



Flails and mulchers in tree work



Introduction

This leaflet covers the safe working practices to be followed when operating front-, rear- or arm-mounted flails and mulchers in forestry and other tree work. The flail or mulcher may be part of a purpose-built machine or mounted on and powered by a tractor, excavator or other suitable base vehicle.

You can use this leaflet, along with the machine and base vehicle manufacturer's handbooks, as part of the risk assessment process to help identify the controls to put in place when using a flail or mulcher.

Where the base vehicle is a tractor or excavator, this leaflet must be read in conjunction with AFAG leaflet 501 *Tractor units in tree work*, or AFAG leaflet 704 *Excavators in tree work*.

You must also assess the effects of the site conditions and the weather as well as following this guidance.

All operators must have had appropriate training* in how to operate the machine and base vehicle as well as how to carry out the tasks required (see AFAG leaflet 805 *Training and certification*).

Personal protective equipment (PPE)

1 Use the following PPE:

- Safety helmet (complying with EN 397) when the risk assessment identifies that it is needed.
- Suitable hearing protection (complying with EN 352) where the noise level exceeds 80 dB(A) (see INDG363 *Protect your hearing or lose it!*).
- Suitable protective gloves when inspecting or carrying out maintenance on the flail or handling oils, lubricants and hydraulic components.
- Protective boots with good grip and ankle support (complying with EN ISO 20345).
- Suitable eye protection (complying with EN 166) for use during maintenance and when the risk assessment identifies that it is needed.
- Suitable respiratory protective equipment (eg disposable dust mask complying with EN 149 and FFP2 filter or equivalent) when the risk assessment identifies that it is needed.
- Non-slag outer clothing appropriate to the prevailing weather conditions. High-visibility clothing (complying with EN 471) should be worn when the risk assessment identifies that it is needed.

* A relevant NPTC Forest Machine Operator Certificate Scheme (FMOCS) qualification should be obtained for the tractor or other base unit being used. An FMOCS qualification is also available for the use of mechanical flails.

- ❑ 2 A suitable first-aid kit, including a large wound dressing, should be available in the base vehicle (see HSE leaflet INDG214 *First aid at work: Your questions answered*).
- ❑ 3 Hand-cleaning material such as waterless skin cleanser or soap, water and paper towels should be readily available.
- ❑ 4 You should have available and know how to use an emergency kit for spills of fuel, oil or chemicals.

General advice

- ❑ 5 On all reasonably foreseeable approaches to the worksite, erect warning and prohibition signs conforming to the Health and Safety (Safety Signs and Signals) Regulations 1996, indicating a hazardous worksite and that unauthorised access is prohibited. In areas of very high public access, your risk assessment may indicate that additional controls (eg barrier tape, barriers, extra manning, operating with all working lights on etc) are required.
- ❑ 6 Working on public highways should be in accordance with Department of Transport (DoT) and Local Highways Authority (LHA) guidelines. The LHA should be notified of the time and location of the intended work and the correct warning signs as specified by the DoT. Non-authorized placement of road signs may create offences under the Highways Act.
- ❑ 7 Base vehicles will need to be fitted with an operator protective structure (OPS) designed to minimise the risk of injury from flying debris entering the cab. OPSs may take the form of a framework with mesh grills, safety glazing or polycarbonate. The risk assessment will determine the level of protection required. OPS design should take account of the operator's need for good all-round visibility. Doors and windows should not be removed from the base vehicle.
- ❑ 8 Use of a flashing warning beacon is recommended when carrying out work from, or moving between sites on, public roads.

The machine

- ❑ 9 Before starting the job, assess what sort of work is being carried out so that you can identify the most suitable type of flail/mulcher.
- ❑ 10 Check that the weight of the machine does not exceed the maximum load for the front or rear axles and tyres of the base vehicle. Use counterbalance weights or ballast where necessary.
- ❑ 11 If the machine is powered by the base vehicle's hydraulic system ensure the hydraulic capacity is adequate for the type of flail/mulcher being used.
- ❑ 12 If the machine is powered by the base vehicle's power take-off (PTO) shaft, ensure:
 - the PTO speed is compatible with the flail/mulcher and the PTO shaft;

- the PTO shaft is fitted with a suitable guard (complying with BS EN ISO 5674) enclosing the shaft along its full length, from the base vehicle to the flail (see AS24 *Power take-offs and power take-off drive shafts*).

- ❑ 13 All pulleys, belts, drive shafts and blades must be guarded.
- ❑ 14 Safety devices (eg shearbolts, pressure-relief valves, PTO torque clutches and belts) should be fitted in accordance with the manufacturer's handbook.
- ❑ 15 Front- or rear-mounted flails/mulchers must be fitted with cutting height adjustment and a pusher bar to prevent tall, woody material falling onto the base vehicle cab.
- ❑ 16 Arm-mounted flails/mulchers will require the base vehicle's side window/door to be guarded in accordance with the manufacturer's instructions.
- ❑ 17 Additional guarding may be required for certain forestry operations (eg deflector plates to prevent debris from flying into the front or rear of the base vehicle). This should be fitted in accordance with the manufacturer's instructions.
- ❑ 18 All relevant safety/warning decals should be in position on the flail.

Maintenance

- ❑ 19 Ensure maintenance is carried out by a competent person, in accordance with the manufacturer's handbook and meets the requirements of the Provision and Use of Work Equipment Regulations 1998.
- ❑ 20 Before opening any guards make sure the engine is switched off, the start key removed, and the dangerous moving parts have come to a complete standstill. Heavier rotors may run down very silently and take a long time to stop.
- ❑ 21 Check all cutting devices for damage, and sharpen or replace if necessary. If damaged or worn, replace as a complete set/pair to maintain balance. Check the condition and tightness of securing bolts.
- ❑ 22 Do **not** support the flail/mulcher by hydraulics alone – use suitable and secure props or stands.
- ❑ 23 Ensure all hydraulic pressure in the systems to be maintained or repaired is released before work starts. Where this is not possible, ease the residual pressure by careful slackening of joints.
- ❑ 24 Always use two spanners to refit a pipe or hose to avoid twisting the hose.
- ❑ 25 Do not use your hand to check for hydraulic leaks – use a piece of paper or cardboard. Hydraulic fluid under pressure can penetrate the skin. If such contamination occurs seek medical attention at once.
- ❑ 26 Inspect for cracks and other damage.
- ❑ 27 Keep a maintenance record.

Preparing to work

- ❑ **28** Before starting work the operator should carry out a site-specific risk assessment. Where appropriate, the area to be worked should be walked to identify any hidden obstacles or variability of ground level. Particular care should be taken when operating close to wire fences, as discarded material may be lying in the undergrowth.
- ❑ **29** When preparing to operate along roadsides, check for the presence of above-ground utilities such as poles (and pole stays), water hydrants, telecom boxes etc.
- ❑ **30** Do not operate arm- or excavator-mounted machines, capable of exceeding 4.2 m in height, if any part can come within 15 m of overhead electric power lines, unless it has been established that the line voltage does not exceed 33 kV, in which case this distance may be reduced to 9 m (see AFAG leaflet 804 *Electricity at work: Forestry and arboriculture*). Any machine used to clear standing trees/plants of over 4.2 m in height will need to follow the guidance for tree-felling operations contained in AFAG leaflet 804.
- ❑ **31** A sign warning against working in the vicinity of overhead electric power lines should be prominently displayed (in all machines capable of exceeding 4.2 m in height), together with the maximum height of the machine and the maximum height in the recommended travelling position.
- ❑ **32** Set up an appropriate risk zone around the area being worked.
- ❑ **33** A suitable method of working should be set up and followed to minimise the risk of:
 - instability of the base vehicle and flail/mulcher, particularly when working on sloping ground;
 - cut debris being discharged into watercourses;
 - damage to buildings, vehicles and other amenities from discharged material;
 - any contact with power lines.

Emergency procedures

- ❑ **34** Ensure a designated and responsible person knows the daily work programme and agree with them a suitable emergency contact procedure. Where reasonably practicable, use a mobile phone or radio and a pre-arranged call-in system.
- ❑ **35** Ensure the operators can provide the emergency services with enough detail for them to be found if there is an accident, eg the grid reference, distance from the main road, type of access (suitable for car/four-wheel-drive/emergency service vehicles). Know the location details before they are needed in an emergency (also see AFAG leaflet 802 *Emergency planning*).

Operational procedure

- ❑ **36** The flail/mulcher should only be operated from within the cab of the base vehicle.
- ❑ **37** Ensure that 3-point-linkage-mounted flails/mulchers are balanced and level before starting work.
- ❑ **38** Select a gear and speed that is appropriate to the recommended PTO shaft speed, ground conditions and vegetation.
- ❑ **39** Look out for obstructions and other hazards in the path of the base vehicle and flail/mulcher.
- ❑ **40** The flail/mulcher should be run at the highest position that will give the desired cutting result. Two passes may be necessary in dense vegetation.
- ❑ **41** Where possible, excavator-based flails/mulchers should be operated using a slewing motion, with the head at right angles to the operator's cab, so that debris is not directed towards cab windows or the vehicle. If it is necessary to operate the head in line with the cab then:
 - cutting should always be away from the operator;
 - an adjustable debris deflector plate must be fitted;
 - a suitable cab operator protective structure must be fitted; and
 - the head should not be operated above the level of the cab.
- ❑ **42** Stop work and disengage the PTO or drive to the machine immediately if any part of the flail/mulcher becomes loose or is damaged.
- ❑ **43** Stop work if anyone is seen approaching within the risk zone identified in the risk assessment.
- ❑ **44** Do **not** leave the base vehicle cab until the cutting head has stopped rotating and has been lowered to the ground.

Obstacles

- ❑ **45** When an obstacle is encountered:
 - stop the flail/mulcher immediately;
 - reverse to disengage the obstacle;
 - where possible do **not** lift the cutting head until it is completely stationary.
- ❑ **46** **Stop** immediately if unusual vibration occurs.
- ❑ **47** Reduce speed when using forward-mounted flails/mulchers as visibility may be restricted.

