

DRIED vs. GREEN TIMBER

From day to day, most people have some contact with dried or green timber in specifying and designing timber structures. When designing with dried timber, we must use dry timber during manufacturing timber structural components. The consequence of using green timber instead of dried timber will lead to some expected structural issues.

Seasoned

To fully understand the difference between dried and green timber, we need to know the term “seasoned” first. What is “season” timber? Obviously, it’s not adding salt and pepper like Master chefs. In our industry, the process of drying out the water from “wet” or “green” timber is termed “seasoning”, or more simply “drying”. Drying the moisture out of wood enhances its properties to such an extent that the resulting timber is given the special name “seasoned” rather than “dried” although the terms are identical.

Moisture Content

Next importance term is “Moisture Content”. This is simply the weight of water contained in a piece of timber compared with the weight of actual wood substance in the same piece.

This is usually expressed as a percentage:

$$\text{Moisture content} = \frac{\text{Weight of Water}}{\text{Weight of wood substance}} * 100\%$$

The moisture content of a freshly sawn log varies with the density and species of timber. For example, radiata pine can have a green moisture content of 180% but ironbark has a green moisture content of only about 40%.

Seasoning timber causes many changes in its properties, and in practically every case the change is an improvement. There is only once principal disadvantage in drying timber, namely, the loss in volume due to shrinkage. However, by a correct understanding of shrinkage of timber this effect can be minimised, and timber can then be confidently used without fear of adverse behaviour subsequently in service.

For a seasoned timber, the average moisture content in the piece shall be no more than 15%. Australian Standards set different moisture content ranges for different products reflecting they type of timber and application, but usually is 9% to 14% with the average of 11%.

Shrinkage in Timber

All timber shrinks to some extent as it dries, resulting in a direct loss in volume. It should be noted that shrinkage is a direct cause of cracks that occur on the surface or ends of sawn timber and is also primary cause of the warping which sometimes occurs. Basically, shrinkage of timber varies in the three directions of the tree, as shown in Figure 1. It shrinks very little along its length, of the order of only 0.1%, that is, 1mm per meter. The shrinkage in width will depend on how the board is sawn from the log. If it is quarter sawn, that is, in a radial direction, at right angles to the growth rings, its shrinkage would be roughly half of that if it is back sawn or sawn in a direction tangential to the rings. Unit tangential movement (U.T.M) is a useful measure of movement. It is the percentage dimensional change for each 1% change in moisture content between 3% and the fibre saturation point for the particular species. For example, slash pine has a U.T.M of 0.30. Therefore, a piece of 90x35 back sawn slash pine with moisture content of 15% is 0.81mm wider than a piece of 90x35 back sawn slash pine with moisture content of 12%. If we use the same rule and compare moisture content of 18% and 12%, we will find the difference in width will be 1.62mm which is quite significant.

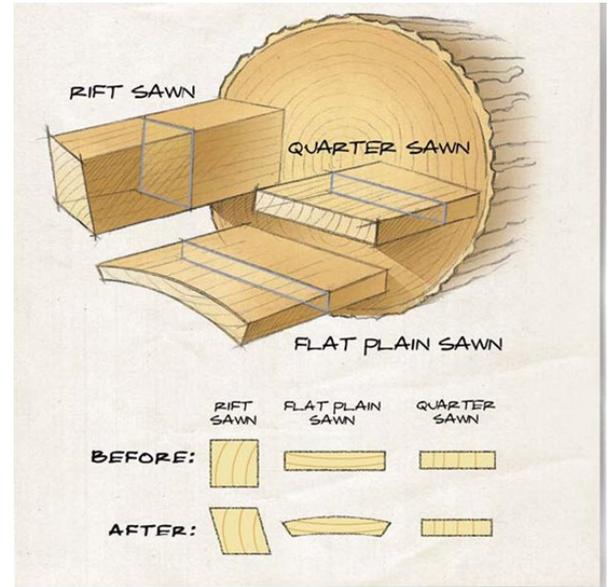


Figure 1 - Shrinkage of timber

Timber Species	Moisture Content (%)	Width (mm)	Change in width (mm)	
Slash Pine (Back sawn)	9		89.19	
	12	90	-	Bench mark value
	15		90.81	
	18		91.62	

Effect on Deformation

Another critical difference between dried and green timber is the creep factor when designing a timber structural element. Long term, greater than 1 year, deformation of dried timber is less than green timber. For bending, compression and shear members, creep factor j_2 for dried or seasoned timber shall be 2.0. However, green or unseasoned timber has a j_2 factor of 3.0. It simply indicated that a green timber beam will deflect 1.5 times more than a dried timber beam long term point of view.

Precautions

As mentioned above, moisture content is the control value of the performance of a structural timber element. We need to maintain the moisture content at an acceptable range. From the manufacturing stage to construction stage on site, all timber elements shall be kept dry and covered if there will be some severe weather conditions.

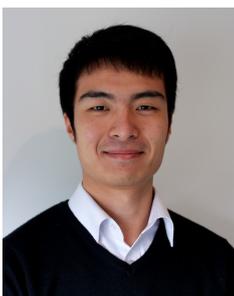
Fabricating - Machinery

So, what about cutting wet timber in a linear saw, e.g. Multinail PieceMaker Linear Saw? Does this pose any risks? Of course it does! As an example, cutting through dry radiata pine is going to demand much less effort on all components on your saw than cutting through soaking wet radiata pine. The additional water and excess moisture can make a difference to the entire cutting process. It places additional resistance on all components within the saw including operators, relating to additional effort for the entire process.

As the timber is wet, sawdust will tend to stick to slides, guides and sensors instead of running freely through the machine. As an example, trying to put soaking wet timber through a linear saw can cause damage to all components and possibly endanger your staff. Wet sawdust can get caught on the saw blade and all other moving parts and can effectively gum up the works inside or promote rust on metal parts and electronics and shorten the lifespan.

When you think about it, majority of bearings and slides are already wet, wet with sealed oil lubrication! Everyone knows water and oil do not mix well together! Repairs are costly, and on top of that, they take your time and attention away from more important responsibilities within your business.

Keeping your timber dry and controlling moisture not only gives the high performance of final timber structure but also ensures your investment remains in peak condition.



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