# Working safely with agricultural machinery

## Introduction

This leaflet gives advice on how to work safely with mobile and stationary agricultural machinery – particularly when carrying out maintenance and dealing with blockages. See 'Find out more' at the end of the leaflet for sources of detailed guidance on working safely with specific types of machines, eg round balers.

Machinery accidents are caused by a range of factors including:

- using a machine that is unsuitable for the task;
- failing to follow a safe system of work;
- unsafe methods for clearing blockages or making adjustments;
- failing to follow safe operating or 'Safe Stop' procedures;
- guards and other safety devices missing or defective;
- lack of operator training;
- poor maintenance.

## Hazardous areas on agricultural machines

Many agricultural machines have potentially dangerous moving parts, which can cause serious or fatal injuries. For example:

- balers – pick-ups, twine mechanisms and moving rear doors;
- forage harvesters – chopping cylinders;
- combine harvesters – augers in the grain tank and the header unit;
- potato harvesters – rotating rollers and conveyors;
- slurry tankers – power take-off (PTO) shafts;
- bale and straw choppers – chopping mechanisms;
- tractor – hitch mechanisms, PTOs and PTO shafts;
- power harrows – rotating tines;
- feeder wagons – rotating components in the mixing chamber.

These machines and others like them are extremely powerful. Workers using them may become complacent and may not be aware of the forces involved. For example:

- with tractors, a 10 cm diameter fencepost is smashed into matchwood almost instantly when trapped in a rising pick-up hitch;
- leaking hydraulic oil from a burst hose can be projected at 3000 psi and will penetrate the skin as easily as it would if delivered through a hypodermic syringe;
- a PTO shaft will wrap clothes, hair or arms at a rate of about 1.5 metres per second.

## Control measures

### *Safe Stop*

It is extremely dangerous to carry out any work on a machine while it is under power. The most important safety measure is to follow the Safe Stop procedure before carrying out any maintenance or adjustments, including dealing with a blockage or other problem:

- Put the handbrake on.
- Make sure the controls are in neutral (equipment made safe).
- Stop the engine (or turn off the power).
- Remove the key (or lock-off the power supply).

Many serious and fatal accidents have occurred where operators have tried to clear blockages, tried to correct faults or worked on machines with the engine running or power engaged. So always make sure you follow the Safe Stop procedure.

Remember that agricultural machines may have several power sources – mechanical, hydraulic and electrical (eg a potato harvester with hydraulic-driven components, PTO-driven parts and electrical controls for some systems). All power sources must be isolated during Safe Stop. Usually, stopping the tractor and removing the key does this – but this may not be the case with fixed machinery where it may be necessary to isolate the power supply.

Follow Safe Stop:

- before leaving the driver's seat/operating position;
- when anyone else approaches;
- before anyone carries out maintenance, adjustments or deals with a blockage.

Always make sure the machine has come to rest – remember to allow for any 'run-down' time before making any adjustments.  Run-down time can vary from a few seconds to several minutes, depending on the machine.

## Before you start

Before you start work with a machine there are a few basic checks that can be carried out. Ask yourself:

- Is the machine you intend to use suitable for the job?
- Are all safety devices such as guards in place and working correctly?
- Are you (or the operator) properly trained to do this job/use this machine? See the section below for more advice on training and competency.
- Has the instruction manual for the machine been provided, read and understood?
- Is the right personal protective equipment (PPE) available and worn?
- Has a risk assessment been carried out?
- Has the work been properly planned and communicated to those who may be at risk?
- If two or more people are involved, has everyone understood what needs to be done and has a system of communication been agreed on?

## Is the machine operator competent to do the job safely?

Before performing any work with an agricultural machine, including operation, maintenance or repair, consider these questions:

- Are all operators/workers trained to do this job?
  - Relevant training/courses for machines are available from a variety of sources including manufacturers/dealers and through colleges and other training providers. Don't forget that training is needed by casual or seasonal workers.
  - You should also check that any contractors you intend to use are competent to do the job. Workers should not use a machine unless they are properly trained and know how to use it safely.
- Is suitable clothing and footwear available and worn (including any PPE)?
  - Safety boots should usually be worn when using machinery and operators should wear clothes that will not snag on machinery or controls.
  - Any jewellery (including watches and rings) that might snag should be removed and long hair tied back so it does not get caught up in moving parts.
- Have operators been provided with relevant information?
  - The operator should read and understand the instruction manual and keep it handy for quick reference.
  - They should also be provided with any relevant information to enable them to do the work safely, eg information from risk assessments.
  - Where workers travel on the machine, eg a manned potato harvester, they should also receive adequate instructions and training.

## Checking the machine before use

Before working with any machinery, you should carry out a basic check to make sure that it is in good working order and safe to use. The exact requirements will vary according to the machine but some basic checks could include the following:

- Mechanical defects – pay particular attention to items such as brakes, wheels and tyres.
- Guards and other protective devices should be correctly fitted and maintained in good condition. Check they are in place, securely attached and working – particularly PTO shaft guards. Any damaged or defective guards should be repaired or replaced before the machine is used.
- Check that stopping devices are functioning correctly, eg emergency stops.
- All controls should be clearly marked to show what they do.
- If workers are to be carried on the machine ensure they can do so safely, eg check for safe means of access and that working platforms have guard rails etc.
- Hitching and attachment points – for mounted, semi-mounted or trailed machinery, check that it has been safely attached to the towing vehicle such as a tractor. Pay attention to the condition of drawbar/pick-up hitch, and hitch rings, pins, clips etc.
- Carry out any pre-use checks as specified in the operator's manual.
- For self-propelled machines, make sure mirrors are clean and properly adjusted. Check any other reversing aids are working.

More examples of what to look for when checking agricultural machines can be found in the *Farm Vehicle Health Check* leaflet – see 'Find out more' at the end of the leaflet.

***Case study***

*An operator was working on a potato harvester when her right hand and arm were taken in between the elevator web and the clod roller. She sustained serious crush injuries. The manufacturer's guard covering these components had deteriorated so much that it offered no protection.*

*Guards are there for your protection. Check them before you start work. Don't use the equipment if the guards are missing or damaged.*

## Using the machine

When you are working with a machine:

- Don't remove or defeat guards (eg by overriding safety devices) in order to allow the machine to work quicker or to avoid blockages or other problems. If guards become damaged or defective, stop work and take action to get them fixed. Don't leave it until later.
- Don't run the machine when the guards are removed.
- Replace all guards before making a test run and check the machine before restarting.
- Check for bystanders and warn them before you restart the machine.
- If the machine is to be checked again after the test run, repeat all safety procedures – especially Safe Stop.
- Do not mount or dismount from a moving machine.

## Dealing with blockages or other problems

- Always follow the Safe Stop procedure before carrying out any intervention.
- Secure anything which could fall on you, eg by using props or scotches on tailgates/doors.
- Secure anything which could move or rotate, eg by using chocks.
- Remember that energy is stored in springs or hydraulics, for example. Consider how will you stop this energy being released or release it safely.
- Use the right tools for the job. Remember, machine components may suddenly move when a blockage is cleared.
- Follow the manufacturer's instructions/procedures, eg as set out in the operator's manual. Adjusting the machine settings can help avoid blockages.
- Use built-in ladders and other purpose-designed access points and platforms where provided. Where such facilities don't exist you will need to consider alternative safe means of access, eg with measures provided to prevent falls.
- When the job is finished, always replace the guards before running the machine.
- Check the machine over before restarting.

***Case study***

*A farmer became trapped in the rotating tines of an unguarded power harrow when he attempted to remove a stone while the machine was still powered. The tines rotated when the blockage was removed, trapping both the man's legs. One leg was amputated.*

*Proper guarding of the tines and Safe Stop would have prevented this accident.*

## Maintenance and repairs

Follow Safe Stop and make sure the power source is locked off or the key removed to stop other people restarting the machine while you are working on it.

Always follow the safe working procedures set out in the workshop manual.

Don't use substandard replacement parts (these may fail prematurely and create safety risks). Additional precautions may be required where machinery has broken down in the field due to poor weather and/or the operating environment. Also be aware of risks arising from any in-house modifications and homemade machines.

### *Lubricating*

- If you need to remove the guard to lubricate the machine, never do so while the machine is in motion.

### *Checking hydraulic systems*

- Remember that hydraulic oil is under high pressure.
- If checking for leaks, use something (eg a piece of card run along the hose) to show where the leak is.
- Do not use your hands to feel for leaks. Release the pressure before working on the system.

### *Sharpening*

- When working on a forage harvester, for example, only the actual sharpening should take place with the machine in motion.
- All activity before and after sharpening (eg guard removal) should be done with the machine's components stationary – even if run-down takes a long time.
- Beware of flying particles when sharpening machinery. Use PPE such as goggles.

### *Working under machines*

- When working under raised machines, jacks should be used. These should be correctly positioned, and appropriate means of additional support (eg axle stands) provided.
- When working on hydraulically-raised equipment (eg trailers) use props. Never rely on the hydraulics alone.

### *Preventing unintended movement*

- Where possible, take additional precautions to ensure that moving parts remain stationary, eg chocking the cutting cylinder of a forage harvester to prevent movement.

### *Hammering*

- Beware of flying particles. Always use the appropriate PPE, such as goggles.

### *Cleaning*

- Be aware of the danger of falling off or into machinery, particularly in wet or muddy conditions.
- Make sure you know how to access machines safely, especially large machines such as combines.
- Don't clean with machines running and guards removed.

***Case study***

*An operator was carrying out repairs under a tractor-mounted rotary cultivator. He was crushed when the piece of wood he was using for support gave way and the cultivator fell on him.*

*Use of axle stands may have prevented this accident. Secure anything that could fall on you or start moving, and always use the correct equipment for the job.*

## Find out more

Farm *Vehicle Health Check* – this leaflet is available at www.bagma.com or www.nfuonline.com/Our-work/Farm-safety/Guidance/Farm-Vehicle-Health-Check-Scheme

HSE Agricultural Information Sheets (AIS) provide guidance on a range of specific farm machines. They can be found on the HSE website at www.hse.gov.uk/agriculture

AIS4 *Safe use of round balers*

AIS6 *Safe use of combine harvesters*

AIS13 *Safe use of potato harvesters*

AIS21 *Safe use of rotary flail hedge cutters*

AIS24 *Safe use of forage harvesters*

AIS25 *Safe use of agricultural mowers*

Other useful HSE leaflets include:

AS24 *Power take-offs and power take-off drive shafts* HSE 2011 www.hse.gov.uk/pubns/as24.pdf

*Farmwise: Your essential guide to health and safety in agriculture* HSG270 HSE Books 2009 ISBN 978 0 7176 6509 9 www.hse.gov.uk/pubns/books/hsg270.htm

## Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

This document can be found at: www.hse.gov.uk/pubns/indg241.htm.