

No second chances

A farm machinery safety step-by-step guide



*This is a web-friendly
version of leaflet
INDG241*

Over a five-year period, HSE Agricultural Inspectors investigated nearly 7000 accidents. This guide is based on a detailed analysis of over 1000 of these accidents which involved maintenance and blockage clearing.

In this booklet you will find practical advice on working with mobile and stationary agricultural machinery – particularly machine maintenance and dealing with blockages.

Remember, the time to consider safety is before something goes wrong, not afterwards.

Key findings

An analysis of the machinery accidents investigated by HSE revealed the following key findings:

- **Bad work practices** were a factor in 75% of machinery accidents – indicating that **lack of training** and **lack of knowledge** are issues which need to be addressed.
- **Maintaining** the machine and clearing **blockages** were identified as two particularly hazardous activities.
- The machine was **under power** in over 60% of cases, although power was only required in one third of these.
- 29% of machines had **poor guards**.
- 10% of machines had not been properly maintained.
- Most accidents involved workers in the 17-25 year old age range, with another peak involving 40-45 year olds.
- 50% of all accident victims were caught on moving parts.
- The operator was most often the injured party.

Power means peril

A common feature of the accidents investigated was the failure of operators to turn off the tractor or switch off and lock off the machine before dealing with the problem. This factor occurs again and again in accident reports.

Too few workers realise how much power is involved when an agricultural machine is in operation. Most can quote the rated power of their tractors. Few realise what this actually means – or their own frailty in comparison.

Remember:

- A 10 centimetre fence post is smashed into matchwood almost instantly when trapped in a rising pick-up hitch.
- A jet of hydraulic oil from a burst hose can emerge at 3,000 psi and will penetrate the skin as easily as it would if it were delivered through a hypodermic syringe. The external signs of injury may be slight, but the internal damage is not. Oil can penetrate muscles and organs, which usually means surgery. Oil is corrosive to body tissue and causes severe damage which may lead to amputation.
- A PTO shaft will wrap clothes, hair or arms at a rate of about 1.5 metres in just one second.

Training, adequate preparation and thinking ahead may have helped prevent many of the accidents analysed. Too often, workers do not fully appreciate the potential consequences of their actions.

Safe stop

Safe Stop is probably the most important safety action of all when operating tractors, self-propelled machinery or any other machinery. It means:

- Making sure the handbrake is on (for mobile equipment)
- Making sure all controls and equipment are left safe (eg in neutral)
- Stopping the engine or turning off the power
- Removing the key or locking off the power supply.

Remember:

Some 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 addressed during Safe Stop. Usually, stopping the tractor and removing the key does this – but this may not be the case with fixed machinery.

These steps should always be taken:

- Before leaving the driver's seat/operating position.
- When anyone else approaches.
- When anyone is working on a machine.

Safe systems of work

The points outlined below form the basis of a safe system of work. They will be examined in greater detail on the following pages.

The points you should consider are:

- Are you properly trained to do this job/use this machine?
- Have you read the instruction manual for the machine?
- Have you got the right equipment, clothing etc?
- Have you planned your work – considering all aspects, including access to the machine?

- If two or more people are involved, has everyone understood what needs to be done and has a system of communication been agreed on?
- Always stop a machine before any intervention.
- Always make sure the machine has come to rest – remember run down time.
- Make the stop positive – remove the key from mobile equipment and lock switches on static equipment.
- Secure anything which could fall on you – eg by using props.
- Secure anything which could move or rotate – eg by using chocks.
- Remember that energy is stored in, for example, springs or hydraulics.
- How will you stop this energy being released or release it safely?
- Use the right tools for the job.
- Follow the manufacturer's instructions/procedures.
- When the job is finished, always replace the guards before running the machine.
- Check the machine over before restarting.

Above all, if you have not been trained to do a job, don't tackle it!

Am I prepared?

Before working with agricultural machinery, you should ask yourself these questions:

- **Am I trained to do this job?**
If the answer is "no", do not proceed!
- **Do I know how to operate this machine?**
 - Never use a machine unless you are properly trained and know how to use it safely.
 - Make sure you read and understand the operator's manual and keep it handy for quick reference.
- **Am I wearing suitable clothing and footwear?**
 - Wear footwear with a good grip (safety boots should usually be worn when using machinery).
 - Wear clothes which will not snag on machinery or controls (preferably overalls – and not torn ones!).
 - Wear appropriate personal protective equipment.
 - Remove any jewellery which might snag (don't forget watches and rings).
 - Keep long hair tied back.
- **Do I know what might happen as a result of my actions?**
 - Know how the machine operates – what happens in what sequence.
 - Plan your work in advance and remember that parts of the machine can and may move.
- **Is anyone else working on or near the machine?**
 - If so, agree a course of action before any work starts.
 - Remove the key – unskilled assistants may not know the controls and move the wrong ones.
 - Consider other people who may be nearby and warn them before you start the machine again.

Is the machine prepared?

Before working with any machinery, you should carry out a basic check to make sure that the machinery is in good working order. The key questions you should ask are:

Is it safe?

- Check for mechanical defects (paying particular attention to brakes).
- never use machines which are not properly maintained.
- Only operate machines from the normal operating position.

What about the guards?

- Check that guards are in place.
- Check that guards are not damaged.

Remember:

- Damaged guards must be reported and repaired.
- Missing guards should be replaced.

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. 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.

Maintenance –

Before you start

Again, the key question is: "Am I trained to do this job?" If the answer is "no" – don't do it!

Before any maintenance is carried out:

■ Use Safe Stop

- It could save your life – or someone else's.

■ Check the machine has stopped

- Even if the power has been turned off, machine parts may continue to rotate. On some machines, run-down times of five minutes are not unusual.

■ Secure anything which could move

- Use appropriate props, chocks, etc (eg. prop a raised trailer body).

■ Double check:

- Am I wearing the correct clothing?
- Have I removed jewellery?

■ Double check:

- Have I been properly trained to do this job?
- Have I planned the job?
- Have I got the right tools and equipment?
- Do I know what might happen?

■ **If anyone else is working on the machine:**

- Have they been properly trained to do the job?
- Communicate clearly.
- Agree the action and stick to it.
- Remove the key or lock off the power supply – unskilled assistants may not know the controls and may move the wrong ones.

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 which could fall on you or start moving, and always use the correct equipment for the job.

Maintenance –

While you work

While working with machines, follow safe working procedures. Pay particular attention to guards.

When you are working:

- Do not remove guards unless the power to the machine is locked off or the key removed.
- Do not defeat guards (eg. by overriding safety devices).
- Do not run the machine when the guards are removed.
- Replace all guards before making a test run.
- Check the machine before re-starting.
- Check for bystanders and warn them before you re-start the machine.
- If the machine is to be checked after the test run, repeat all safety procedures – especially Safe Stop.

Case study

The operator of a potato planter had repaired the chain drive which had snapped during planting. He did not replace the guard before running the machine to check the repair. When he was satisfied with the repair he replaced the guard, but his thumb was caught between the moving chain and sprocket and the tip of the thumb was cut off.

He should not have attempted to replace the guard with the machine running. The guard should have been replaced, with the machine stopped, before the test run.

Maintenance –

Hazardous activities

During the maintenance of agricultural machinery, there are many activities which are potentially hazardous. Some features more than others in accident reports.

NOTE: The following list draws on accidents investigated by HSE. It does not cover every hazardous situation which could occur during maintenance. You should be aware that there are many other potential dangers.

Lubricating

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

Checking hydraulic systems

- Remember that hydraulic oil is under high pressure. The external signs of oil injection may be slight, but the internal damage is not and may lead to surgery or amputation.
- 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.
- Release the pressure before working on the system.

Sharpening

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

Working under machines

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

Hammering

- Beware of flying particles. Always use the appropriate personal protective equipment. It offers protection not only against flying particles, but also many other risks.

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.

Blockages

Many accidents happen while cleaning machine blockages – often because operators attempt to clear a blockage while the machine is still powered.

Again, the key question to ask is: “Have I been trained to do this job properly?” If the answer is “no”, do not attempt it.

■ Use Safe Stop

- Safe Stop is probably the single most important procedure for the prevention of accidents (see page 5). A blocked machine may suddenly start operating again unless the engine is stopped before the blockage is cleared.
- The power must be locked off or the key removed to stop other people re-starting the machine while you are working on it.

■ Check it has stopped

- Even if the power has been turned off, machine parts may continue to rotate. On some machines, run-down times of five minutes are not unusual. Many injuries are caused because work is begun before the machine has come to a complete stop.

■ Make the stop positive: chock it

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

■ Use a tool to clear the blockage

- Never use your bare hands to clear a blockage or try to kick it free. Note that, even in cases where operators use a tool to clear a blockage, a significant number are injured because the machine is still running.

■ If it isn't cleared, don't touch

- Remember, machines can suddenly move when a blockage is cleared.

Case study

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

Safe Stop would have prevented this accident.

Special danger areas

An analysis of accidents investigated by HSE indicates that there are certain places and parts of machines which present special danger. These are some – but not all – of them. Remember that any agricultural machine under power represents potential danger.

- Baler – pick-ups and twine.
- Forage harvester – chopping cylinder.
- Combine harvester – grain tank.
- Potato harvester – rotating parts.
- Slurry tanker – PTO shaft.
- Bale and straw choppers – chopping mechanism.
- Tractor – hitch mechanism, PTO shaft.
- Mounted equipment – underneath.

Also beware of:

- In-house modifications to machines, and home-made machines.
- Substandard parts (which may fail and throw off flying particles).
- Any mechanism which can be turned manually but which may gather momentum.
- Any mechanism which has momentum and takes time to stop;
- Hydraulic fluid (where there is a danger of oil injection).

The cost of accidents

Many accidents result in physical costs – pain and suffering.

But accidents also cost money – both for the injured person and the employer.

Time off work because of an accident may lead to loss of earnings for the individual. For the self-employed, it could even end their business.

For the employer, there may well be hidden costs. Many people believe that minor injuries cost nothing more than the price of a sticking plaster. But people will have to spend time dealing with the accident. they may have to:

- Help the injured person and give first aid.
- Clean up.
- Reschedule the job.
- repair or reset the equipment or check for faults.
- Investigate the accident and prepare reports.
- Deal with insurers or Health and Safety Inspectors.
- Wait to have to get back to work.

Accidents which cause damage to expensive plant and equipment can cost even more.

No second chances video

There is also a 13 minute video available to accompany this leaflet which looks at the potentially fatal consequences of ignoring safe working practices. It uses dramatic reconstructions and interviews with accident victims to point out important safety advice to anyone who is working with machines – particularly maintaining or unblocking them.

ISBN 0 7176 1951 6 Price £25.00 + VAT

The video is available from HSE Books, PO Box 1999, Sudbury, Suffolk CO01 2WA
Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk

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This document contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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