UNIT 3: THE WOOD

WOOD DEFINITION

Wood is a **raw vegetable material** that comes from the trunks of trees and bushes.

It is composed of:

- Cellulose fibers (*Fibras de celulosa)*
- Lignin (*Lignina*)

PARTS OF A TREE TRUNK

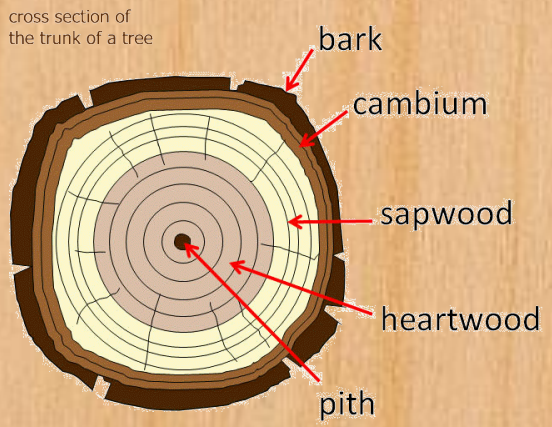

Illustration 1: Parts of the trunk (source: www.wikipekes.com)

- **Bark** (Corteza). The outer layer of the trunk and branches. The bark serves as a protective coat for internal wood.
- **Cambium** (cambium). The thin layer of living cells within the bark is called cambium. It is the part of the tree that creates new cells allowing the tree to be thicker every year.
- **Sapwood** (madera de crecimiento). It is the youngest wood in the tree. Over the years, internal sapwood layers die and become heartwood.
- **Heartwood** (duramen). It is the hardest wood of the tree , which provides support and strength to the tree. Usually its color is darker than the sapwood.
- **Pith** (Médula). The pith is the small and dark zone where we can find spongy living cells. In general, it is not used.

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WOOD PROPERTIES

WHAT MAKES THE WOOD DIFFERENT AMONG THEM:

- **Specie (Tipo de árbol).**
- **Environment where is located (Medio ambiente).**
- **Type of soil (Suelo-terreno).**
- **Age (Antigüedad del árbol).**

PHYSICAL PROPERTIES:

- **Density (Densidad). Density is the ratio between the mass of a body and volume occupied. The porous bodies such as cork or polystyrene have a low density, while the compacts as metals or rocks have a high density.Wood is less dense than water, so it floats.**
- **Hardness (Dureza).Wood is hard but can be penetrated by objects such screws or nails.**
- **Electrical Insulation (Aislamiento eléctrico).The wood is a great electrical insulatior. It does not allow electricity to flow through. Be careful, it has not to be wet.**
- **Thermal Insulation (Aislamiento térmico). Due to its composition, it is a good thermal insulator.**
- **Melting point (Punto de fusión). The wood does not have a melting point, for this reason, rather tan melt, it will burn.**

MECHANICAL PROPERTIES

- **Flexibility (Flexibilidad).Wood is often very flexible, particularly some types of wood.**
- **Toughness (Tenacidad): Toughness is the property to resist a sudden effort. The wood does not have much toughness.**
- **Hardness (Dureza): Hardness is the resistance of a material to be scratched by another one. The wood is not too much hard.**

ECOLOGICAL PROPERTIES:

- **Recyclable (Reciclable): We can use a waste wood to give it another use. For example. we can recycle the paper.**
- **Renewable (Renovable). The growth peroid of a new tree is short compared to petrol. For this reason we consider that is a renewable resource.**
- **Biodegradable (Biodegradable). Wood does not remain for a long time. Fungus and microorganisms decomposes it.**

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WOOD PROCESS

In this area we will describe the process that the wood suffers from the timberland to the final product. The process is:

- **Tree cutting: (Tala del árbol): We choose the tree to cut it down with the saw or chainsaw.**
- **Pruning (poda): We cut off all the branches of the tree to leave the trunk without them.**
- **Transport (Transporte).The trunks, once loaded up on the trailers, are transported by road, rail or water to the sawmill.**
- **Debarking trunks (Descortezado de los troncos). Once the trunks are downloaded into the sawmill, they are debarked by a chain of rollers with metal teeth.**
- **Sawing (Serrado). The trunks are cut by saws in different ways.**
- **Drying (Secado). The wood is dried to let off their moisture and take its real volumen.**
- **Planing (Cepillado). In this process we seek to give a good shape to woodwork.**

Illustration 2: Wood process. (Soruce: Joaquin Vidal)

WOOD PREPARATION

As we described before, to make a good woodwork, we can't use the wood as found it in the timberland. It takes a process to make this material useful.

Immediately after debarking the trunks, the process to get the final product is determined by it. So we will cut the trunk to get planks and boards of different thickness and lengths. Once this is made, we will have to wash and dry the wood. The first one to eliminate bugs and fungus that can affect the wood quality, and then drying the wood to remove the moisture to get the real volumen of it.

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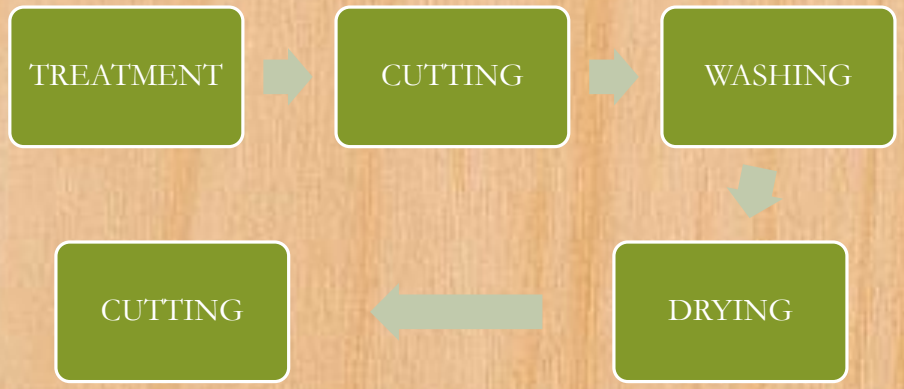
PROCESSES NEEDED:



CUTTING: The kind of cut is determined by the final product and the use that it will have. Here are the different types of cutting:

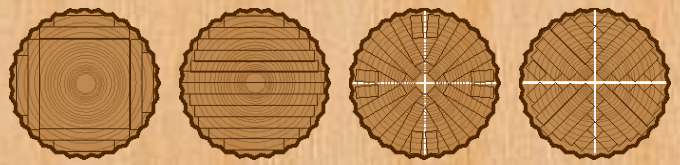


Illustration 3: Different types of cutting wood (Source: tekneso.com)

TANGENTIAL SAW / PLAINSAW / RADIALSAW/ QUARTERSAW

WASHING: In this process we give a treatment to the wood to eliminate the bugs and fungus that can affect the quality of the wood. While we do this, different fluids of the wood are extracted.

DRYING: We have to eliminate the moisture of the wood to not have problems about the size of the wood (because the moisture grows the volumen of the wood).We can remove it in this different ways:

- **Natural drying (Secado natural). The wood is stacked outside protected from the rain and the sun. Depending on the weather, it will dry fast or not.**

- **Artificial drying (Secado Artificial).The wood is dried in big ovens. It is the fastest process.**

TREATMENT: In this process we protect the wood with chemicals products to make it more durable.

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WOOD CLASSIFICATION

Wood is classified as HARDWOOD or SOFTWOOD depending on the tree it comes from.

HARDWOOD FEATURES

- **Denser that softwoods. (Más densa que la madera blanda).**
- **Generally they are deciduous trees (Árboles de hoja caduca en general).**
- **Slow growth (De crecimiento lento).**
- **Big range of colours and grains (Gran rango de colores y grano)**
- **More resistant and harder than softwoods (Más resistente y duro que las maderas blandas)**
- **Wood for high quality furniture (Madera para muebles de alta calidad).**

Illustration 4: Types of hardwood (Source: Joaquin Vidal)

SOFTWOOD

- **Generally evergreens trees. (Generalmente árboles de hoja perenne).**
- **Quick growth (De crecimiento rápido).**
- **Contain more fluids than the hardwoods trees. (Contiene más fluidos que los árboles de madera dura).**
- **Colours lighter than hardwoods (Colores más claros que las maderas duras).**
- **Most common woods for woodworking by its malleability. (Maderas más utilizadas por su maleabilidad).**

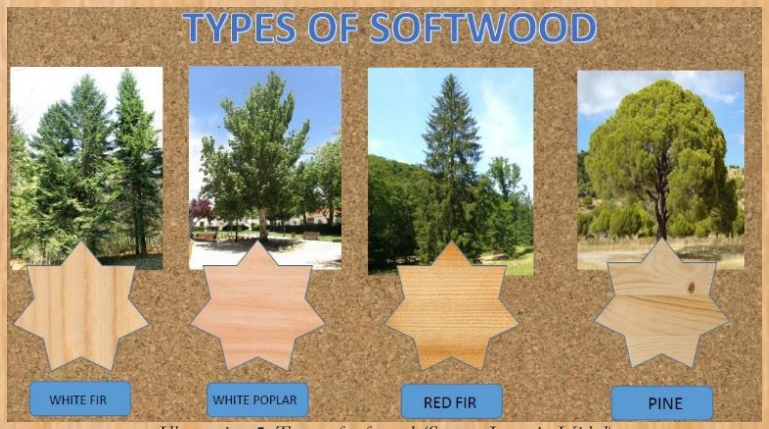

Illustration 5: Types of softwood (Source: Joaquin Vidal)

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WOOD DERIVATIVES

Wood derivatives have some advantages over natural wood: The boards are prepared in large area panels. The tree wood is better utilized and they can be deformed, rot less and are cheaper.

ADVANTAGES:

- **You can choose more sizes.**
- **No treatment required against bugs.**
- **Mechanical properties improved.**

TYPES:

PLYWOOD

Illustration 6: Plywood (source: wikipedia)

- **Made of thin wood veneers, ones above the others alternating vein direction. Plywood is attached with glue and high pressure.**

- **It deforms less and has the same strength in both directions.**

CHIPBOARD

Illustration 7: Chipboard (source: kronospan.co.uk)

- **It is made by small wood particles and shavings mixed with resins and pressed.**
- **They broke easily. They deform in contact with water. Not allowed screws. To improve its appearance they are covered with decorative plates.**

FIBREBOARD

- **They are obtained from a mass made by wood fiber and glue, which is compressed at high pressure.**
- **Fibers planks have different grades of density:**

Illustration 8: Fibreboard (source: www.ema-models.co.uk)

  - **LD (Low density)**
  - **MD (Medium density)**
  - **HD (High density) is a special one called Hardboard**

- **Deform less and resist better the moisture tan the chipboard.**

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PAPER AND CARDBOARD

The paper and the cardboard are derivative materials from the wood. They are made from the fibers of the wood called cellulose.

Process to extract the cellulose and make paper or cardboard:

Illustration 9: paper process (soruce: www.paper.org.uk)

1. **Transport the cut trees to the paper mill.**
2. **The bark is removed from the trunk.**
3. **The wood from the trunk is reduced to cellulose fibers (chips) by a mechanical or chemical process.**
4. **Addition of chemical products to the pulp made by chips.**
5. **The paste is compressed to remove the water and to obtain a thin sheet of paper.**
6. **The paper is stored to be market in different sizes as the final consumer requires.**

CARDBOARD

Illustration 10: Cardboard (source: kartox.com)

TISSUE PAPER

Illustration 11: Tissue paper (source: www.solarispaper.com.au)

CARD

Illustration 12: Card (source: www.escool.au

WOODWORK TOOLS

Look to the posters in classroom.

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KEY WORDS

Trunk: (Tronco). The main part of a tree from which the branches grow.

Log: (Tablón-Tronco). Tree trunk that has been cut down for processing or burning.

Soil: (Suelo-Terreno). The earth where the plants grow.

Grain: (Veteado). The lines we can see on the surface of a piece of wood.

Board: (Tablero). Flat piece of wood or recycled material, used in carpentry and wood working.

Plank: (Plancha-Tablero). Wood cut into a flat board which can be of varying size and thickness.

To prune: (Podar). Process of removing branches of a tree.

To Saw: (Serrar). Cut wood, metal…with a metal blade or tool.

To warp: (Alabear). Be deformed because of a process of change.

To bend: (Doblar). Become curved or form a curve.

To pulp: (reducir a pulpa). Cut into small pieces and mix with water.

To roll out: (Desenrollar). Flattened out with a cylindrical tube or roller.

To harden: (Endurecer). To make hard.

Pile: (Montón). A collection of objects laid one on top of another.

Humidity: (Humedad). The measurable amount of water in something (air, wood…)

Moisture: (Humedad).A slightly wet or humid condition.

Deciduous: (Caducos). Trees that lose their leaves in winter.

Resin: (Resina). A sticky (Pegajosa) substance found inside the wood.

Long lasting: (duradero). Lasts for a long time.

Fungus: (Hongo). A type of parasitic organism.

Bugs: (Bichos).

Insects: (Insectos)

Sheet: (Hoja-Sábana).Thin, flat piece of material.

Chip: (Viruta). Little piece or fragment of material.

Finish: (Acabado). An attractive thin layer of some kind that seals and protects a surface.

Leftovers: (Sobrante). What remains after the main part has been used.

Wax: (Cera)

Rot: (Pudrir)

Furniture: (Mueble)