TIMBER

Lecture - 1

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Content

Introduction

The wood which is suitable or fit for engineering construction or engineering purpose is called timber.

Why Study of Timber is Important ?

- The properties of timber varies from tree to tree even for same species and, therefore, it becomes necessary to test the material before using it. Since tree is basic source of wood, a knowledge of type of trees, their growth pattern, structure, defects, processing. The sawed wood meant for construction in the form of boards is called lumber.

Classification of Timber

- Trees are classified into two groups depending upon growth pattern :

Endogenous trees

Exogenous tress

Conifers or Evergreen

Deciduous

Classification of Timber

Endogenous trees

- The trees which grow endwards by depositing every year of fresh layer internally, instead of on the outside of tree is known as endogenous trees. The stem of these tree are light and tough and are flexible. E.g. Palm, bamboo.

Classification of Timber

Exogenous tress

- The trees which grow in out wards across horizontal section of stem are called exogenous trees. These trees are only fit for engineering construction. They are further subdivided into *Conifers and Deciduous*

Classification of Timber

Conifers or Evergreen

Confiers are evergreen trees having pointed needle like leaves, e.g. deodar, chir, fir, kail, pine and larch. They show distinct annual rings, have straight fibres and are soft with pine as an exception, light in colour, resinous and light weight.

Classification of Timber

Deciduous

These type of trees have flat board leaves, e.g. oak, teak, shishum, poplar and maple. The annual rings are indistinct with exception of poplar and bass wood, they yield hard wood and are nonresinous, dark in colour and heavy weight.

Conifers, as compared to deciduous, are used predominantly for construction purpose for their long straight trunk and the better quality of wood

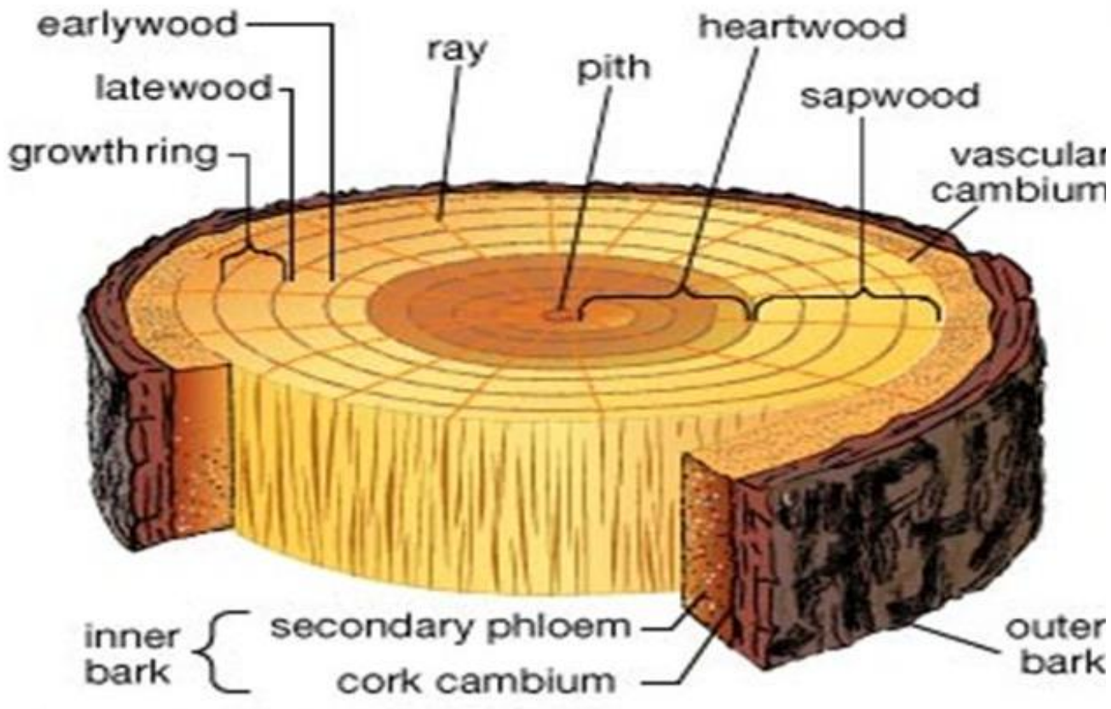
Difference b/w Soft Wood and Hard Wood

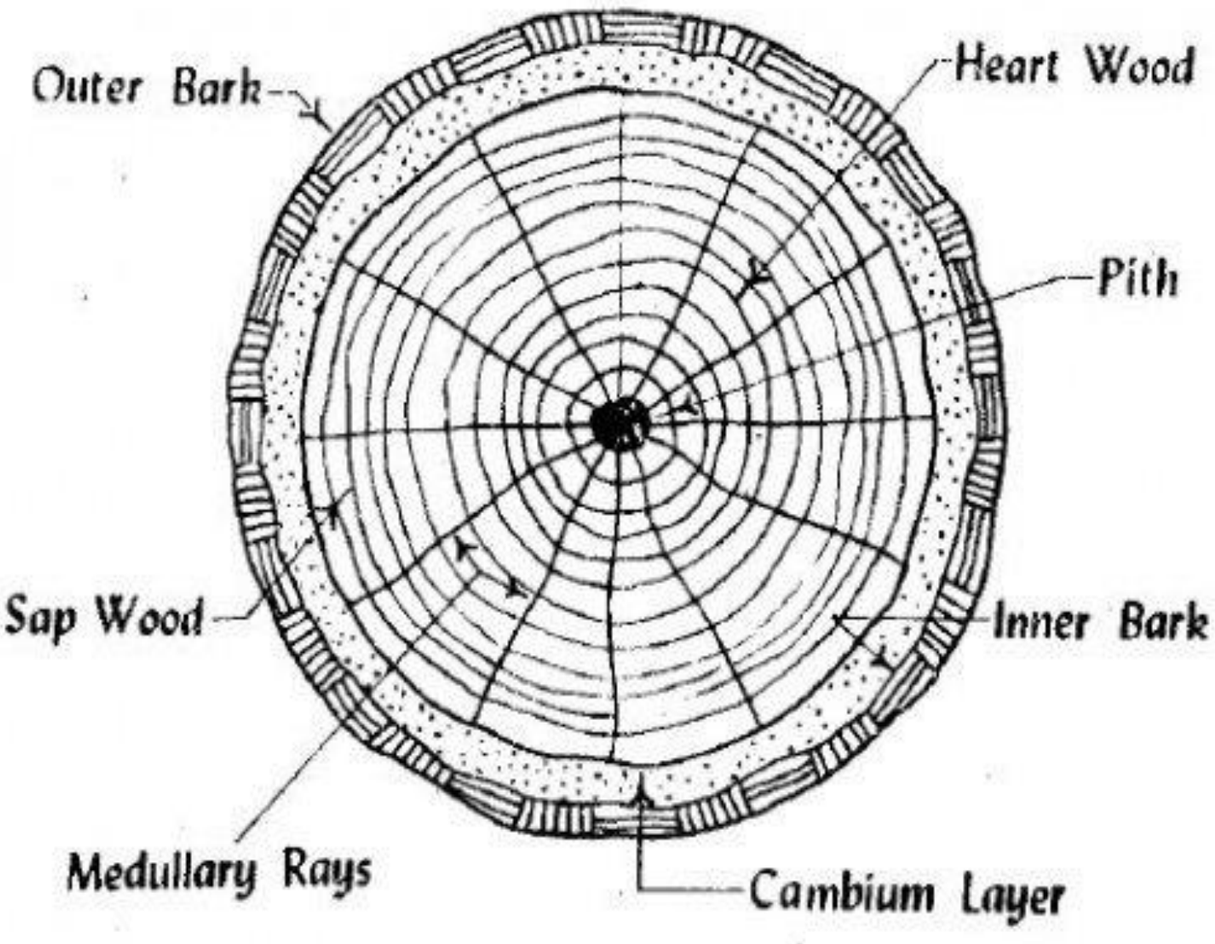
S. No	Property	Soft Wood	Hard Wood
1	Colour	Lighter	Darker
2	Growth	Faster	Slower
3	Weight	Lighter	Heavier
4	Density	Low	High
5	Annual Rings	Distinct	Indistinct
6	Heart Wood and Sap Wood	Cannot be distinguished	Distinguished
7	Strength	Strong along the Grains	Strong along and across the Grains
8	Examples	Chir, fir and other Conifers	Teak, sal, sheesham and other deciduous trees

Structure of exogenous tree (timber)

STRUCTURE OF TIMBER

Structure





Function of Different Component of Structure of Timber

It protect the wood against mechanical damage

Cambium

The function of cambium is to grow wood cells on the inside and smaller bast cells on the outside.

It give a strong and firm support to the tree. With the growth of tree, the cells in the inner older portion of trunk gradually become inactive and lifeless, but do not decay . The portion of the trunk is called heart wood.

Bark

Sapwood

The sapwood assists in the life process of tree by storing up starch and conducting sap. The cells in the sap wood are active.

Heart Wood

Pitch

At the center of the cross section is the pith, a small area occupied by friable tissues consisting of thin walled, loosely connected cells called pith. In a felled tree, it easily crumbles and rots. In the cross sectional direction, nutrients pass from bast to the heart through groups of cells running at right angles to the cambium layers and are referred to as medullary rays.

Seasoning of Timber

As fresh timber which is obtained from trees contains about 30 to 40 % sap or moisture. This sap is very harmful for the life of a timber. Therefore, it is necessary to remove that sap by applying some special methods. All those methods which are used for removing the sap from timber are collectively termed as seasoning of timber. Timber cut from freshly felled tress is too wet for normal use and is dimensionally unsuitable. *Seasoning is the process of reducing the moisture content (drying) of timber in order to prevent the timber from possible fermentation and making it suitable for use.*

Seasoning of Timber

It can also be defined as the process of drying the wood to a moisture content approximately equal to the average humidity of the surroundings, where it is to be permanently fixed. Very rapid seasoning after removal of bark should be avoided since it causes case hardening and thus increases resistance to penetration of preservatives.

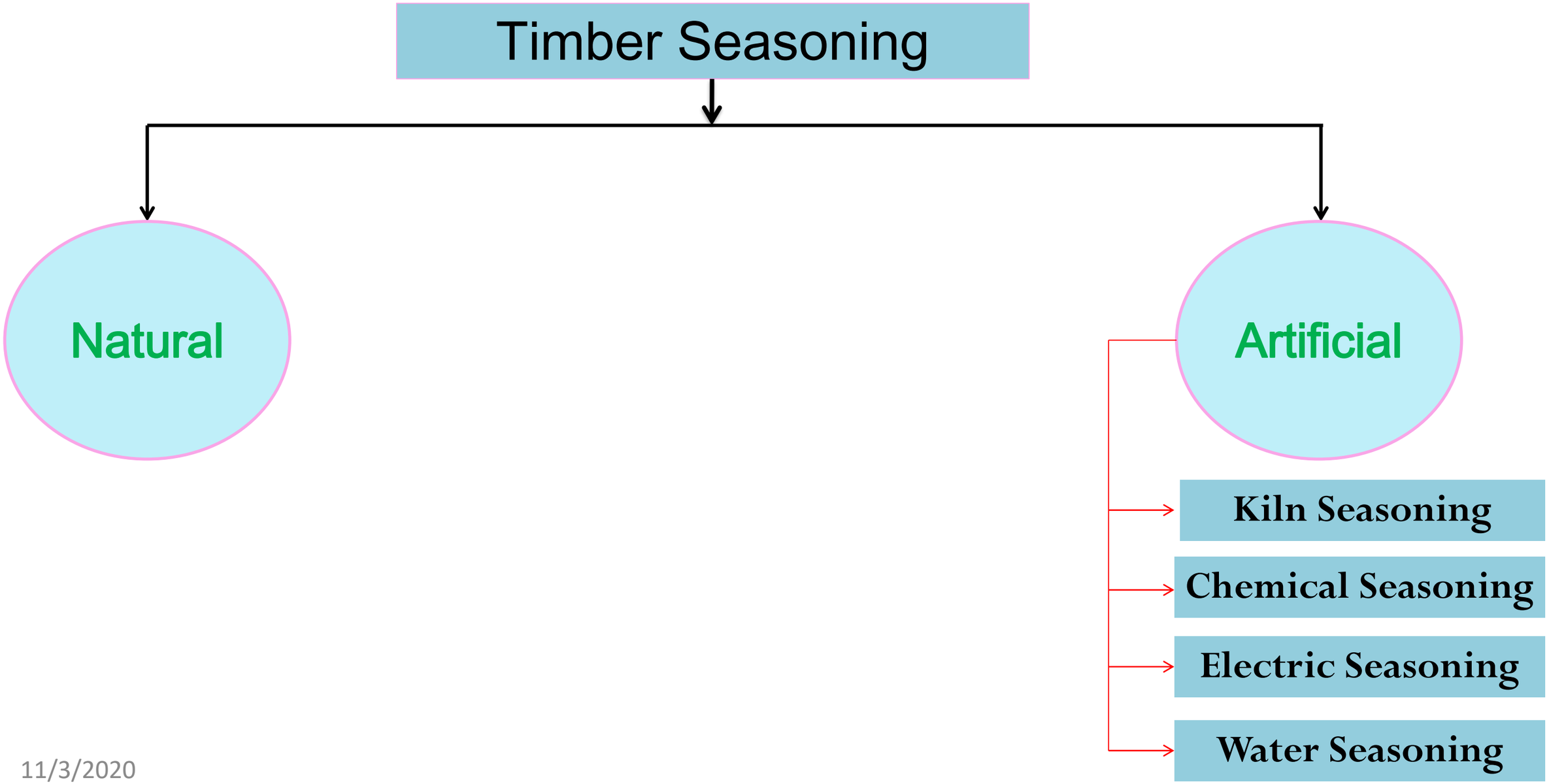
Advantages of Seasoned Timber

- Reduce the shrinkage and warping after placement in structure.
- Increase strength, durability and workability.
- Reduce its tendency to split and decay.
- Make it suitable for painting.
- Reduce its weight.
- The recommended maximum moisture content of timber as per IS : 289 for standard elements such as beams, rafter, and posts are as follows.

Advantages of Seasoned Timber

- Zone I Dry Zone (R.H.< 40%) : 12%
- Zone II Moderate dry zone (R.H. 40-50%) :14%
- Zone III Moist Zone (R.H. 50 - 67%) :17%
- Zone IV Moist Zone (R.H. > 67%) :20%

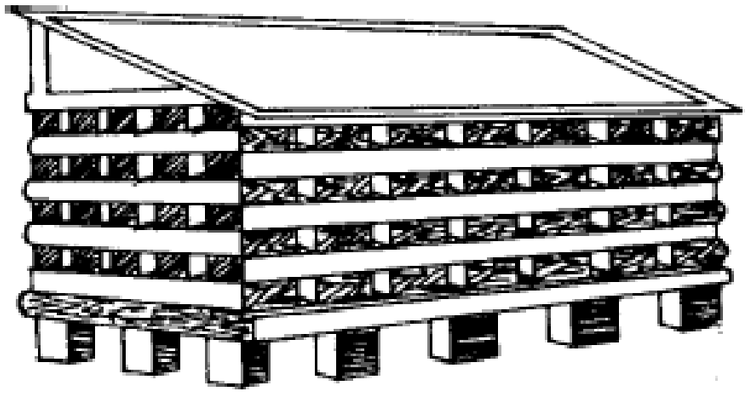
Types of Timber Seasoning



Types of Timber Seasoning

Natural or Air Seasoning

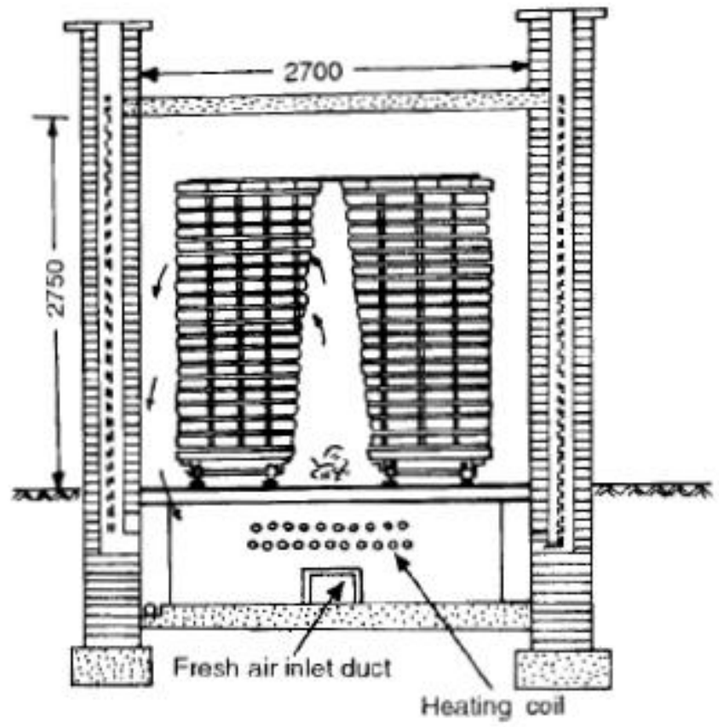
In the air seasoning/natural seasoning/natural drying, seasoning of timber, timber is dried by direct action of air, wind and sun. In this method, the timber logs are arranged one over the other, keeping some space or distance between them for air circulation of fresh air. Generally this type of seasoning requires few months to over a year, this is very slow process. Air seasoning reduces the moisture content of the wood to 12–15 per cent. It is used very extensively in drying ties and the large size structural timbers.



Types of Timber Seasoning

Artificial (Kiln) Seasoning

In kiln seasoning timber is placed in a chamber with some special heating arrangement. In this process one thing should be kept in mind that heating system should be under control, other wise timber will be crack or wrap. The time required for this seasoning is 3 to 12 days. This is a quick process.



Types of Timber Seasoning

Artificial (Kiln) Seasoning

Advantages

- Dries More Quickly
- Final Moisture content is lower
- Can be properly controlled
- Defects associated with seasoning are minimized

Disadvantages

- Hearting the kiln used a lot of energy
- It is an expensive method
- Requires a skilled operator

Types of Timber Seasoning

Artificial (Chemical) Seasoning

In chemical seasoning carbon dioxide, ammonium carbonate or urea are used as agents for seasoning, those are applied in dry state, the inter surface of timber dries first than outer side. This ensures uniform seasoning. The time required for this seasoning is 30 to 40 days.

Types of Timber Seasoning

Artificial (Electric) Seasoning

There logs are placed in such a way that their two ends touch the electrodes. Current is passed through the setup, being a bad conductor, wood resists the flow of current, generating heat in the process, which results in its drying. The draw back is that the wood may split. In this method electric current is passed through the timber logs. The time required for this seasoning is 05 to 08 hours.

Types of Timber Seasoning

Artificial (Water) Seasoning

In water seasoning, timber logs are kept immersed whole in the flowing water. The sap present in timber is washed away. After that logs are taken out from water and are kept in open air, so water present in timber would be dried by air. The time required for this type of seasoning is 2 to 4 weeks.

Summary

- Introduction of Timber
- Classification of Timber
- Seasoning of Timber

THANK YOU