



Technical Note 001

Using a tree jack

Advice from the Chainsaw Working Group aimed at Operators is summarised in this document. These are general guidelines and set out advice at the date of issue; they may not be relevant to your situation or site and it is necessary to use common sense when applying them. A full glossary of terms used is found at the end of this document.

Jacking is a method of causing the controlled fall of a tree against its natural lean or weighting. A jack can provide a greater controlled mechanical advantage than wedges or a breaking bar. However, these advantages come with additional hazards if the equipment is used without good assessment and planning or in inappropriate situations.



COMPETENCE REQUIRED TO USE A TREE JACK

Jacking a tree is skilled technical work. The chainsaw technician must be highly competent in felling and have considerable experience before being trained in jacking techniques.

- Jacking must only be done by chainsaw technicians trained in jacking procedures (competent jack technician).
- Trainees must be under the **close supervision** of a competent jack technician and must have an appropriate **written procedure** to follow.
- If assistance is required when a tree is being jacked, the **assistant** must also be a competent jack technician.

WHAT ARE THE HAZARDS AND WHY?

The main hazards with using a jack are:

1. The tree fails to fall.
2. Loss of control over the direction the tree falls.

Why does this happen?

- Lack of proper assessment of the tree before commencing.
- Lack of training and experience.
- Not using appropriate falling jacks and tools.
- Defects in the stump or tree, such as decay or deadwood.
- Jack failure or using a jack that cannot overcome the weight of the tree.
- Attempting to jack a tree that is too small to accommodate the notch.
- Jack and plates not placed deep enough in the notch.
- Notch cuts are not horizontal, so jacks or top plates move suddenly.
- Notch is too tall for the maximum travel of the jack.
- Failure to follow up with wedges while jacking.
- Jacking the tree off the hinge due to excessive backwards lean.



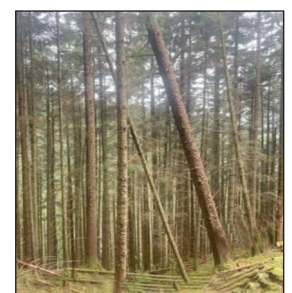
Signs of decay



Dead tree



Caption to follow



Heavy lean to overcome

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WHEN MIGHT IT BE SAFE TO USE A JACK?

A jack could be used when an assessment by a competent jack technician confirms the following:

- The tree is sound and can accept the pressure the jack will need to exert.
- The tree is large enough to make a secure notch for the jack.
- The lean and weight of the tree is likely to be overcome by the jack available.
- The lean and weight of the tree is not so great that the hinge is likely to shear when a jack is used.
- The weather conditions are suitable i.e. no gusting or high winds.
- Site conditions are predictable i.e. no multiple windblow/hung up trees.

Jacks must not be used if any of the conditions above cannot be met or are uncertain.

Examples of situations where jacks could be considered for tree felling include:

- Whenever a breaking bar or wedges are judged not capable of creating enough force to cause the tree to fall in the intended direction.
- When there is a need to control the fall of a tree that could land in a place where it would cause damage or be unsafe to work, such as in a watercourse, on other standing trees, on neighbouring land, fences, walls or other structures, on roadways, in gullies, on switched off powerlines and rail lines.
- Felling trees that lean uphill against required felling direction.
- Maintaining a felling pattern or specific felling direction to avoid **brushing** and timber breakage.

WHAT IS THE RIGHT JACK TO USE?

The bottle jack is the common tool for tree felling and it is suited to fitting within the notch cuts.

- The working capacity of the jack must allow the tree to be pushed effectively to fall safely.
- The jack must have a heavy-duty top plate to distribute the jack's force. No welding or modifications can be made to the jack's components so if a top plate is not

already part of the jack, a removable top-plate will need to be used.

- The top plate must be capable of taking the maximum pressure of the jack without deforming.
- A removable top plate must have a collar welded onto its bottom face to prevent it slipping off the jack as the felling cut opens.



Standard bottle jack with removable top plate



20-tonne 'Treemans' jack



Clark 'Ram Jack'

ESSENTIAL!

- Select a jack suitable for the task, clean and maintained in good working order.
- Use a CE-marked jack, if available, with the capacity and reliability needed.

Imported high capacity jacks designed for tree felling might not be CE marked, but suitability and rating for the task are major considerations when selecting the equipment to be used.

- Complete regular and pre-use checks and tests of the jack to ensure that all working parts are in good repair and there are no oil leaks in the lines or seals.
- Make a written record your checks and tests and any maintenance on the jack.

Note that some of these points are legal requirements under the PUWER regulations.

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PLANNING YOUR ESCAPE ROUTES

Plan and prepare your escape route with care. Always remember that a tree may not fall to plan. On steep ground or difficult terrain only one escape route may be available at times but wherever possible, plan and prepare a second alternative route.

- Plan for an escape distance of at least 3 metres (10 feet) or to safe cover behind standing trees.
- Identify escape routes and walk them before any cuts are put into the tree.

- Look above your escape route (check that nothing is likely to fall from surrounding canopies).
- Remove trip hazards such as loose debris, sticks, 'spears' and rocks.
- Consider where you will place the chainsaw when the tree starts to fall.
- On steep ground, escape routes would preferably be to the high side of the stump at a 45-degree angle.

USING YOUR ESCAPE ROUTES

1. Be alert for any indication that the tree is starting to fall:
 - The felling cut begins to open up, wedges become loose, tree creaks, bottle jack gauge (if present) shows a pressure reduction.
2. As the tree starts to fall, move away along the nearest escape route and take cover.
3. Leave the chainsaw in the chosen place.

NEVER SACRIFICE YOUR PERSONAL SAFETY TO SAVE A CHAINSAW.

4. Watch the falling tree for overhead hazards while you move away.

5. Once the tree has landed and settled, wait for the canopy to stabilise.
6. Before returning to the stump, assess adjacent trees and surrounding area and ensure that everything has stopped moving.

Back at the stump, check again that there are no additional hazards in the canopy. Gather all wedging tools, jack and top plates together. Trim any hinge or fibre-pull with the top of the chainsaw bar to direct debris away from you.

WORKING CHECKLIST

- Follow the initial preparation steps for felling any tree, including identifying and clearing out escape routes and picking a felling direction to avoid **brushing** in the canopy.
- Assess the tree for soundness and any visible signs of decay.
- Make the correct directional cuts to the recognised standard and form a clean edge to the front of the hinge.
- Make the **felling cut** (back cut) up to half of the tree. Make sure the felling cut is far enough into the tree so there is room to place the jack without impeding the chainsaw bar.

Note: If the tree is less than 75cm diameter (30") at the base, the notch for the jack can be formed first. Then make the directional cuts before making the main felling cut.
- Look up often to check for stem movement and debris.
- Aim to jack directly against the lean of the tree whenever possible to avoid uneven loading on the hinge which may shear and cause a loss of control. A slightly **offset jack position** can help counter some sideways lean.
- Measure the height of the jack in the position it will sit for jacking purposes. Make sure the notch cuts are level and the notch is just slightly bigger than the closed jack to permit maximum movement.
- Cut the notch out of the stump so the jack and top plate fit closely under the felling cut. The notch must be level to avoid the jack slipping when under load, and deep enough to allow the jack to be in complete contact with the tree.
- When the jack is in place and wedges are secured, the rest of the **felling cut** can be completed.
- A good method is to pump the jack several times and then **drive** the wedges deeper.
- **Alternate back and forth** between jack and wedges to assist the lift. This allows the jack and wedges to share the load and holds the tree on a more stable base across several points. The wedges also prevent the tree from sitting back if the jack fails.

REMEMBER!

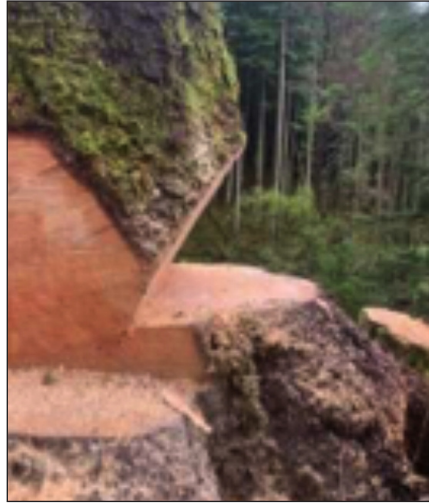
- **Never** rely on just the jack to lift the tree. Always set wedges and follow the jack lift with the wedge, using an axe/hammer as the tree moves on the jack.
- Keep wedges tight in the felling cut as you work.
- **Always look up often as you work to check for any risk of branches and debris falling from above.**
- Always work from a safe position to avoid being struck by the tree, jack, plates or debris.
- **Seek a second opinion.** Call on your supervisor or another jack technician to discuss the work and make certain it can be done safely.

TREE JACKING – STEP BY STEP

1

Make the correct directional cuts.

Dress buttresses as necessary to provide access for felling cuts.



Use an axe to clean the undercuts, not hands

2

Make the felling cut halfway into the tree.

Place wedges in the felling cut and ensure they are tight.



Wedges stop the weight of the tree pinching the bar and chain

3

Measure the height of the closed jack and add the thickness of the jack top plate.

Mark off the distance to a line below the felling cut at the back of the tree.



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4

Make the **undercut** at this measured point. Make it horizontal and deep enough to allow the jack to fit inside firmly.

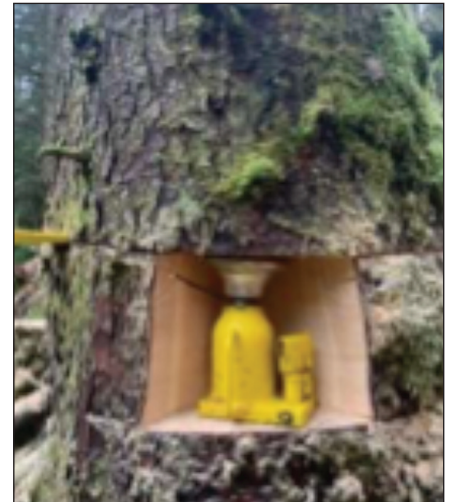
Make two vertical cuts toward the heart of the tree as if you were cutting a wedge-shaped piece of pie. Make them wide enough apart to create a space that the jack will fit inside.



5

Remove the cut-out segment of wood.

Insert the jack with the top plate on the ram.



Ensure the jack is sitting as level as possible on solid wood

6

Insert the jack handle and apply enough pressure to put a reasonable strain on the jack.

Do not jack too heavily at this point. If the force is too great, the jack seal can blow.

Make sure the jack is in full contact with **solid wood**.



Where possible avoid standing directly behind the felling direction

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7 Set wedges in the felling cut to help prevent heavy strain on the jack.

Drive in wedges progressively as you jack the tree. This makes sure the jack will hold.

As you cut the remaining wood at the back of the hinge, apply the jack periodically, and drive the wedges tightly.



8 Continue cutting until enough hinge wood remains.

Continue moving the tree with the jack and wedges alternately until it starts to fall.

Follow the escape route and look for falling debris.



An exceptionally heavy tree may require two jacks

JACKING A TREE WITH HEAVY LEAN BACKWARDS & SIDWAYS

Some trees have a very heavy lean backwards and sideways. In these situations, even putting in the felling directional cut in can make the tree move further into its natural lean.

Installing the jack first and taking some load off before the directional cut is made helps in these situations, by reducing any movement.

The same principle is applied when a tree is too small to put the jack in without it moving backwards.

The competent jack technician needs to be precise with the directional cut, paying attention to the hinge size and depth of step on the hinge. There must also be caution when completing the felling cut as the jack is now in position.



The photos show a jack installed before the directional cut is made. This tree has a severe sideways lean against the desired felling direction.

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GLOSSARY OF TERMS

Assessment

A pre-felling assessment of the tree to decide whether a jack can be safely used.

Assistant

A competent person who is trained in chainsaw operations.

Brushing

When the crown of a falling tree brushes heavily against standing trees creating a new hazard of hanging debris.

Close supervision

Supervision which is close enough that a trainer can stop a trainee before a hazardous event occurs. Generally, within 10 metres but no closer than 5 metres to an active chainsaw. Radio communication should be used between trainer and trainee.

Competent/Competent person

A person who has a combination of training, skills, practical experience and knowledge and is able to apply them to perform a task or technique safely.

Directional cuts

Cuts forming the directional sink at the front of the hinge.

Drive/Driven (wedges)

The action of striking wedges with a sledgehammer or the back of an axe to force them into the felling cut to prevent it closing, to support the tree when cut and to assist its fall in the planned direction.

Felling cut

The main cut(s) or 'back cut' that severs most of the stem and forms the back of the hinge.

Heavy strain

Too much weight for the jack. The jack then fails to move the tree.

Hinge/Hinge wood

The unsevered timber remaining once the felling cut has been completed.

Notch cuts

The undercut and the two vertical cuts used to form the triangular space below the felling cut, into which the jack will fit.

Offset jack position

Placing the jack slightly to one side of the centre of the felling direction to counteract a heavier lean to that side.

PUWER regulations

Provision & Use of Work Equipment Regulations 1996.

The requirement to undertake regular checks and ensure jacks and other equipment are maintained and fit for purpose.

Qualified

A person who has received training on the task in hand and has achieved competence through experience and certified chainsaw training.

Sink

The space formed at the front of the tree by the directional felling cuts, which allows the hinge to fold as the tree falls.

Solid wood

Healthy or hard wood, not rotten or unsound or outer sap wood.

Supervisor

A competent person with training, practical knowledge and experience of supervising chainsaw operations.

Undercut

The horizontal cut made beneath the felling cut to form a level base in the notch for the jack to sit on.

Written procedure

A documented set of instructions for a trainee or operator, to ensure a process is understood and followed.

THIS TECHNICAL NOTE SUPPORTS THE FOLLOWING FISA GUIDES:

FISA 302 – Basic chainsaw felling and manual takedown

FISA 307 – Chainsaw felling of large trees



Further information

This guide is produced by the Forest Industry Safety Accord (FISA) 59 George Street, Edinburgh, EH2 2JG Tel: 0131 220 0855 Email: info@ukfisa.com

Copies of this guide and all other FISA priced and free publications are available by mail order from the FISA office or through the FISA website www.ukfisa.com. From here you will also be able to access a wide range of additional forestry safety information including frequently updated safety alerts.

This guide sets out evidence of good practice for a specific forestry task. Deviation from the guide should only be considered after a full risk assessment has been undertaken by competent persons. Health and safety obligations **MUST** be met at all times.

THINK SAFE / STAY SAFE

For more general information about health and safety, please visit the Health and Safety Executive website www.hse.gov.uk