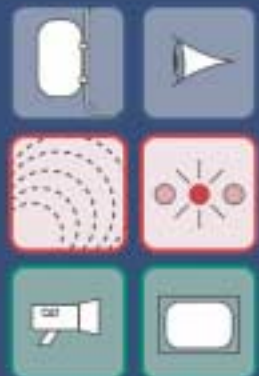




## Visibility Assessments

# Caterpillar TH63

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## **Introduction to mobile equipment all round vision.**

EC machinery directives and the Provision and Use of Work Equipment Regulations (PUWER) both state that devices must be fitted to remedy inadequate direct vision.

Current Health and Safety recommendations require that the area of 360° visibility be measured at a 1metre distance, 1metre high.

The visibility studies enclosed are a small selection of studies carried out for various clients. The objectives of the studies was to record the blind spots created on mobile equipment when an operator is in the 'Driving/Operating Position' and if possible to remedy these blind spots and record the results..

The visibility and blind spot areas were mapped out using various reference points on the machine as guidelines.

Center Line  
Front and Rear  
Wheel Centers  
Pivot Point  
Tow Hook

Further details can be obtained by visiting our website at [www.allroundvision.com](http://www.allroundvision.com)

This booklet should only be used as a example on how to achieve 360° all round vision, a risk assessment should be carried out to determine if these solutions are acceptable to the site and the environment in which the machines are working.

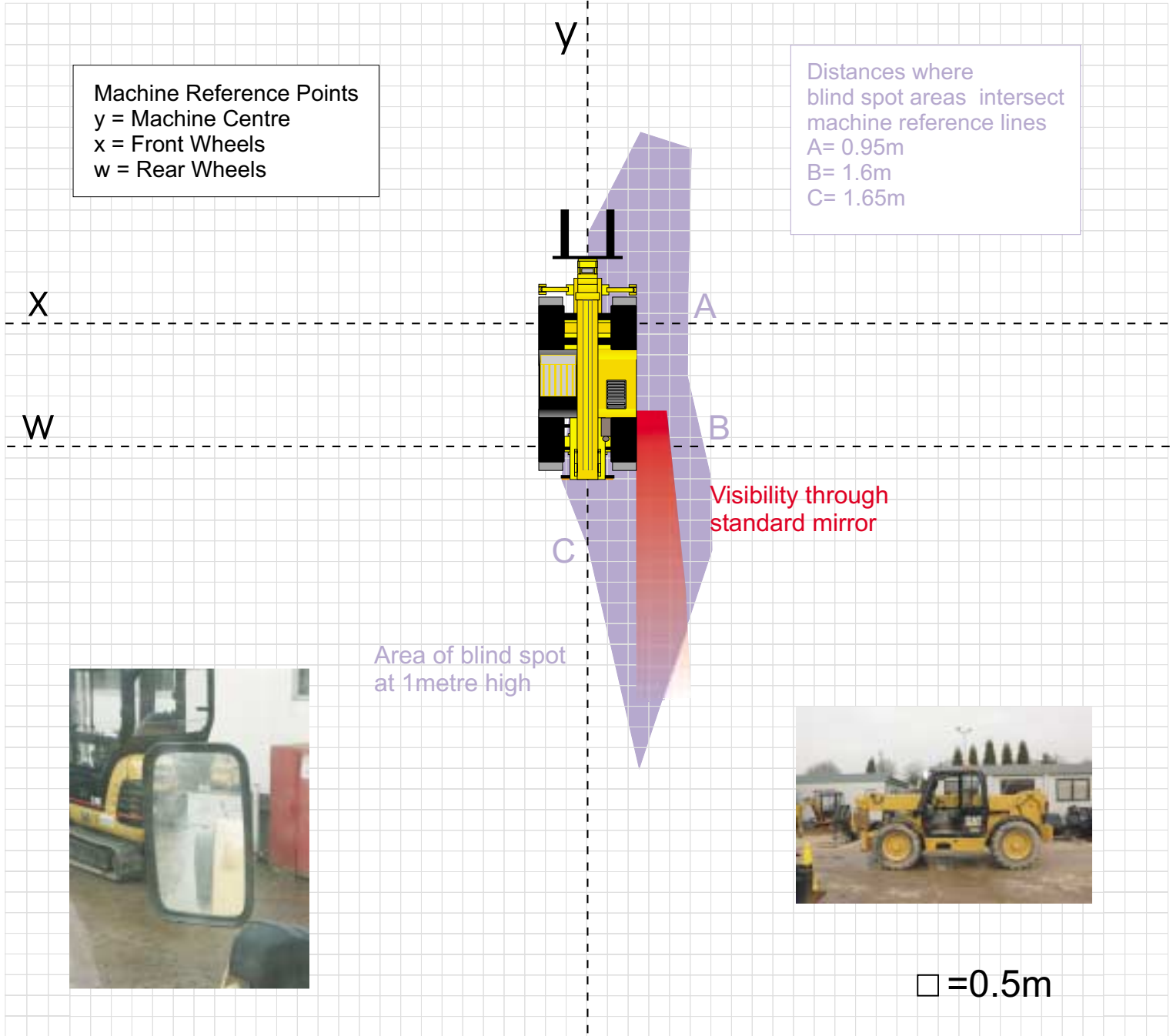




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# Machine Vision

boom @ 110mm

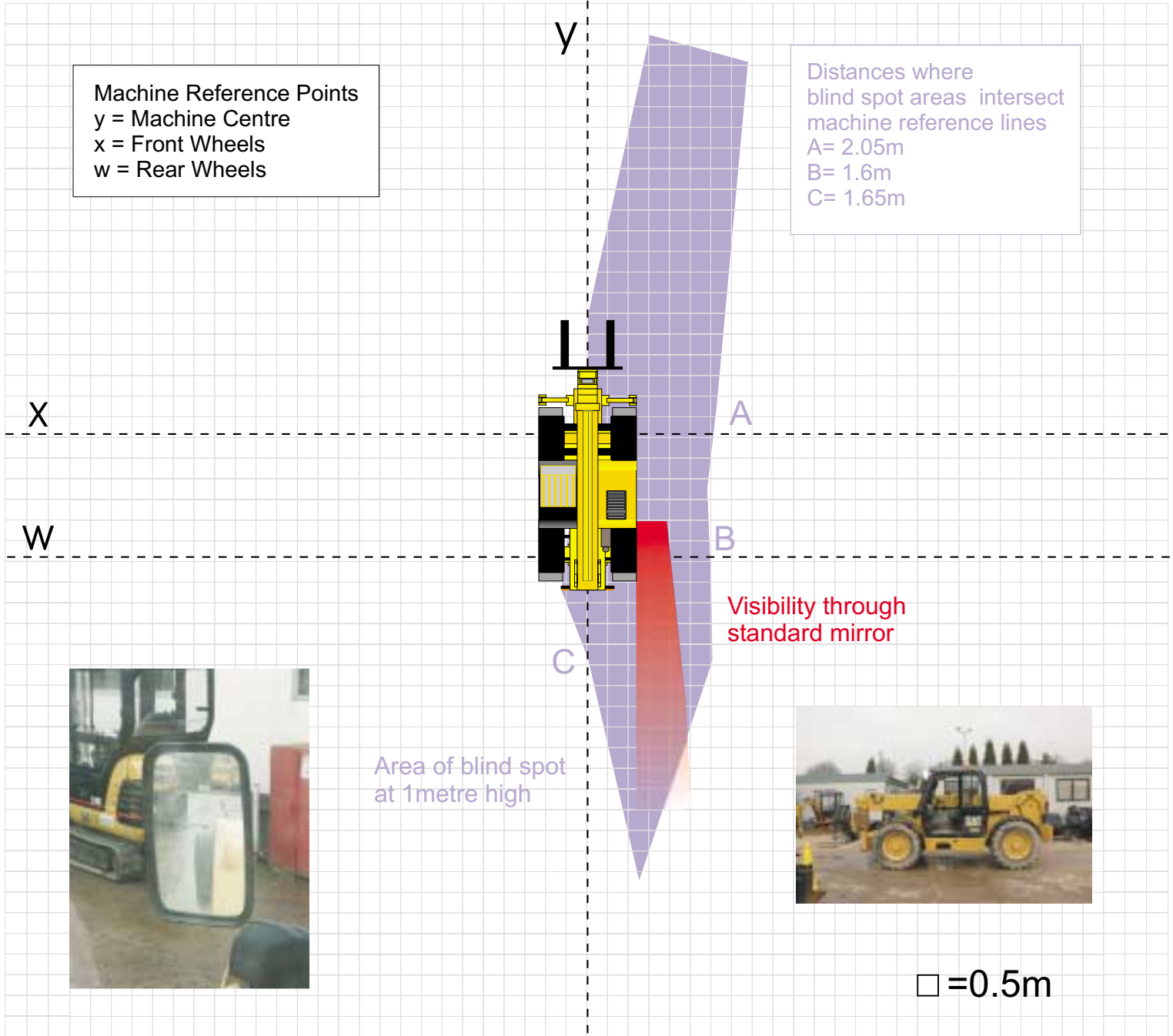




CAT TH 63

# Machine Vision

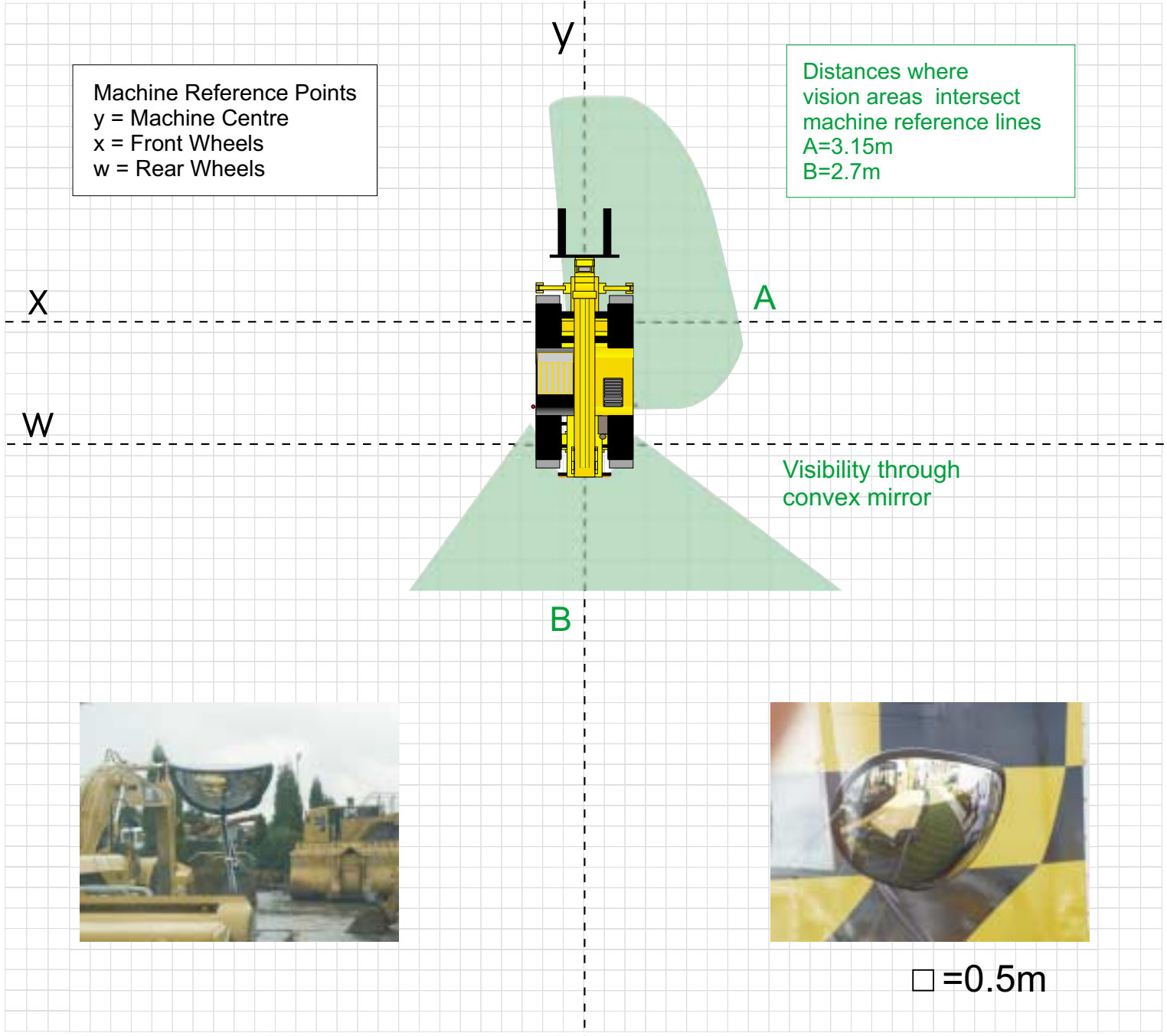
boom @ 500mm





CAT TH 63

# Enhanced Vision

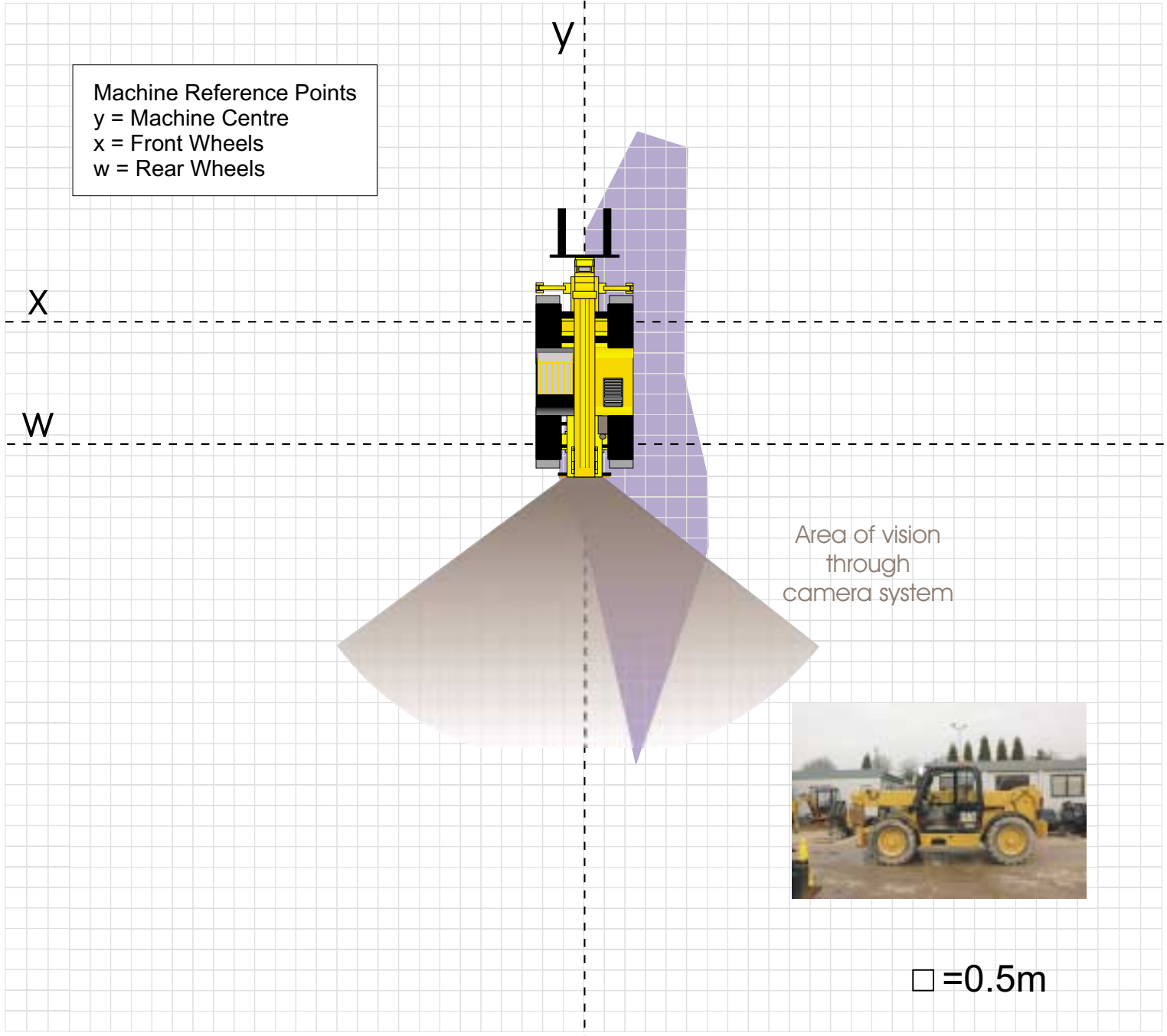




CAT TH 63

# Rear View Camera

boom @ 110mm

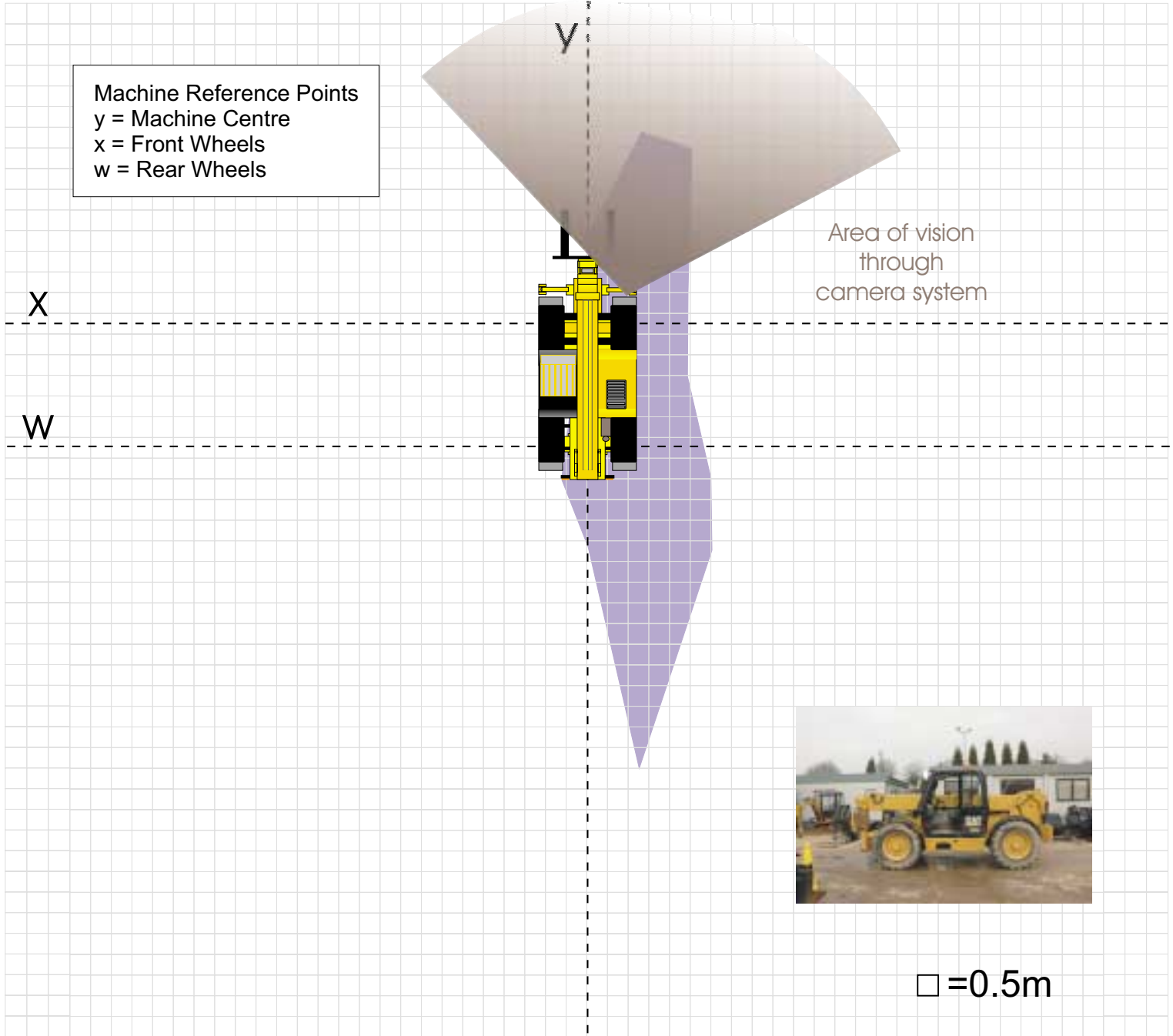




CAT TH 63

# Off-side Camera

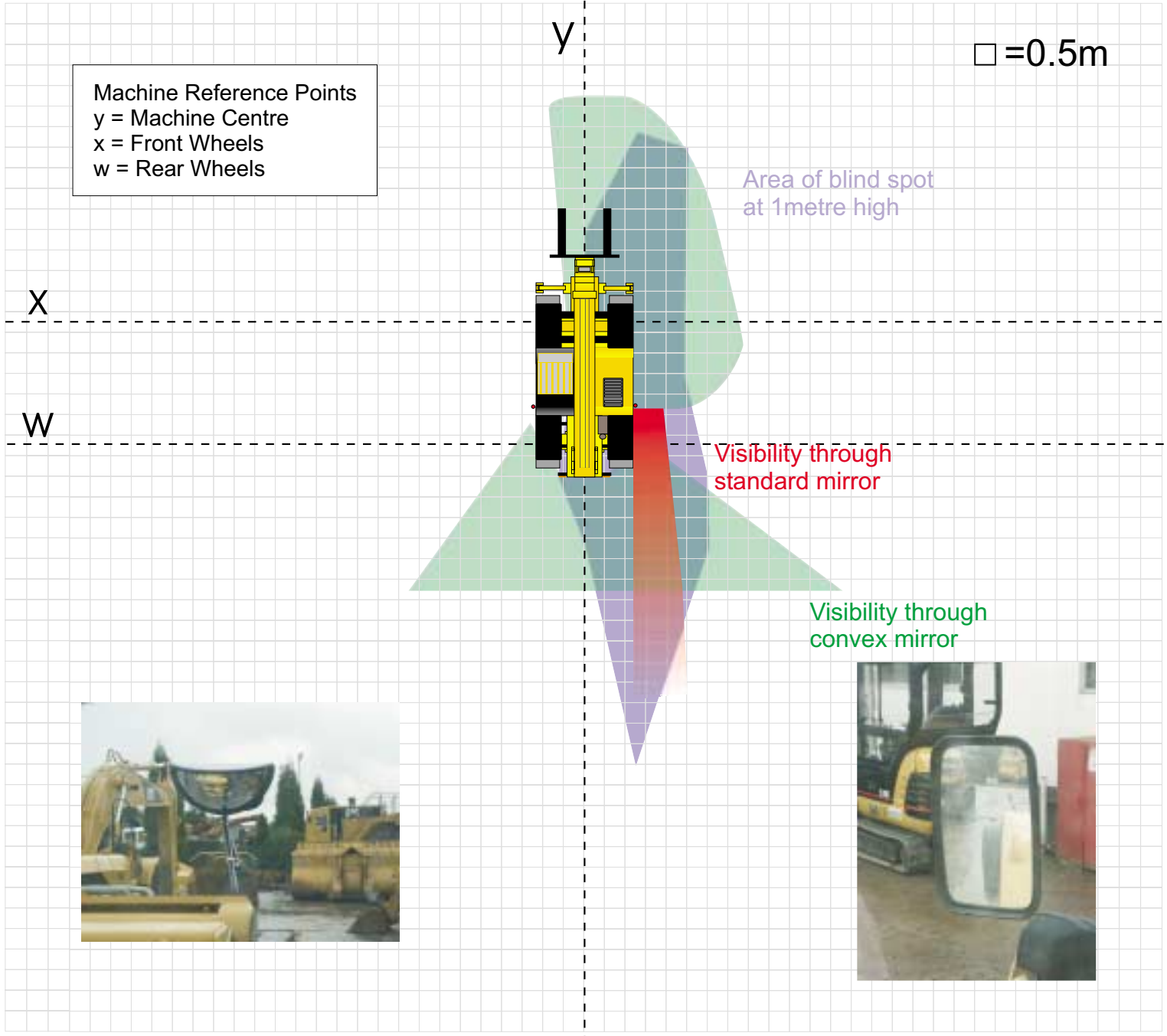
boom @ 110mm  
camera mounted onto mirror arm  
approx. 105° angle of view





CAT TH 63

# Comparison mirrors







## Regulations

Health and Safety regulations are relevant to the safe operation and use of work place vehicles, part of these regulations require that devices should be installed so far as reasonably practical to remedy inadequate direct vision.

Health and Safety recommends that when assessing visibility from the driving position the operator should be able to see a 1 metre high object, 1 metre away from any danger point of the vehicle. These regulations and recommendations affect both operators and manufacturers, not only in the UK but Europe as well.

When a work place vehicle is sold or manufactured within Europe, inadequate direct vision is legislated by; EC Machinery Directives, Supply of Machinery (Safety) Directives, EN474, EN1459, ISO5006 and ISO 13564.

When a work place vehicle is operated within the UK inadequate direct vision is legislated by The Provision and Use of Work Equipment Regulations 1998

The EC Machinery Directive was adopted in 1989 and subsequently implemented in all Member States; in the UK it was implemented as the Supply of Machinery (Safety) Regulations 1992<sup>(1)</sup>. Since January 1995, therefore, European manufacturers and suppliers of most types of workplace machinery have been required to ensure that their machinery meets the relevant Essential Health and Safety Requirements, as listed in the Directive. Machinery covered by this legislation includes workplace vehicles such as dumpers, excavators, tractors, mechanical shovels, telehandlers etc. It is our opinion that particular attention should be drawn to Schedule 3, Section 1.1.2 Principles of safety integration and Section 3.2.1 Driving position.

### **Supply of machinery UK 1992 Regulations, Section 3.2.1 states**

#### **Driving Position**

"... Visibility from the driving position must be such that the driver can in complete safety for himself and the exposed persons, operate the machinery and its tools in their intended conditions of use. Where necessary, appropriate devices must be provided to remedy hazards due to inadequate direct vision."

The duty to meet these requirements falls to the manufacturer or the importer if the machinery is manufactured outside of the European Economic Area.

Further harmonised European standards should also be referred to:

A: BS EN 474 Parts 1 -11: Earthmoving machinery.

B: BS EN 1459: Industrial self propelled variable reach trucks.





## Regulations

### **BS EN 474 Part 1:**

#### **Earth Moving Machinery - Safety, Part 1 General Requirements**

Definition As described in ISO 6165 an example of this is machinery designed primarily for use with equipment to loosen, pick-up, move, transport, distribute or grade earth or rock.

#### **4. Safety requirements and/or measures**

##### 4.7 Visibility

##### 4.7.1 Operator's Field of View:

The design and position of the operator's place shall be such that the operator has sufficient visibility in relation to the drive and work area of the machine. Aids, e.g. mirrors, ultrasonic devices, TV devices, shall be provided as and when available to remedy inadequate direct vision."

### **BS EN 1459:1999**

#### **Safety of industrial trucks**

Definition Self propelled seated rider operated variable reach counterbalanced trucks with one or more articulated arms, telescopic or not, non-slewing. These can be either industrial trucks for operation on substantially firm smooth, level and prepared surfaces or rough terrain trucks for operating on unimproved natural terrain.

#### **5. Requirements and/or safety measures**

##### 5.9 Visibility

5.9.1 The truck design shall provide sufficient visibility to enable the operator to carry out all travel and manoeuvres safely. In order to aid the operator to avoid collisions when visibility is limited, built in devices shall be provided, these shall include mirrors, cameras and monitors, raised or reversible operator position, audible and visual alarms.

5.9.3 Trucks shall conform to prEN ISO 13564

#### **Reference:**

prEN ISO 13564 - Test method for measuring visibility from self-propelled trucks.





## Regulations

### **An All Round Vision perspective on the Provision and Use of Work Equipment Regulations 1998.**

The Provision and Use of Work Equipment Regulations 1998 (PUWER 98) are made under the Health and Safety at Work Act 1974 (HSW Act) and come into force on the 5<sup>th</sup> December 1998.

The primary objective of PUWER 98 is to ensure that work equipment should not result in health and safety risks, regardless of its age, condition or origin.

PUWER 98 applies to the provision and use of all work equipment, including mobile and lifting equipment. For the purpose of PUWER 98 (Part III), mobile work equipment is any work equipment which carries out work while it is travelling or which travels between different locations where it is used to carry out work. Such equipment would normally operate on wheels, tracks, rollers, skids, etc.

PUWER 98 is enforceable in all workplaces and work situations where the HSW Act applies and extends outside Great Britain to certain offshore activities in British territorial waters and on the UK Continental Shelf.

Items of work equipment first provided for use from the 5<sup>th</sup> December 1998 (New Work Equipment) will need to meet all requirements of PUWER 98. If your work equipment is provided for use before the 5<sup>th</sup> December 1998 then regulations 26-30 dealing with existing mobile work equipment do not come into effect until the 5<sup>th</sup> December 2002.

The phrase 'Provided for use' refers to the date on which the work equipment is first supplied to the premises, site or undertaking.

Motor vehicles when used off the public highway, which are not privately owned fall within the scope of PUWER 98. However the more specific road traffic legislation will take precedence when these vehicles are used on public roads.





## Regulations

### PUWER98 Regulation 28(e) Sections 369/370

#### Regulation 28(e)

##### Driver's field of vision

**369** This regulation applies when mobile work equipment is about to move or while it is travelling (including manoeuvring). Under these circumstances, where the driver's direct field of vision is inadequate to ensure safety then visibility aids or other suitable devices should be provided so far as is reasonably practicable. **Regulation 17** requires that operators of mobile equipment should be able to see anyone who may be put at risk when any control is operated. Therefore, if direct vision is impaired, then mirrors or more sophisticated visual or sensing facilities may be necessary.

**Regulation 28(e)** requires, so far as is reasonably practicable, mobile work equipment to have adequate devices to improve the driver's field of vision where this is otherwise inadequate. Such devices may include mirrors or closed-circuit television (CCTV) and the provision of these devices can be used to meet the requirements of both regulations.

**370** Examples of devices which can aid the drivers vision include:

- (a) plane, angled and curved mirrors;
- (b) Fresnel lenses;
- (c) radar; and
- (d) CCTV systems.

The selection of these devices for use on mobile work equipment is a matter for risk assessment, taking account of the purposes for which the devices are provided and their ability to improve driver visibility.

