

# 11

## Conversion of Timber

### KEYWORDS

clear felling  
conversion  
cupping

flame figure  
plain sawing  
quarter sawing

radial sawing  
slash sawing  
tangential sawing

### FELLING

Trees are cut down (felled) during the winter months when there is less growth in the wood. In Ireland, trees are often harvested by **clear felling** – the cutting down of all trees in an area – as it is the most economical method. However, it leaves large areas of poor, bare land and it affects the wildlife of the area. After felling, the trees are transported to sawmills to be cut into boards of suitable size.



Felling trees



Logging

## CONVERSION

The process of cutting the logs into usable timber sizes is called **conversion**. Boards are cut even the bark and small branches can be used as chip wood. The bark, which is removed from the logs, is turned into bark mulch.

The purpose of converting logs into boards is:

- It allows the wood to dry faster
- It gives wood of usable size and shape
- It allows the quality of the timber to be seen and assessed

Nowadays, the logs are cut using a large bandsaw, but in times past a saw pit would have been used.



The saw pit



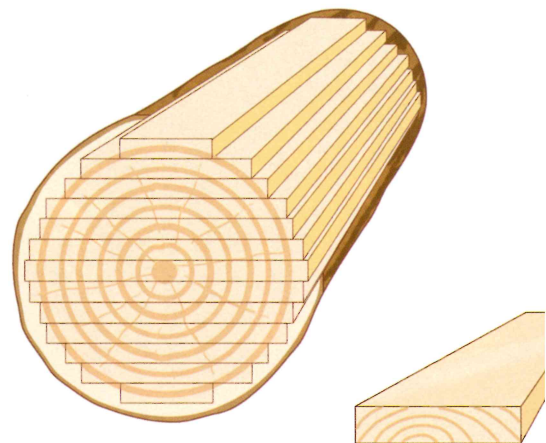
Large horizontal bandsaw

There are three methods of converting the logs:

- 1 Through and through sawing
- 2 Quarter sawing
- 3 Tangential sawing

### Through and through sawing

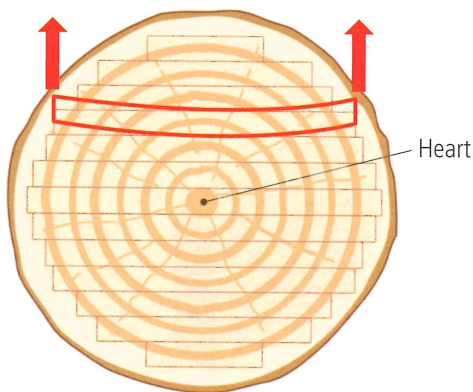
Through and through sawing is the fastest and most popular method of conversion. The logs are cut in parallel cuts in the direction of the grain. This form of conversion has certain advantages. It is also known as **plain sawing** or **slash sawing**.



Through and through sawing



| Advantages  | Disadvantages  |
|---|--|
| <ul style="list-style-type: none"> <li>● Low cost</li> <li>● Little waste</li> <li>● Easy method as the board doesn't need to be turned</li> <li>● A fast method</li> </ul> | <ul style="list-style-type: none"> <li>● Boards cut this way are likely to cup when drying (see diagram)</li> <li>● The boards show no particular grain pattern</li> <li>● Less durable than other methods as there is a lot of sapwood in boards cut this way</li> <li>● It is not particularly suitable for structural timber</li> </ul> |



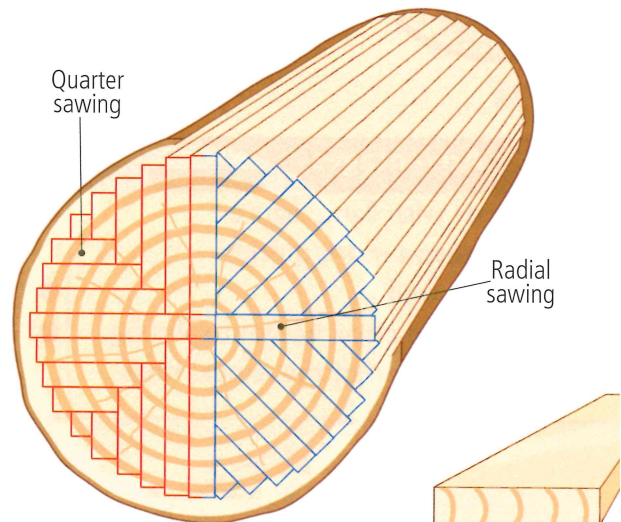
*Cupping. Boards tend to shrink away from the heart*

### Radial sawing

Radial sawing involves cutting the quartered log in lines towards the centre of the log as shown in the diagram. This also reveals silver grain.

### Quarter sawing

In the quarter sawing method, logs are first quartered before cutting the boards, as shown below. This method of conversion displays an attractive grain figure when the ray cells are revealed (known as silver grain in oak). Cutting logs this way involves turning the log for each cut, so it is labour intensive.

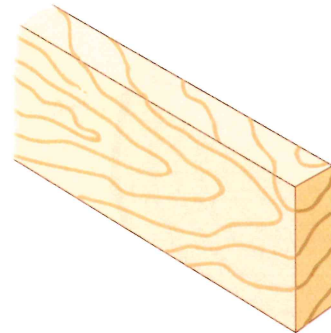
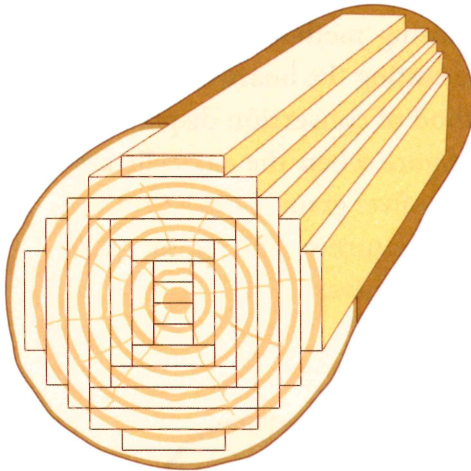


*Quarter sawing or radial sawing*

| Advantages   | Disadvantages  |
|--|--|
| <ul style="list-style-type: none"> <li>● Attractive grain pattern is produced</li> <li>● The boards are more stable and shrink less</li> <li>● The boards wear more evenly (important in flooring, for example)</li> </ul> | <ul style="list-style-type: none"> <li>● Labour intensive, as the log has to be quartered and then turned for each cut</li> <li>● Therefore an expensive method</li> <li>● More waste produced</li> <li>● The boards are not as wide as in plain sawn</li> </ul> |

### Tangential sawing

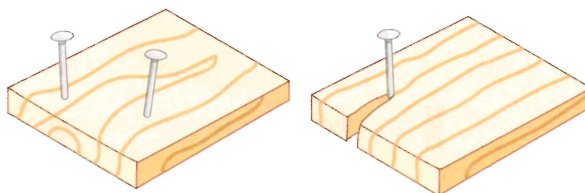
In the **tangential sawing** method the cut is made at a tangent to the annual rings of the Timber converted in this way will highlight the **flame figure** that occurs in woods with distinct annual rings. Pitch pine and Douglas fir show the flame figure to great effect.



*Tangential sawing*

*Flame figure*

| Advantages  | Disadvantages   |
|---|---|
| <ul style="list-style-type: none"> <li>● Produces boards with flame figure</li> <li>● These boards season more quickly</li> <li>● The boards wear well</li> <li>● The boards can take a nail without splitting because of the position of the annual rings</li> </ul> | <ul style="list-style-type: none"> <li>● Boards converted this way tend to shrink &amp; cup</li> <li>● The timber is prone to warping and cupping</li> <li>● It is expensive as the log is turned 90° for each cut</li> </ul> |



*Tangentially sawn boards don't split easily*



## Exercises

- 1 What is the process of sawing logs into boards called?
- 2 Give two reasons why logs are sawn into boards.
- 3 Give two advantages of plain sawn wood.
- 4 Give two disadvantages of quarter sawn wood.
- 5 Give two advantages of tangential sawing of wood.
- 6 The sketch shows sawdust, bark and thin strips of wood that are left as waste when a log is sawn into planks. Suggest one use for each of these waste products.



Sawdust



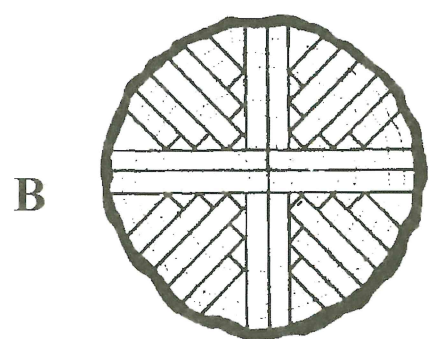
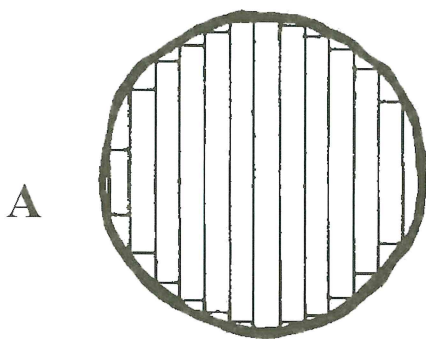
Bark



Strips of wood

## Exam Question

- 1 Shown in the diagram are two methods for timber conversion.



- (a) Name the two methods of conversion shown in the diagrams.
  - (b) State two advantages and two disadvantages of each method.
  - (c) The diagrams show the ends of two boards, M and N. Which of the boards is most likely to cup? Give a reason for your answer. Describe, using a neat freehand sketch, the direction of cupping.
- (JC, HL, 2005)



M



N





Sample answer to exam question

- 1 (a) The methods of conversion shown are:  
A Through and through sawing, also called slash or plain sawing.  
B Quarter sawing or radial sawing.

(b) Through and through sawing

**Advantages**

- There is very little waste from this method
- It gives wide boards
- It is a cheap and easy method

**Disadvantages**

- The boards are prone to cupping
- The boards have no particular grain pattern
- There would be a lot of sapwood in many boards so more likely to rot due to fungi and insects

**Quarter sawing**

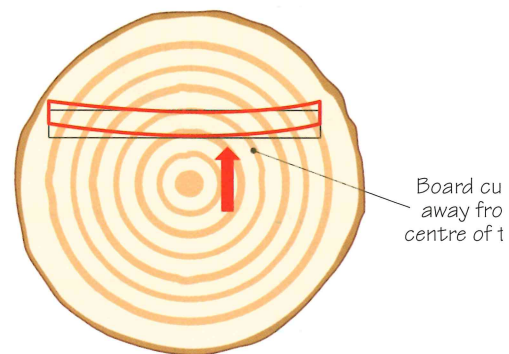
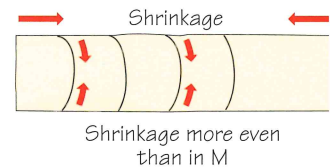
**Advantages**

- The boards are stable
- The boards are hard-wearing and used in flooring

**Disadvantages**

- More labour required, as the logs need to be turned
- More expensive
- More waste produced

- (c) The board most likely to cup is board M. This is because when the wood begins to dry, the cells shrink. The shrinkage occurs along the rings, which tends to pull the board into a curved shape as a result. The other board N will have more even shrinkage because of the arrangement of the rings as shown.



**Web Links**

[www.geoffswoodwork.co.uk/conversion.htm](http://www.geoffswoodwork.co.uk/conversion.htm)

<http://woodsgood.ca/timberconversion.htm>