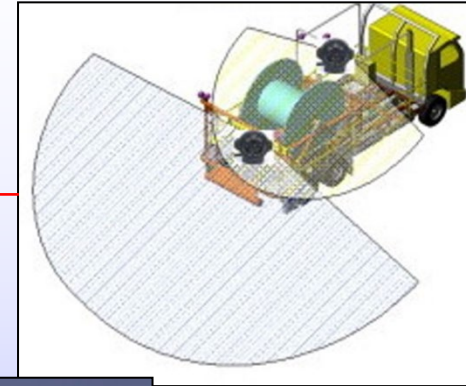
- ☐ Quarry Rigs.
- ☐ General Trucks.
- ☐ Refuellers.
- ☐ Service Vehicles.
- ☐ Lubrication Trucks.
- ☐ Water Trucks.
- ☐ Light Vehicles.
- ☐ Sweepers.







- ☐ Motivators.
- ☐ Cable Reelers.
- ☐ Hose Reelers.
- ☐ Winders.
- ☐ Water Pumps- Pits.
- ☐ Shutdown Monitoring.





# Many Other Applications.....!

(25)



- ☐ Plant Monitoring.
- ☐ Crusher Operation.
- ☐ Conveyor Operation.





# Many Other Applications.....!

(26)

- ☐ RF Video- Mobile Plant.
- ☐ Silo Fill Operations.
- ☐ Dump Operations.

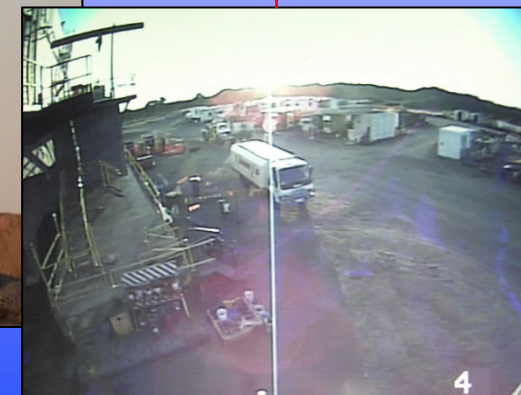
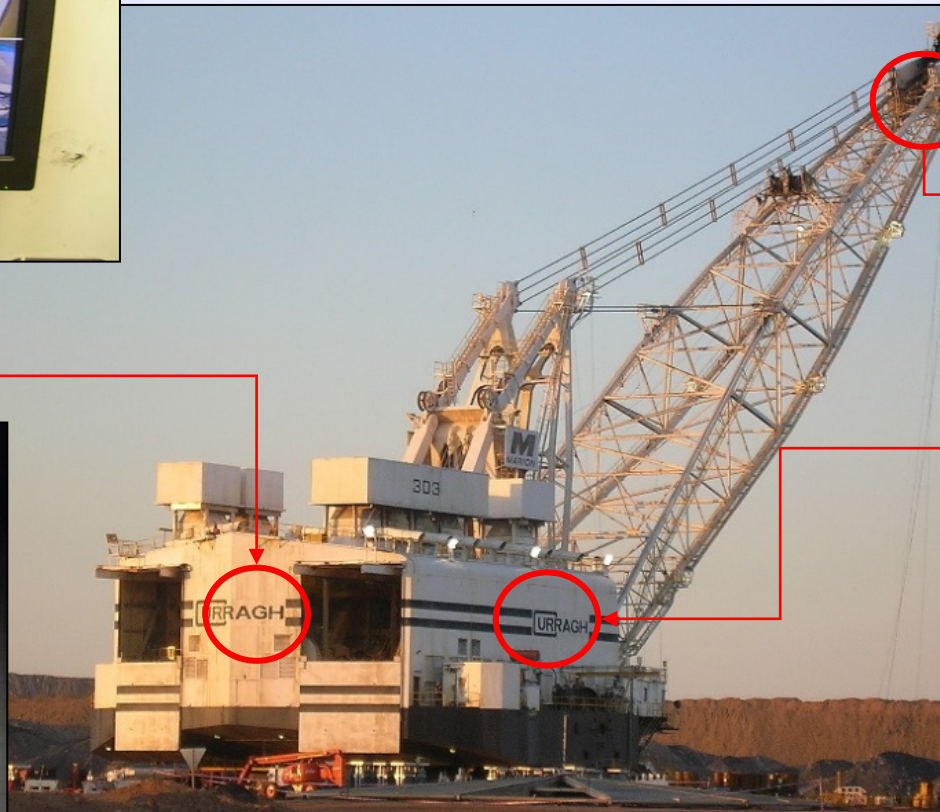
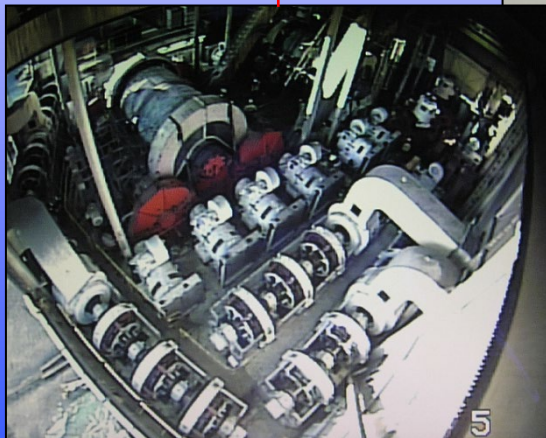




# Many Other Applications.....!

(27)

- ☐ Drag- lines.
- ☐ Shovels.
- ☐ Excavators.

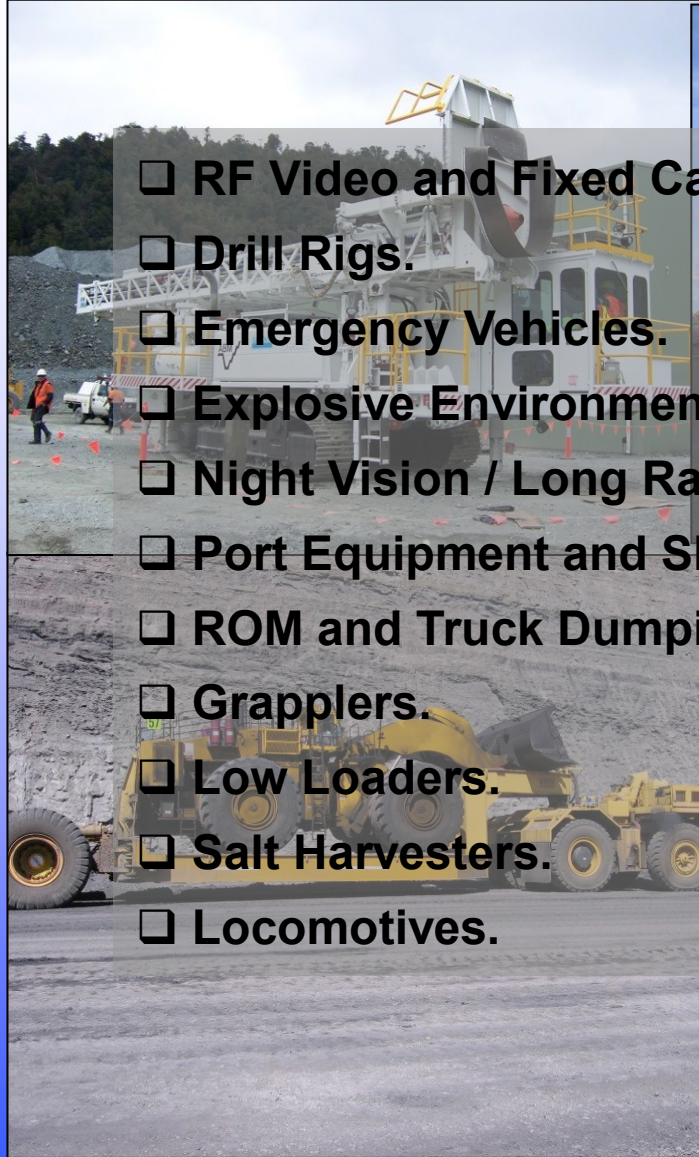




# Many Other Applications.....!

(28)

- ☐ RF Video and Fixed Cable for multiple stationary Cameras and mobile plant.
- ☐ Drill Rigs.
- ☐ Emergency Vehicles.
- ☐ Explosive Environments.
- ☐ Night Vision / Long Range Applications (eg 216 Zoom Cameras).
- ☐ Port Equipment and Ship Loading.
- ☐ ROM and Truck Dumping.
- ☐ Grapplers.
- ☐ Low Loaders.
- ☐ Salt Harvesters.
- ☐ Locomotives.



Maximise the three (3) objectives of **Safety** + **Damage Control** + **Productivity** by:

- ❑ CCTV Systems (VA) are the Primary Safety Solution in providing Operator “Blind Spot” Visibility- 360 Deg around Machine.
- ❑ *HD Devices are a “Blind Solution” & so should only be used “exceptionally” and are not a replacement for Operator Vision.*
- ❑ Utilise the ISO Standards 5006 / 16001 & 13766 as “scoping” guidelines for RA to eliminate Operator Visibility “Blind Spots”- “Adopt / Adapt”.
- ❑ Maximise Safety / Performance / Reliability- specify VA and HD System Suppliers to certify their equipment to the ISO 5006 / 16001 & ISO 13766 Standards.
- ❑ Consider that a combination of both VA and HD can provide a better Safety solution.
- ❑ Use Stand- alone systems that are ‘transferable” across Client Sites & Contractors.
- ❑ Safety Systems can be integrated or controlled to other HD Device / Systems.
- ❑ ISO 5006 is a ”recommendation” by the ISO- of which Australia is a member.

**Are your machines ISO 5006 + 16001 + 13766 Compliant?**





We take away concerns, so you can stay **focused**

**Safety & Health**

**Damage Control**

**Increased Productivity**

### LUBRICATION

DESIGN, INSTALLATION, TECHNICAL SUPPORT OF HIGH QUALITY ACL SYSTEMS & FLUID TRANSFER EQUIPMENT FOR ALL FIXED / MOBILE PLANT- KEEPING YOU ON THE MOVE.



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### SAFETY

SELECT TECHNOLOGIES TO PROVIDE YOU WITH ENHANCED SAFETY, DAMAGE CONTROL AND PRODUCTIVITY.



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### MAINTENANCE

UNIQUE TECHNOLOGIES TO REDUCE MAINTENANCE, INCREASE COMPONENT SERVICE LIFE AND ELIMINATE ASSOCIATED LOSS IN PRODUCTIVITY.



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**Welcome-** LSM Technologies Pty Ltd are part of your **Asset Management**, providing select & unique **Product Technologies** and **Technical Engineering Services** that are focused on:

- Extending **Critical Component Service Life**.
- Enhancing **Workplace Safety & Operator Health**.
- Reducing **Equipment Damage**.
- Increased **Productivity**.

Our web site has been designed as a Technical Resource, including **Customer References**, **Applications**, **Case Histories**, **Manuals**, **Tools** & much more. So as we may keep you informed with **News**, **Training Events** & **Updates**, please click **Register** above.

### Latest News

- 20-Jul** Boral- Orange Grove- Orlaco Viewing Solutions for Plant Monitoring »
- 17-Jul** LSM Technologies invited to present at the 2009 QIHSC- Townsville 23rd to 26th August. »
- 07-Jul** QME to hold 4 x Hands-on Proximity Detection and Collision Avoidance System Workshops »
- 17-Jul** If you are a Harley Rider- then nothing can improve on perfection!- but Ride- on MOT Tyre Sealant can! »
- 17-Jul** Australian Institute of Occupational Hygienists- RCS Exposure Seminars- June - Aug 2009 »
- 01-Jul** Ashton & Son Contracting select RIDE-On for thier Bobcats »
- 06-Jul** Ride- On solves Hans Steel Pty Ltd Truck Steer Tyre Vibration »
- 26-Jun** Platinum Vegetation Services selects RIDE- ON for their Mowers »
- 05-Jun** I have found the cure for Punctures, Cupped Tyres & Deceleration Wobble on my Motorcycle! »
- 01-May** Hummer Owner adds Series 9000 prior to 6,200 kms of Australian Outback Dirt! »