Agricultural machinery's role in safety

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Introduction

- Why health and safety is important in agriculture
- Common themes in machinery accidents
- Challenges for engineers working in the industry

Accident statistics in agriculture

- Lies and statistics
  - Fatal accidents
- Non-fatal accidents
  - Under-reporting

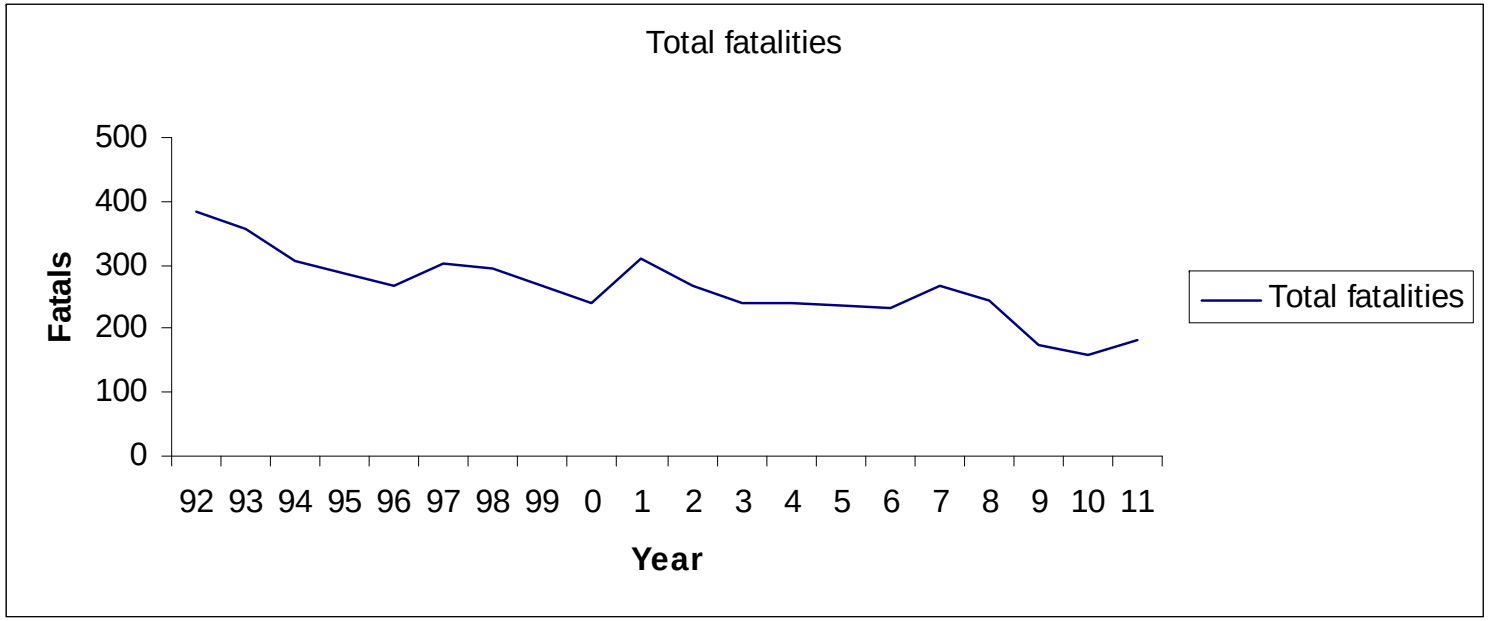
Why is health and safety important in agriculture?

- 1.5% – 2% of working population work in agriculture
- 15% - 20% of work-related deaths occur in agriculture
- In the last 10 years 436 people have been killed in agriculture
- Average of 43 a year – nearly one a week

Who is being killed?

- 32% (140) were employees
- 56% (256) were self-employed
- 12%   (51) were members of the public
  - 19 of whom were children

Accident trends 1991/92 – 2011/12



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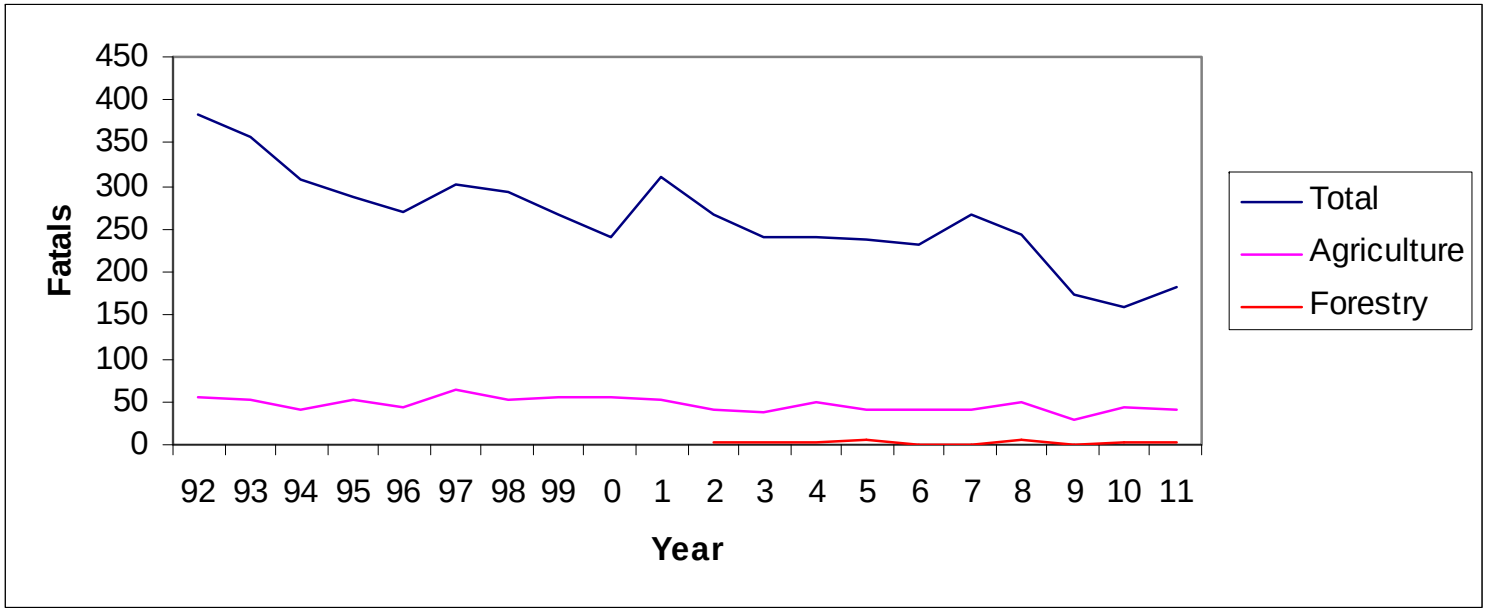

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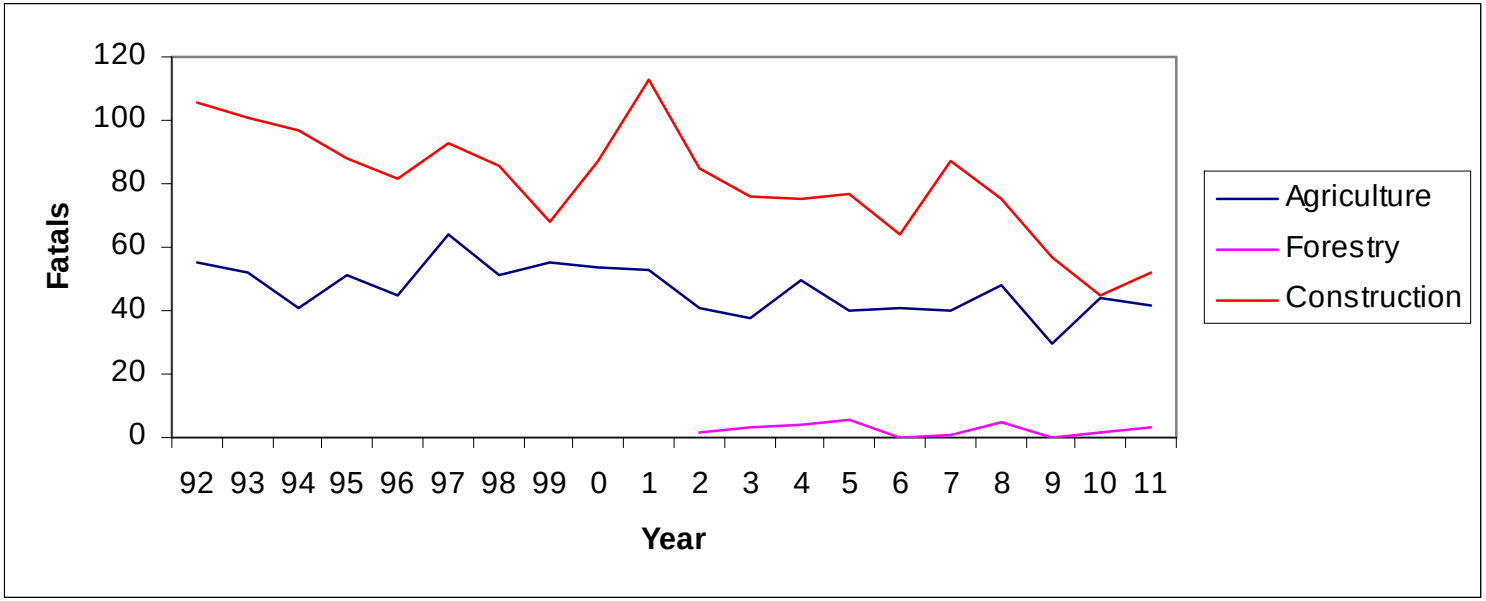


Accident rates 2011/12

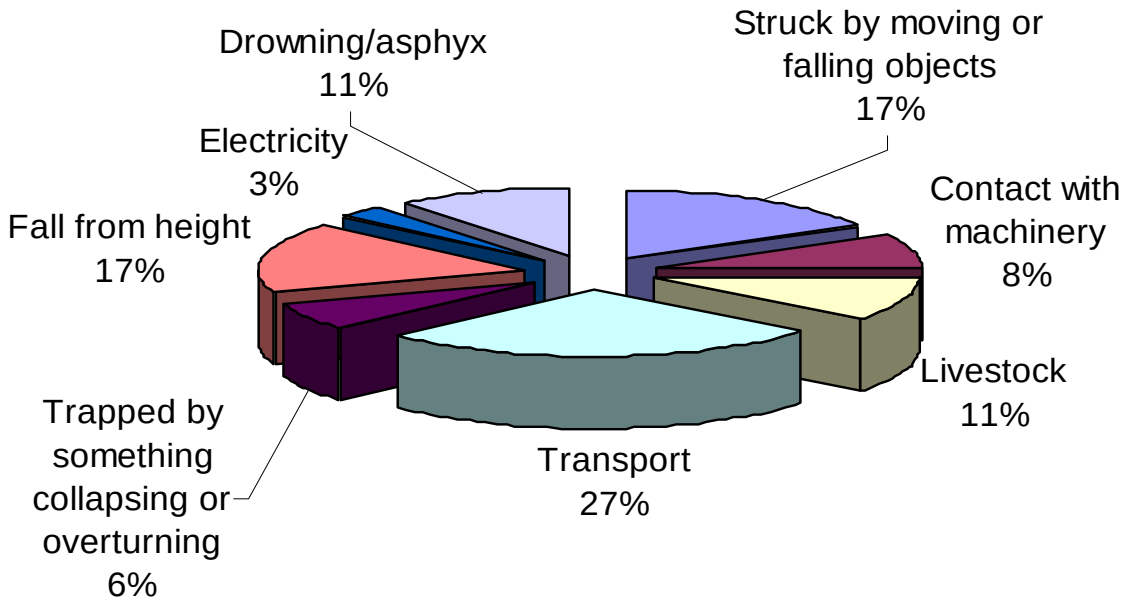
- Accident rates expressed per 100,000 workers
  - Agriculture 8.0
  - Construction 2.3
  - All industries 0.6

- 14 times more likely to be killed if you work on a farm than the rest of industry

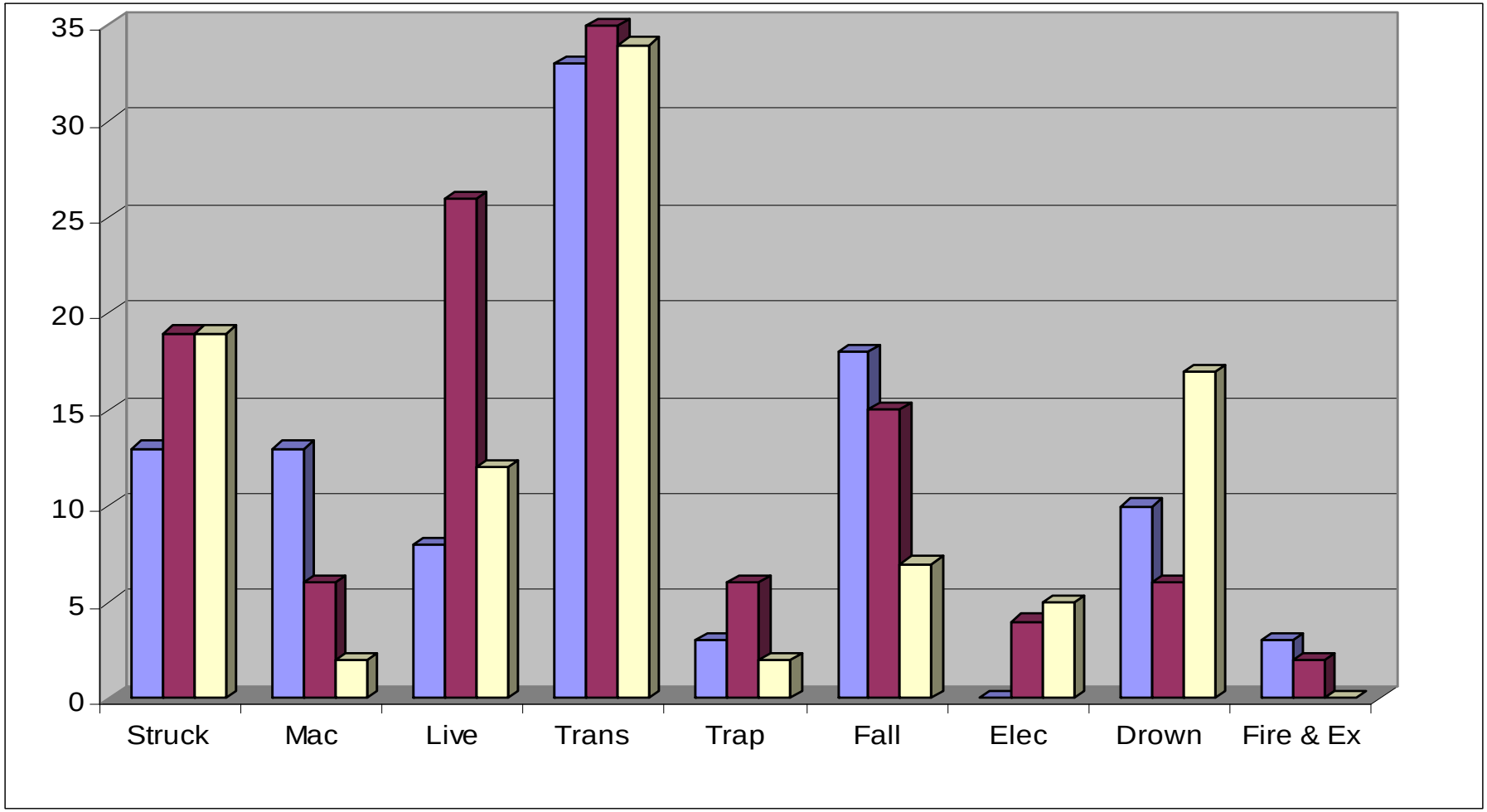
Why health and safety is important

- Protecting people
- Costs of accidents
  - Employee £7.5 bn
  - Employer £3.0 bn
  - Government £3.2 bn

How are people being killed in agriculture?



Accident trends 2003 - 2008 - 2012



Causes of accidents

- Describe typical agricultural accidents
- What can be done to prevent these?
- What are you trying to achieve?

What are you trying to achieve?

How can I make it easier for the operator to do things the right way, rather than the wrong way?

What is a machinery accident?

It is not just what you think

- Contact with moving machinery or material being machinery
- Workplace transport
- Fall from height
- Asphyxiation
- Drowning

Machinery accidents 2002 - 2012

- 436 fatalities
- 169 involved machinery (39%)
  - 116 transport
  - 31 contact with moving machinery
  - 10 struck by or trapped by machinery
  - 6 electrocution
  - 2 drowned
  - 2 explosions
  - 2 falls

Contact with machinery

Contact with machinery

- 31 fatalities
- 8% of fatal accidents in the last 10 years
  - Chainsaw 5
  - Round baler 5
  - PTO shaft 4
  - Feed mixer 3
  - Potato harvester 2
  - Combine harvester 2
  - Fleece winder, palletiser, hedge trimmer, hay turner, bale chopper, grain drier, conveyor, winch, trailer, bale wrapper

Contact with machinery

- Activity being undertaken when accident occurred
  - Equipment in use - 6 accidents (5 chainsaws, 1 slurry pump)
  - Equipment undergoing maintenance – 25 accidents
  - 9 machines were ‘inadequately guarded’

Contact with machinery

- **What might this tell us about the safety of agricultural machinery?**
- Operator unlikely to be entangled in machinery when in the working position
- Operator at risk when having to carry out maintenance activities
- Training and safe systems of work have a role
- What can you do to prevent this?

Workplace transport

Workplace transport

- 116 fatalities
- 27% of fatalities over the last 10 years
  - 55 involved tractors
  - 23 involved telehandlers
  - 26 involved ATV’s
  - 3 involved combines
  - 2 involved forestry forwarders
  - 2 involved self-propelled mowers
  - 2 involved 4x4’s
  - 3 trailer detachments
  - Potato harvester

Workplace transport

Types of accident

- Overturns – 51 (44%)
- Run over – 60 (52%)
- Collisions - 5 (4%)

Workplace transport

Overturns - 51

- 24 tractors
- 21 ATV’s
- 2 mowers
- 2 4 x 4’s
- 2 telehandlers/FLT

Workplace transport

Overturns - tractors

- 24 tractor overturns
- In 12 the operator was ejected from the cab or crushed by the cab
- In none was there evidence that the operator was wearing a seatbelt.
- In 2 accidents the deceased was a passenger (1 child)
- What can you do about this?

Workplace transport

Overturns - ATV’s

- 21 ATV overturns
- Operator normally untrained, going to fast, poor route selection, lack of maintenance, no PPE
- Is there a role for ROPS?
- Or should we stop the vehicle overturning?
- Is there an engineering solution?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Workplace transport

Run over – 60 fatalities

‘ One of life’s mysteries. If there are so few people on farms, and many of those that are on farms are working alone in fields, why are so many people run over?’

Workplace transport

Run over – 60 fatalities

- Reversing vehicles 20
- Operator run over by own vehicle 36
- Children 8


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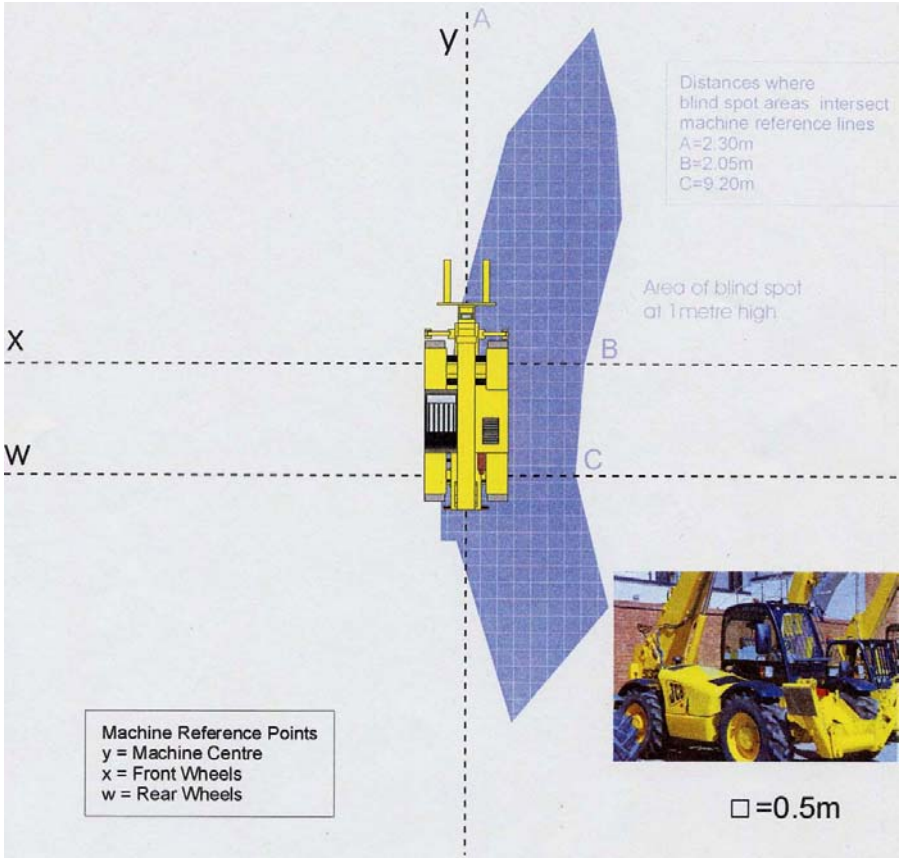
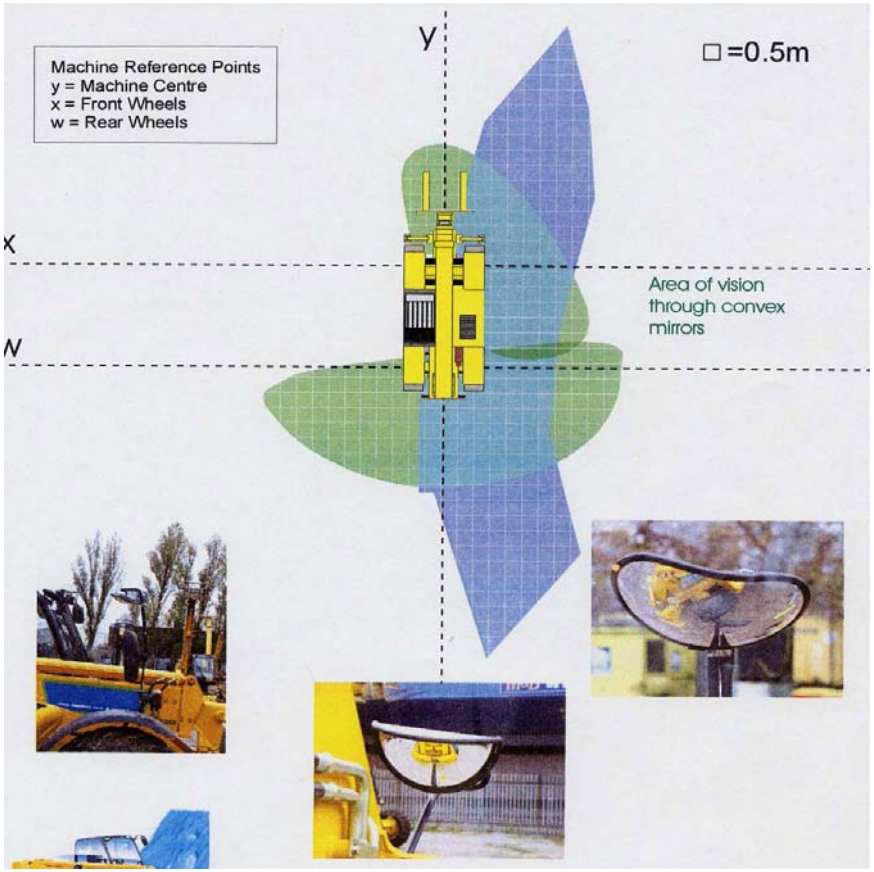
Visibility aids





Workplace transport

- 60% of the people run over in agriculture are the vehicle drivers who have either left the seat while the vehicle is in motion, tried to start the vehicle from somewhere other than the driving position or commenced work on the vehicle or vehicle’s load without engaging the handbrake

Workplace transport

- What can you do about this?
- How can you make it impossible for the driver to leave the seat while the machine is under power?
- How can you make it easier for the operator to apply the handbrake than not?
- HSE guidance – **Safe stop**

Safe Stop

- It only takes a few seconds but it could save your life.
  - Apply handbrake.
  - Controls to “neutral”.
  - Stop the engine.
  - Remove the key.

Workplace transport

Collision

- 5 accidents
- Nearly all ATV’s
- 1 child

Struck by or trapped by collapsing machinery

Trapped by machinery

- 19 fatalities
- 6% of the fatalities over the 10 year period
- 10 involved machinery
  - Trailer 4
  - FLT/loader 2
  - Baler 2
  - Cultivator 1 (7 year old)
  - Not specified 1

Trapped by machinery

- **What went wrong?**
- Working underneath equipment relying on the hydraulics for support (9 cases)
- Inadequate mechanical support (1 case)
- Leaks leading to gradual descent
- Catastrophic failure
- Carrying out maintenance involving undoing the pipes.

Trapped by machinery

- **What went wrong?**
- In many of the cases the equipment was fitted with a mechanical prop which was not used
- Why are props not being used?
- Training and systems of work have a role
- What can you do to make it easier to use one, rather than not.

Electrocution

Electrocution

- 11 fatalities
- 3% of the fatal accidents in the last 10 years
- 6 involved machinery
- Trailers 3
- Combine 1
- Potato harvester 1
- Lorry 1

Electrocution

- **What went wrong?**
- All involved contact with OHPL when the part of the machine was raised for unloading
- Planning and training have a role
- What can you do to prevent this?

Summary

- Statistics show that agriculture has a high fatal accident rate
- 4 out of 10 fatal accidents involve machinery
- The operator is most likely to be injured when they leave the operating position
- Planning, training safe systems of work have a role but, as engineers

The challenge

How can I make it easier for the operator to do things the right way, rather than the wrong way?

Any questions?