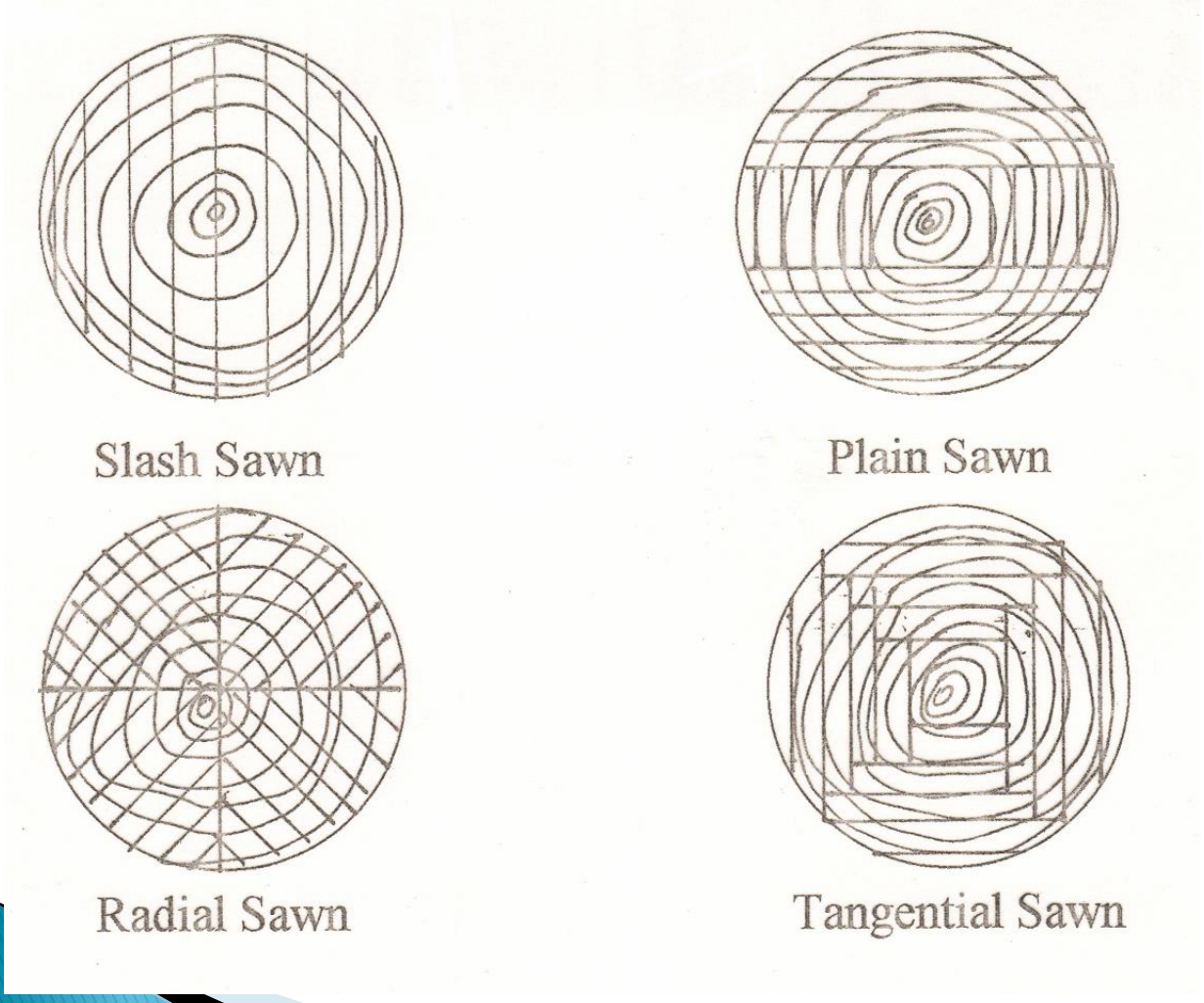
Timber Conversion

J.Byrne 2013

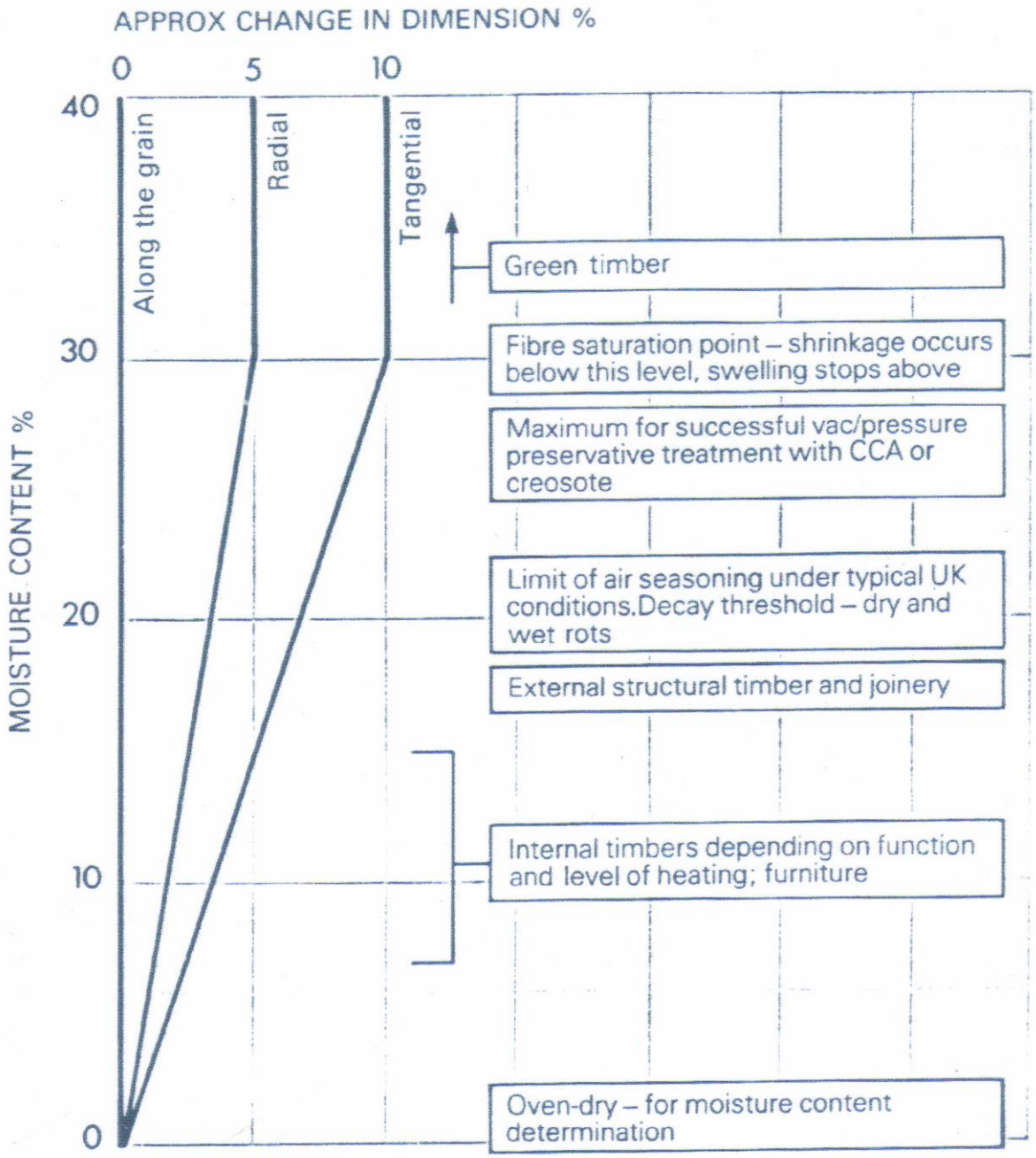
Conversion

- The Felled Tree is brought to a Saw Mill where it is Converted into usable sections
- The method used depends on the quality of the timber and its selling market.
- The main types of Conversion :
- Through Sawn / Slash Sawn : This method is cheapest (less handling) and produces widest boards. The growth ring is less than 45° to the face of the board.
- Plain Sawn : Boards are cut on a tangent to the rings.

- Quarter Sawn / Radial Sawn : These boards are cut with the growth rings at 90° to the face of the board, making them the most stable.
- Tangential Sawn : These boards have a straight figure with a flower figure or ribbon like figure found in hard woods like Oak.



Moisture Content



Seasoning

- When a Tree is felled it's timber starts to lose moisture & the process of seasoning begins.
- As the wood loses water, air moves in to fill the empty spaces of it's cells & so becomes lighter in weight.
- 30%MC is Fibre Saturation Point after this point timber starts to shrink.
- 20%MC timber must be below this to prevent Dry Rot.
- Structural timber 15% – 17%MC
- Furniture 11% – 13 %MC
- Fire surrounds,radiator cabinets 8%MC

Why is Timber Seasoned

- Timber is Seasoned is to reduce the Moisture Content.
- To render the Timber more stable stop it from further shrinkage.
- To increase durability the Timber must be taken below the Dry rot safety zone of 20%MC and to prevent many wood attacking insects.
- To enhance workability. Dry Timber machines easier than wet timber which tends to be more pulpy and gums up machine cutters
- Dry Timber will absorb preservatives easier.
- Adhesives & finishes will not adhere to wet Timber

Stacking Timber for Seasoning

- In order for timber to dry properly it must be stacked correctly with lots of room for Air circulation.

- The bale of Timber must be kept off the ground on Joists and each boards must be at least 25mm apart and each row of timber kept apart with stickers.

Timber Stack

- Evaporation of moisture through the end grain of the timber is greater than from the middle of the stack.
- If not controlled shrinkage and splitting of the boards can occur.

- 3 methods used :
  - Batten nailed to the end.(1 nail)
  - Hoop iron strap nailed on.
  - Thick oil or paint on the end grain.

- As the tree cells looses water air moves in to fill the empty spaces and the tree becomes lighter in weight.

- The amount of moisture that is in the timber cells is called Moisture Content and is based as a percentage of the timber as a whole.

- $\frac{\text{Wet weight} - \text{Dry weight}}{\text{Dry weight}} \times 100 = \text{M.C.\%}$

$\frac{50g - 40g}{40g} \times 100 = 25\%$

- Ans = 25% M.C.

Seasoning

- Natural Seasoning : timber is stacked out-doors protected from the elements in an open shed with free flowing air.

- Artificial : Kiln Seasoning planks are stacked on trolleys and placed into closed brickwork kilns where the wood is dried slowly by artificial heat. Timber is seasoned in 10 -12 days

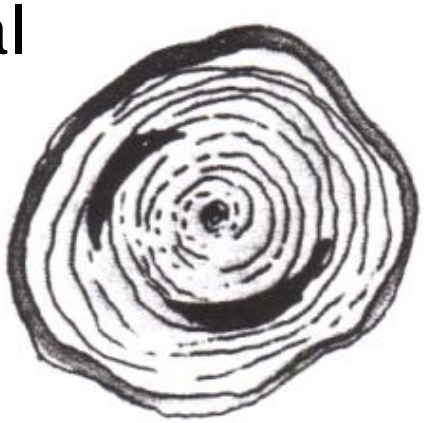
- Progressive Kiln: Built as a long tunnel the timber must be of a similar size & specie. The timber moves through the tunnel and comes out the other end seasoned.

Natural Timber Defects

- Heart Shake: splits radiating from the centre of the log, as a result of shrinkage or over maturity.

- Star Shake: Cracks in a star-like formation at the centre of the log. All logs show a little of this defect on drying.

- Shell shake / Cup Ring : Separation of the annual rings due to lack of Nourishment, excessive wind or unequal growth.

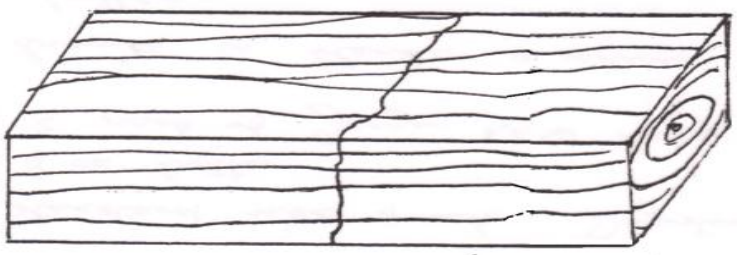


Natural Timber Defects

- Radial Shake : Cracks along the line of the rays widening towarc the outside as tree dries out.

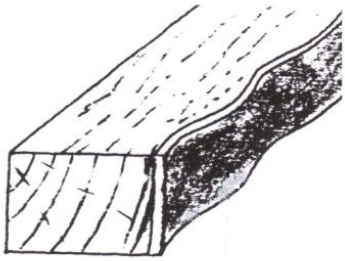
- Wandering Heart : Irregular crooked growth starting in young trees exposed to strong winds.

- Thunder Shake / Upsett : Hair like fractures across the grain of a board due to bad felling or violent storms

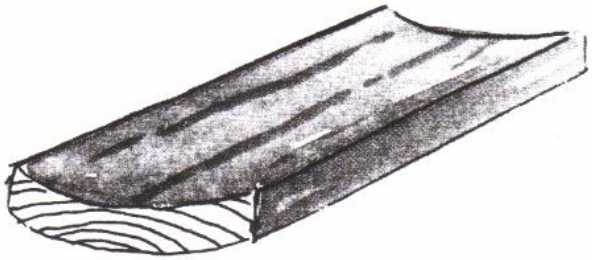


Manmade Timber Defects

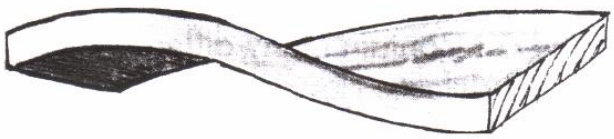
- Waney edge : Converted timber having one or more edges not square or containing bark.



- Badly stacked boards: Can result in



Cupping



Twisting

Springing

Bowing

Seasoning Timber Defects

- Honeycombing : internal splits due to incorrect Kiln seasoning.
- Collapse : Timber is dried too quickly water is sucked out before air has a chance to fill the cell and the cell walls collapse.
- Case Hardening : The inner core remains wet while the outer case dries and hardens.
- End splits : Untreated ends of timber will split from Moisture evaporation.

Name These Timber Defects

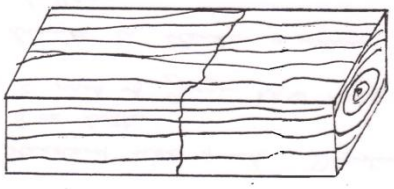
(a)

(b)

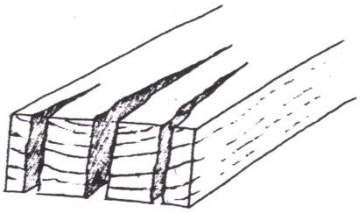
(c)

(d)

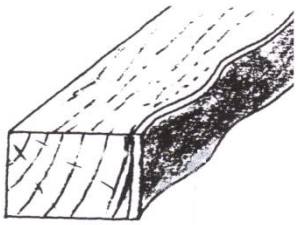
(e)



(f)



(g)



(h)

Name These Timber Defects

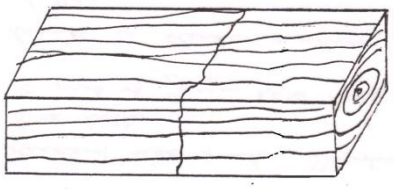
(a) Wandering Heart

(b) Star Shake

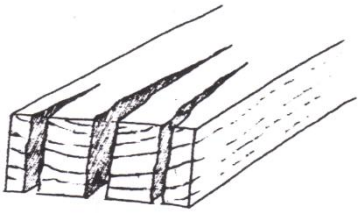
(c) Radial Shake

(d) Heart Shake

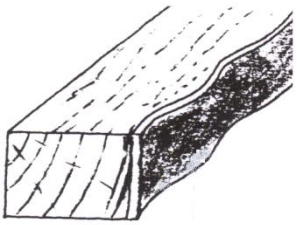
(e) Cup Shake



(f) Thunder Shake



(g) End Splits



(h) Waney Edge

Revision of Timber

1 Name the following defects

(a)

(b)

(c)

2 What is meant by conversion.
3 What is the function of the Bark.
4 Describe wandering Heart.
5 What is Thunder Shake.
6 Describe Case Hardening.
7 What is Dry Rot Safety Zone.
8 Name 2 Artificial methods of seasoning.
9 List 3 Native Softwoods
10 Where does a knot originate
11 List 3 Imported Hardwoods
12 Which method of conversion produces the widest boards
13 List 3 Imported Softwoods
14 Which method of conversion is the cheapest
15 List 3 Native Hardwoods
16 What causes cup shake
17 What is Waney edge
18 Why are the ends of planks treated during seasoning
19 Why is timber seasoned
20 What does M.C. stand for.

JB