WISH

Waste Industry Safety and Health Forum

INFORMATION DOCUMENT

MACHINERY SAFETY INFORMATION WASTE METALS CROCODILE AND SIMILAR POWERED SHEARS

This WISH information document is aimed at health and safety improvements in the waste management industry. The Health and Safety Executive (HSE) provided support to WISH in producing this advice. This advice may go further than the minimum you need to do to comply with the law with regard to health and safety

Contents

This is one of a series of sheets covering specific items of machinery used at waste recycling plants/MRFs and similar. All of the sheets are available from the WISH website at https://www.wishforum.org.uk/information/. In addition, specific isolation and lock-off advice is available at WASTE 29 and overarching waste and recycling machinery safety advice at WASTE 33. This sheet does not aim to be comprehensive – you should also seek guidance, such as from the HSE's website, and where required obtain competent advice. This sheet primarily covers the machinery hazards and risks associated with metals crocodile and similar shears. Please note this sheet does not cover non-machinery risks, such as manual handling, and you should conduct assessments to ensure you have identified all risks.

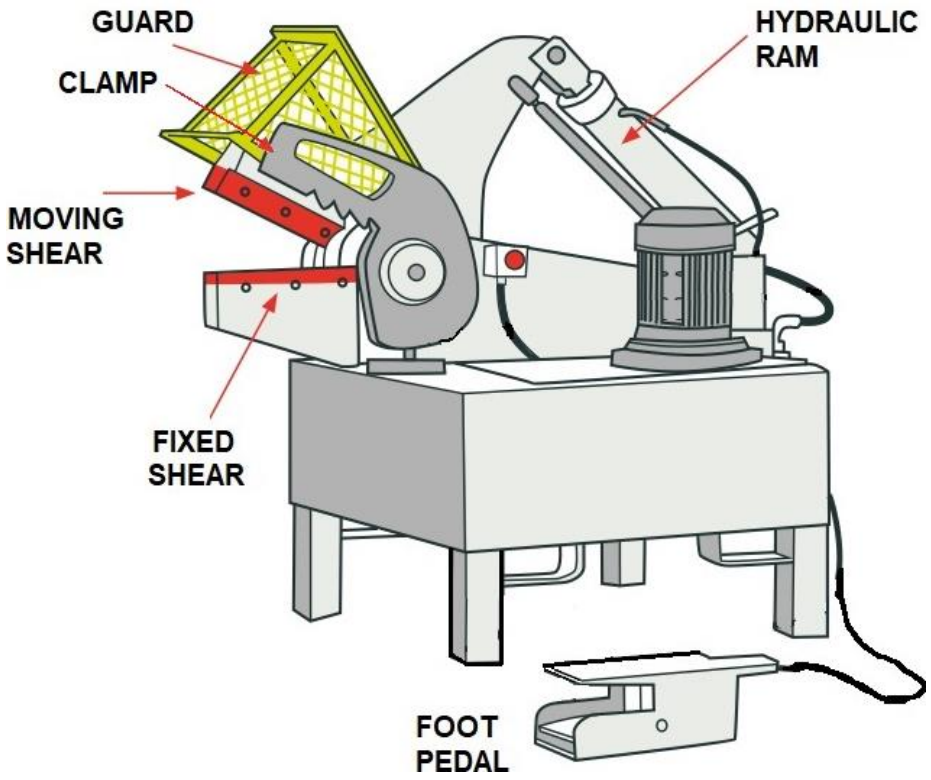
Tips, discussions, case studies, and notes – in WISH documents tips, discussions, case studies, and notes are sometimes provided in green tint boxes. Tips, discussions, and case studies are informal advice, experience, and ideas aimed at helping operators manage risk. They are not part of formal advice. Notes expand on specific issues, give clarification, highlight issues, and provide explanations. Notes are part of formal advice.

Introduction

Contact with the moving parts of machinery, including waste metals crocodile and similar shears, has been the cause of serious accidents at recycling plants/sites. The safe design, use and maintenance of machinery such as waste metals crocodile and similar shears is essential if we are to reduce this unacceptable toll of serious accidents.

This information sheet covers metals crocodile and similar shears used at recycling plants. These machines are commonly called crocodile or alligator shears (the names are interchangeable – for consistency crocodile is used throughout this sheet). Many crocodile shears are floor or bench mounted (see graphic below), although also see section below on hand-held powered shears. Some are installed as part of a larger recycling plant, are automatic in operation, fed by conveyor or similar etc – these are outside of the scope of this document, although the general principles of safeguarding would apply, such as those given in WISH's guidance on the principles of safeguarding, available at: WISH WASTE 33.

Generally, these machines consist of a pivoting set of jaws that close (one fixed jaw and one moving) to create a shear edge. Typically the bottom jaw is fixed and normally includes an 'anvil' or mount to rest the workpiece/item to be cut on. A typical arrangement is as below:



Historically many crocodile shears were powered by a flywheel. However, nowadays it is most common for a hydraulic ram to provide the power source. The ram extends causing the moving shear edge/jaw to close. Some crocodile shears may also include a clamp that moves ahead of the moving shear jaw, (usually powered by a separate hydraulic ram). The purpose of this clamp being to hold the workpiece/item to be cut ahead of the moving shear.

Some crocodile shears may have an automatic mode allowing repeated, continuous closure and opening of the moving shear (see safeguarding below). Most have (or also have) foot pedal or similar operation – pressing the pedal activates the shears. Foot pedal operation can be single stroke (pressing the pedal only activates the shears once and it needs to be released and depressed again to activate the shears again) or multiple-stroke (the machine keeps running continuously if the pedal remains depressed).

Ensuring selection of the right machine for the right job is essential for safe use: the operator's interaction with the shears heavily influences the likelihood of an incident occurring through the type of workpiece being worked (larger workpieces/items to be cut place the operator further away from the shear hazard). Judgement should be made on whether smaller workpieces/items to be cut place the operator inherently too close to dangerous parts (inherently unsafe) or if another process/machine can be used instead and would be safer. The closer the shears operator's hand/s are to the shear point the more likely it is that they will accidentally shear their hand/s. The smaller the workpiece/item being cut is the more likely this will be. Manually operated crocodile and similar shears are not suitable for smaller workpieces/items, and an alternative machine/method should be used.

Case study – a worker at a metals recycling site was operating a set of crocodile shears when he accidentally caught his right hand between the moving and static shears, resulting in the traumatic amputation of four fingers. The company involved was prosecuted and fined. A lack of adequate maintenance, suitable safe ways of working, and training was noted in court and contributed to the company being found guilty.

Machinery hazards crocodile and similar shears

The drive and other similar components of crocodile shears may pose machinery hazards. These should be safeguarded to comply with guidance such as WISH WASTE 33 on the principles of safeguarding of recycling machinery, available at: WISH WASTE 33.

However, the most obvious hazard is the shear-point between the fixed and moving shears (or two moving shears for many hand-held shears). This danger zone is difficult to safeguard completely without compromising the function of the equipment resulting in a heavy reliance on training, competence, safe ways of working, supervision, monitoring etc. Crocodile shears are designed to cut through metals – they are powerful and inadvertent contact with the shear point is likely to result in serious injury.

Case study – a worker at a construction waste site was using a set of hand-held powered shears (see section below) to cut-up waste aluminium window frames from general demolition waste skips (the site used the shears to reduce particle size to allow more efficient onwards transport). The worker used his foot to steady a window frame, slipped and inadvertently sheared his foot rather than the window frame, resulting in a serious and painful injury. Crocodile and similar shears rely heavily on operator competence and training – this type of 'human-based' control is known to be prone to failure.

Note – this information sheet covers machinery hazards and risks. Issues such as manual handling, exposure to sharp and potentially contaminated items etc are outside of the scope of this document and are not directly covered in any detail. However, you should assess whether this type of risk is relevant to your machinery, and if so then they should be included in your risk assessment/s and safe ways of working – both for normal operation and during cleaning, blockage clearance, maintenance, repair etc. Guidance and advice on hazards and risks such as the above is available from the WISH website at https://www.wishforum.org.uk/ and on the HSE's website at https://www.hse.gov.uk/waste/index.htm.

Safeguarding crocodile shears

Because of the different variations of crocodile shears and similar, no single safeguarding solution can be applied without the potential for significant modification to the OEM (original equipment manufacturer) design. Reassessment of the machine against EHSRs (essential health and safety requirements) would be required if any such modification was substantial. In addition, the nature of crocodile shears is that the shear point danger zone cannot practically be fully guarded. There is no physical safeguarding solution that will eliminate or on its own fully control the hazards associated with these machines. However, this does not mean that the shear point on crocodile shears cannot at least be partially physically guarded, for example by a:

- Fixed guard to reduce the gap between the moving shear and fixed shear/anvil
- Moveable guard, attached to the shear jaw/s, such that during the arc of rotation of the moveable jaw, the gap between the fixed shear and moving shear jaw becomes reduced to mitigate against inadvertent contact
- Moveable top guard that is manually adjusted by the operator (in advance of machine operation/activation) and stays in that position

Physical guarding to prevent pieces of metal from being ejected during cutting may also be installed on crocodile shears based on risk assessment.

As noted above, some crocodile shears have an automatic mode – the machine operates continuously with the shears opening and closing automatically until the machine is turned-off or automatic mode disengaged. This automatic mode is inherently unsafe if operators are located close to the machine and/or an operator is manually feeding workpieces/items into the shears. In these cases the automatic mode should be disabled or removed.

Also as noted above, some shears have a multi-stroke mode where the machine continues to operate so long as the foot pedal, or similar, is depressed. Based on risk assessment, provided that the machine is not being manually fed (for example is being fed by a conveyor) this multi-stroke mode may be acceptable. Even in these cases employers should supervise and monitor to ensure that pedals have not been ‘tied-down’ or similar, or that where a shroud is fitted over the pedal that an object such as a ‘fizzy-drinks’ can has not been jammed between the shroud and pedal.

Where shears are manually fed, they should only be used in ‘manual mode’ where pressing the pedal results in one stroke of the shears and the pedal requires releasing and pressing again to produce another stroke.

The closer a worker is to a machinery danger zone the more likely that an inadvertent contact with a moving part, such as shear jaws, might occur. With manual feeding of crocodile shears and similar the closeness of the operator's hands to the shear point may be determined by the size of the workpiece/item being sheared – the larger the piece the further away the operator's hands can be, the smaller the piece the closer the operator's hands are likely to be. Your risk assessment should include this issue. There is no set size/distance for crocodile shears and similar. However, some industries have set a minimum distance to a danger zone for some equipment. For example, HSE guidance for bench-mounted circular saws is that a push stick should be used for the last 300mm of a cut to prevent the woodworker's hands being too close to the saw danger zone (see HSE circular saws guidance).

Because of the issues with physical safeguarding, the safe use of crocodile shears and similar is heavily reliant on safe ways of working. Such safe ways should include:

- Restricting access to areas where crocodile shears are used to authorised and trained personnel only (including prohibiting persons approaching from the rear and side)
- Maintaining a clear and unrestricted space around the shears, including keeping the work area free of slip and trip hazards
- That only trained and competent persons are to operate the shears
- For manual feed, that workpieces/items to be cut are fed/held by the person operating the shears and not a second person
- Generally, the operator should stand to the side of the machine when feeding items as it is usually easier to feed an item and keep their hands away from the shear point
- Implementing safe maintenance and repair procedures, for example electrically isolating and locking-off the shears before maintenance etc work starts
- Implementing daily/pre-use checks to ensure that shears are in good condition etc
- Ensuring that all guards and safety devices have been adjusted correctly, are in place and undamaged etc before work with the crocodile shears commences
- Emergency stops should not be used as a functional stop to turn the machine off after use etc – repeated use of emergency stops can result in excessive wear-and-tear leading to failure when they are really needed

Employers should provide robust supervision and monitoring processes to ensure that safe ways of working with crocodile shears and similar are followed and take immediate action if they are not. Adequate training should be provided for workers who use crocodile and shears and similar, and this training should be repeated/reinforced periodically.

Hand-held powered shears

Many of the crocodile and similar shears used in recycling are bench or floor mounted, as shown in the graphic in the introduction to this information sheet. However, some are hand-held. These are sometimes called crocodile shears, sometimes 'demolition' shears, or in some cases other terms are used.

Example of hand-held crocodile/demolition shears in use (this is only an example – different designs, methods of power etc also exist)

In addition to the safeguarding and procedural controls noted above for 'fixed' shears, for hand-held shears additional controls should include:

- 'Twin-button' or similar systems should be fitted. That is two controls need to be activated to operate the shears so that the operator does not have a 'free hand' which could enter the shear danger zone
- Such 'twin button' systems should be designed so that the controls cannot be 'spanned' by one hand, and employers should supervise and monitor to ensure that twin button systems have not been defeated, such as clips, bungee cords etc being used to 'hold-down' one control
- Clamping/securing of the workpiece/item to be cut is essential, and shears operators should be instructed not to use their foot/feet to steady or hold-down items being cut, and that no second person is to hold or steady items/workpieces
- Operators should not work 'on a pile of debris/wastes' – work areas should be kept clear and free from slip and trip hazards

Disclaimer and WISH

This information document has been prepared by health and safety practitioners to assist health and safety improvements in the waste management industry. It is endorsed by the WISH (Waste Industry Safety and Health) Forum. This information document is not formal guidance and represents good practice, which typically goes beyond the strict requirements of health and safety law.

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This information document is not a substitute for duty holder and/or professional safety advisor's judgment, Notwithstanding the good practice in this document, duty holders are responsible for ascertaining the sufficiency and adequacy of their internal and independent procedures for verifying and evaluating their organisation's compliance with safety law.

The Waste Industry Safety and Health (WISH) Forum exists to communicate and consult with key stakeholders, including local and national government bodies, equipment manufacturers, trade associations, professional associations, and trade unions. The aim of WISH is to identify, devise and promote activities to improve industry health and safety performance.

Useful links and further reading

WISH website: https://www.wishforum.org.uk/
HSE waste and recycling webpages: www.hse.gov.uk/waste/index.htm
BS 14100:2020 - Control of hazardous energy on machinery
BS 14200:2023 – Maintenance of machinery
WASTE 13 'Safe design and operation of MRFs'
WASTE 29 'Practical guidance on isolation (lock-off) for recycling and recovery machinery'
WASTE 33 'Principles of safeguarding for recycling and recovery machinery'

There are also dozens of EN and similar technical standards on machinery safety. You as an operator are unlikely to have access to all of these and would not be expected to have an in-depth knowledge of them. However, you should have access to competent advice which does have access and the required knowledge.