

## TECHNICAL NOTE

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### SUMMARY

This Technical Note provides advice and information to forest managers, woodland owners and contractors on the operation of debuttressing standing timber prior to felling by mechanical harvesting machines. It reviews current training, guidance and practice, and provides information about the decision process to be taken on when and how to carry out the debuttressing operation.

### INTRODUCTION

Concern has been expressed about why debuttressing takes place prior to mechanical harvesting and the safety implications involved. There are indications that where there is a delay between debuttressing and felling, high winds have caused wind break on debuttressed trees, putting anyone in the vicinity at risk. Also, where debuttressing takes place during mechanical harvesting, chainsaw operators can be placed in an unsafe working area.

The objectives of this Technical Note are:

- To review the current training and guidance given to chainsaw operators on the practice of debuttressing.
- To report on chainsaw cutting trials carried out with the co-operation of Forestry Training Services to identify safe working practices.
- To review current practices in relation to planning, organisation of the work site and safe working practice to enable comprehensive risk assessments to be made.
- To identify and review:
  - safe working practices within the harvesting site, with particular reference to the safety of other personnel, such as supervisors and authorised visitors and machinery;
  - the safety criteria for site organisation and protection for the general public and other forest users.

### REVIEW OF CURRENT TRAINING AND GUIDANCE

Consultation with industry recognised trainers was carried out to ascertain whether any separate training was given to chainsaw operators on the operation of debuttressing of large standing timber which is subsequently to be felled by harvester.

The results indicated that no formal training was being given on this specific operation as a preparation for mechanical harvesting. The only training given was on the technique of removal of buttressing on large trees, i.e. those with a diameter greater than two guide bar lengths which would then be immediately manually felled. Debuttressing in preparation for mechanical harvesting has different inherent safety concerns as the tree is left standing after debuttressing.

### REVIEW OF CURRENT DEBUTTRESSING PRACTICES

The main reasons for debuttressing are:

- To make the use of a harvester more efficient and less hazardous. Using a harvester to fell trees with buttresses or butts which are too large to fell with one cut may require double/multiple cuts. In these circumstances there is a significant increased risk that the tree could fall out of the harvesting head towards the harvester during the operation. The presence of buttressing could also make the operation more difficult to judge and therefore unacceptably add to any risk.

- To enable some larger stems to be mechanically harvested, which is more cost effective than manual felling.
- To ensure the maximum recovery of timber down to normal felling height.
- To lower stump height and therefore to allow better access for subsequent extraction and ground preparation machinery.

As an alternative to debuttinging, when trees are too large to be felled by a harvester, manual felling may be carried out, followed by mechanical processing by a harvester.

In some locations debuttinging is carried out at the same time as pre-brashing and the removal of doubles. In others it is carried out as a separate operation. The normal instruction given to operators is to remove buttresses on the larger trees but no training is currently available on how the trees should be debudded specifically as a preparation for subsequent mechanised harvesting.

The overall crop size is considered relative to the capacity of the harvester head and a general decision taken as to whether debuttinging is required.

There is potential for the debuttinging to be carried out adjacent to drifts which are being mechanically harvested. This could bring the chainsaw operators too close to the harvesting operation. In addition to potentially being in the risk zone of the harvester, the mechanical harvesting and felling of trees through the adjacent standing crop could cause sufficient disturbance to break off dead, windblown or debudded trees in this adjacent drift, placing the chainsaw operator at risk.

**Debuttinging has the potential for increasing the risk from the crop prior to harvesting. This, in turn, increases the need for strict attention to be paid to the placement of warning signs (both the timing and location) on such sites when this operation is being and has been carried out.**

## DEBUTTINGING CONSIDERATIONS AND GUIDANCE

### Pre-assessment of the site and crop

The suitability of the site and crop for debuttinging must be assessed, particularly with respect to the following aspects.

#### Potential for wind snap or windblow within the crop to increase the hazard

Debuttinging should not be carried out on high Wind Hazard Class (5/6) crops because debudded trees could be snapped by either high winds or other trees being blown onto them. All crops should be inspected prior to debuttinging to ensure that no significant amount of windblow or snap is present as this could increase the risk of the operation.

#### Suitability of the harvester for the size and form of the crop

- The base machine should have sufficient slewing and lifting power for all the trees it is expected to fell within the crop.
- The maximum opening of the delimiting knives should enable the head to be located at the base of the tree.
- The delimiting knives should almost meet round the back of all trees to ensure that any felled tree can be securely held and controlled for the whole of the felling and processing operation.
- The length of the chainsaw guide bar should normally be able to fell the tree with one cut. Occasionally two cuts may be required but full control of the tree must be maintained during the felling cuts and the extra manoeuvring takes more time. Too many such trees within the crop would make the operation inefficient and increase inherent risks.

#### Percentage of trees requiring debuttinging

Debuttinging will enable more trees with large stems to be mechanically harvested and ensure maximum recovery of timber down to normal felling height. The percentage of trees requiring debuttinging should be assessed. If this is significant (perhaps greater than 10%) then the suitability of the harvester for the crop should be questioned.

## Ability to control access to the site

If expected public pressure in or around the site is high there may be problems with restricting access. In such cases adequate public control may not be achievable and debutting should not be attempted. It may be possible to consider closure of forest areas or to delay the operation until a time of year when the level of public pressure is low, enabling better management.

## Management of the site and site safety

In addition to the normal items to be taken into account in the risk assessment for manual and mechanical harvesting operations, the site manager/supervisor needs to consider and include the following in the risk assessment.

### Timing of debutting relative to the harvesting operation

Debutting should be timed to ensure that there is no need for chainsaw operators to work within any risk zone of the harvester and in particular not within the adjacent drifts, ensuring that they are never within two tree lengths plus a boom distance from the harvester.

Debutting operations should be planned to minimise the time between the debutting and final felling. Wherever possible felling should take place within three days of the debutting operation. Consideration should always be given to forthcoming weather conditions and the work planned accordingly. The longer that period is extended the greater the potential for the tree to begin to dry and crack around the cut area, which may lead to a reduction in the strength properties of the stem and subsequently to failure.

### Site planning

- A full site plan should be drawn up to identify areas of work and sequence of operations to ensure that chainsaw operators never work within the exclusion zone of the harvester.
- The site plan should include all the normal identification of hazards covered in a harvesting site plan.
- The direction of work should be into the prevailing wind to ensure operators are working away from areas of increased risk. Alternative areas of work should be available in case of changing wind direction.

- All chainsaw operators and machine operators must have copies of the site plan.
- Amendments to the site plan must be communicated immediately to all site operatives.

### Signage

All personnel who are not directly involved in the operation (staff and public) must be excluded from the site where debutting is being or has been carried out, with buffer zones as for a normal harvesting site being enforced. The requirements for signing the site are identical to those for normal harvesting sites. The regulations can be found in The Health and Safety (Safety Signs and Signals) Regulations 1996. Guidance is available in HSE leaflet *Managing health and safety in forestry* (Health and Safety Executive, 2003).

### Site visitors

Risk assessments should be given to all personnel who visit the site as for a normal harvesting site.

### Risk to members of the public

In forest areas that have a high public pressure or high recreational value, safety signs and barriers need to be checked on a daily basis. Any damaged or vandalised signs should be replaced. In the event of public encroachment, all operations should stop immediately and the incident reported to higher management.

## Communication between site operators

Close communication must be maintained between all machine operators and chainsaw operators on site, to ensure that each worker is aware of where others are working at all times.

## Machine operators

When carrying out minor repairs, maintenance or refuelling, machine operators should move their machines from the working face to a distance of at least two tree lengths from the standing crop. This is to avoid the possibility of a debudded tree falling on the machine or on the operator while he is out of the cab.

If the machine breaks down and cannot be moved, the adjacent crop should be inspected for hazardous trees prior to any work being undertaken *in situ*.

## Safe working practice for chainsaw operators

If the pre-assessment of the site and crop confirms that debuttinging can be carried out, the following working practice should be carried out.

### Pre-operation checks

- Chainsaw operators should have all the relevant NPTC certification (National Proficiency Tests Council, 1998):
  - CS30 Maintain the chain saw
  - CS31 Fell small trees
  - CS32 Fell medium sized trees
  - CS33 Fell large trees
- Operators should have been issued with a site plan and understand the working area and working pattern sequence.
- Chainsaw operators should have agreed the working programme with other site workers (including machine operators), to ensure that safe working distances are maintained.
- All required signage and exclusion barriers as specified on the site plan should be erected.
- Chainsaw operators should be given clear instructions about the size of trees/buttinging which needs to be reduced. Unnecessary debuttinging should be avoided.

### Debuttinging procedure

- **Visual assessment:** A visual assessment should be carried out to determine if the tree requires debuttinging. Figure 1 shows a tree with a dbh of 44 cm and a diameter at the start of the buttress of 48 cm. Assessment of felling with a harvester without debuttinging would have resulted in the saw cutting the tree at 57 cm above ground level. Debuttinging the tree and simulated felling indicated that the saw would be cutting the tree at 18 cm above ground level. The cylindrical outline of the tree at the start of the buttress needs to be determined.
- **Cutting procedure:** The full cutting sequence is shown in Figure 2.
  - The first cut starts at the top of the buttinging. The operator follows the vertical line from the

cylindrical outline as he cuts down towards the lower edge of the buttress (Figures 2 and 3).

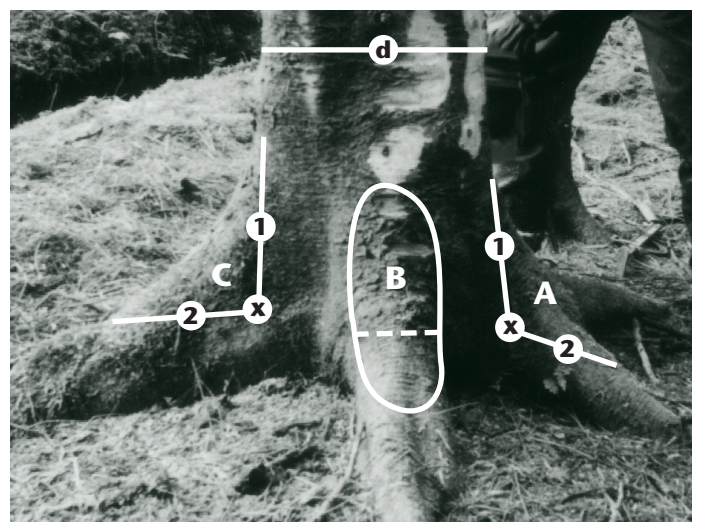
- The second cut starts at the outer edge of the buttress and should be as horizontal as possible as it proceeds towards the vertical cut. The two cuts need to meet accurately to prevent any over cutting into the stem of the tree (Figures 2 and 4).
- The complete debuttinged tree with no overcuts, is shown in Figure 5.

Following successful debuttinging the tree can be felled down to a low stump height with a good stem surface area, as shown in Figure 6.

**Figure 1** Buttressed tree, 44 cm dbh and 48 cm diameter



**Figure 2** Debuttinging cutting sequence



A, B, C: buttresses

Cutting sequence:

1: vertical cut

2: horizontal cut

x: marks the point where the horizontal and vertical cut should meet

d: diameter assessment point



### Poor debutting practice

Cutting off the vertical into the cylindrical form should be avoided; this produces the pencil effect shown in Figure 7. This decreases the stability of the tree and

**Figure 3** Debutting phase 1



**Figure 4** Debutting phase 2



**Figure 5** Complete debarked tree, with no over cuts

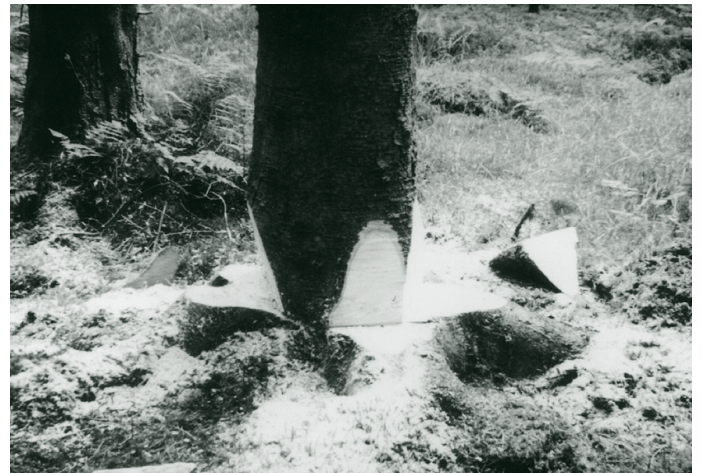


increases the possibility of the stem snapping. Over cutting of the horizontal or vertical cuts also increases the potential for the tree to snap or the stem to crack. Face cuts that overlap and cut into stem wood (Figure 8) are also bad practice.

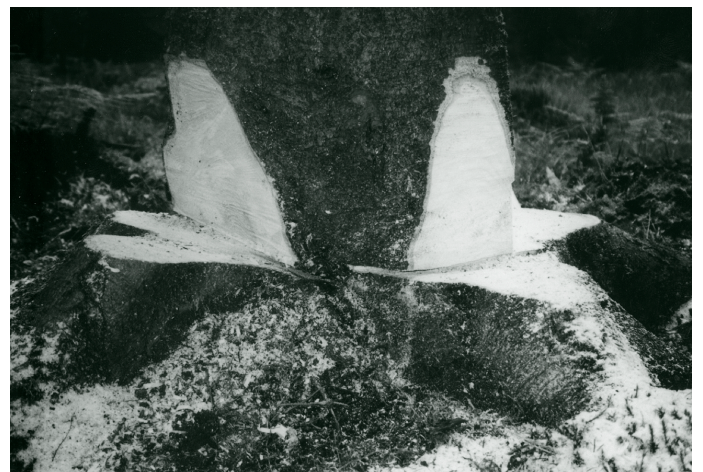
**Figure 6** Stump shows debutting and stem surface area



**Figure 7** Tree pencilled and extreme debutting



**Figure 8** Face cuts overlapping and cut into the stem wood



## REFERENCES

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