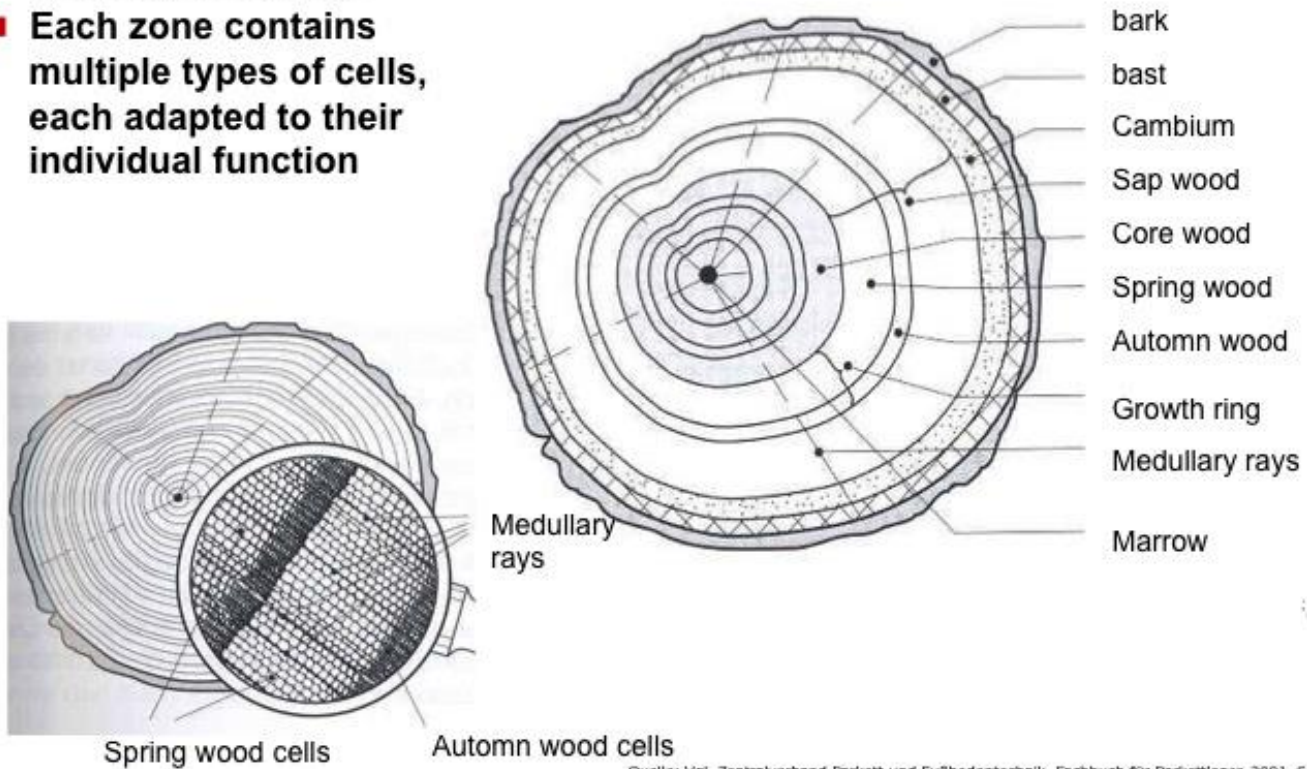


The Tree

- A tree trunk consists of various circular zones called growth rings
- Each zone contains multiple types of cells, each adapted to their individual function

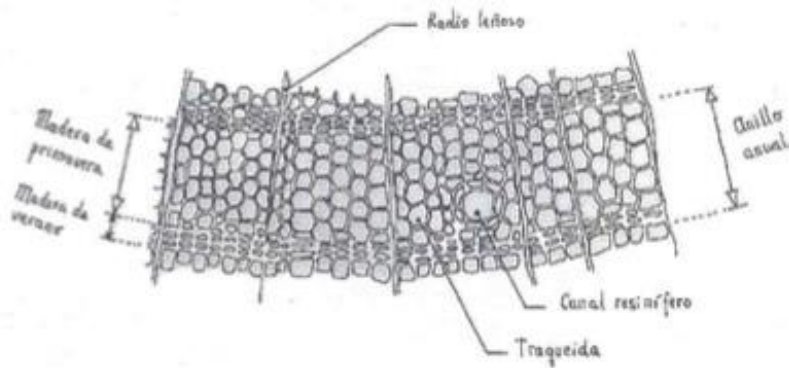
Transverse Section of a trunk



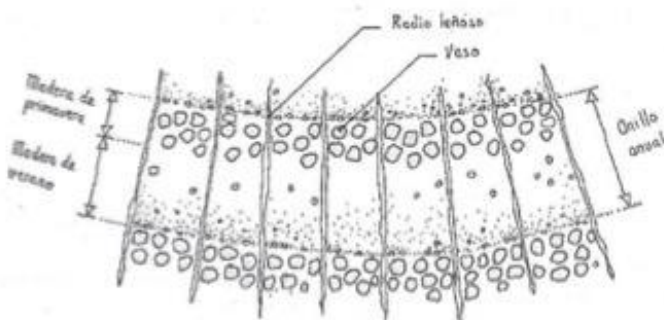
Quelle: Vgl. Zentralverband Parkett und Fußbodentechnik, Fachbuch für Parkettleger, 2001, S. 152 ff

The microscopic structure of wood

- Trees can be classified either as: coniferous/needle-bearing trees (spruce, pine etc.) or as deciduous/leaf-bearing trees (beech, oak, ash etc.)
- The cell structure of deciduous trees is quite different from coniferous trees.



Microscopic section of a growth ring of a coniferous tree

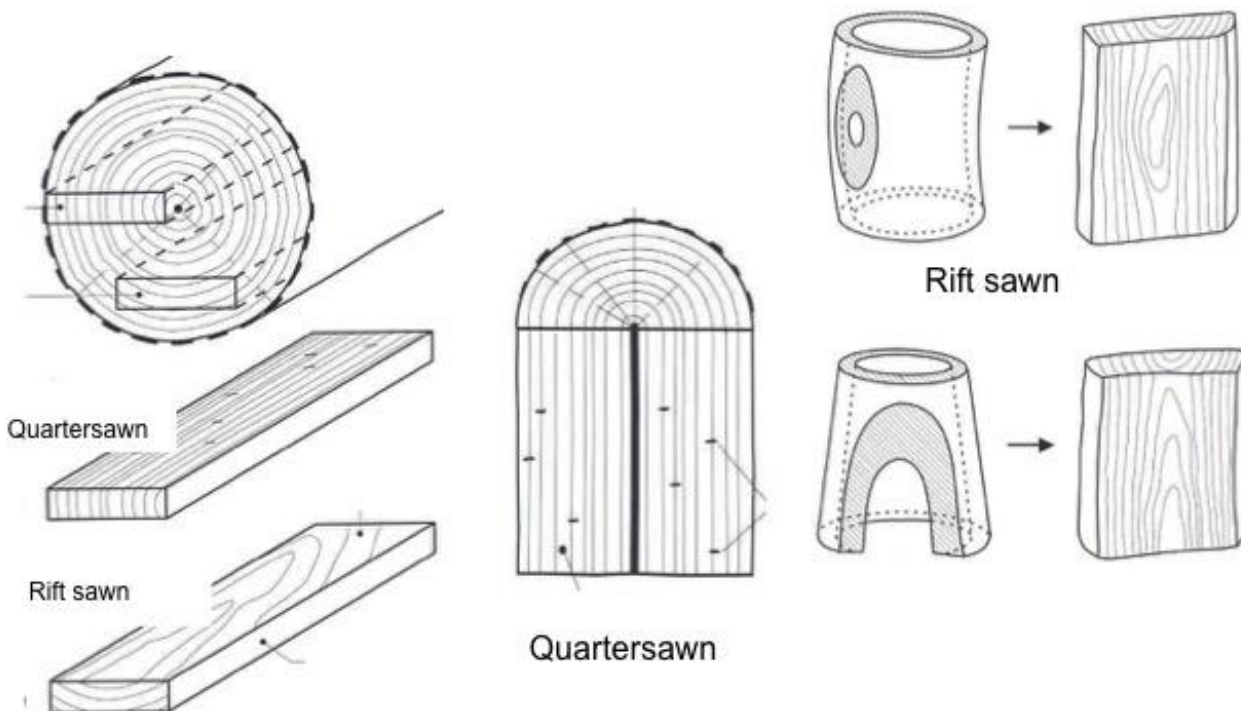


Microscopic section of a growth ring of a deciduous tree

Quelle: Vgl. Pavimentos de madera – Manual de la instalación, AITIM, 1997, S. 12 ff.

Grainage depends on cutting direction

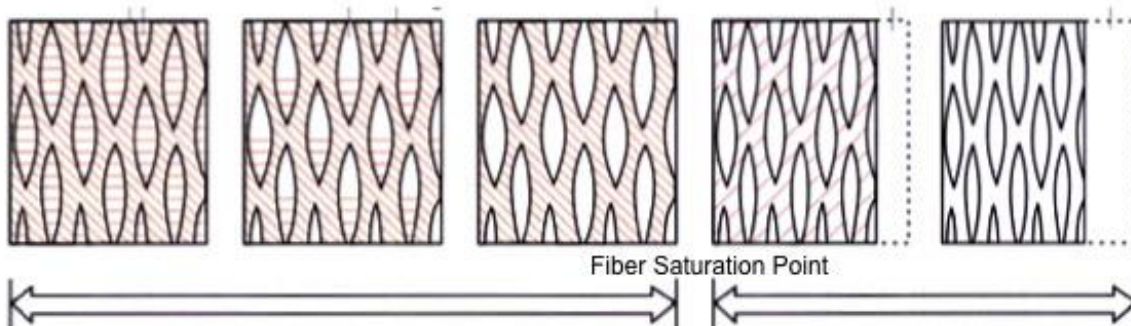
- The growth rings give a different aspect called grainage depending on the direction the board is cut from the trunk



Quelle: Vgl. Zentralverband Parkett und Fußbodentechnik, Fachbuch für Parkettleger, 2001, S. 152 ff

Wood's moisture: the content of water

- Immediately after felling a tree the cellular lumen (= free water) and the cell's membranes/fibres (= contained water) are filled with water.

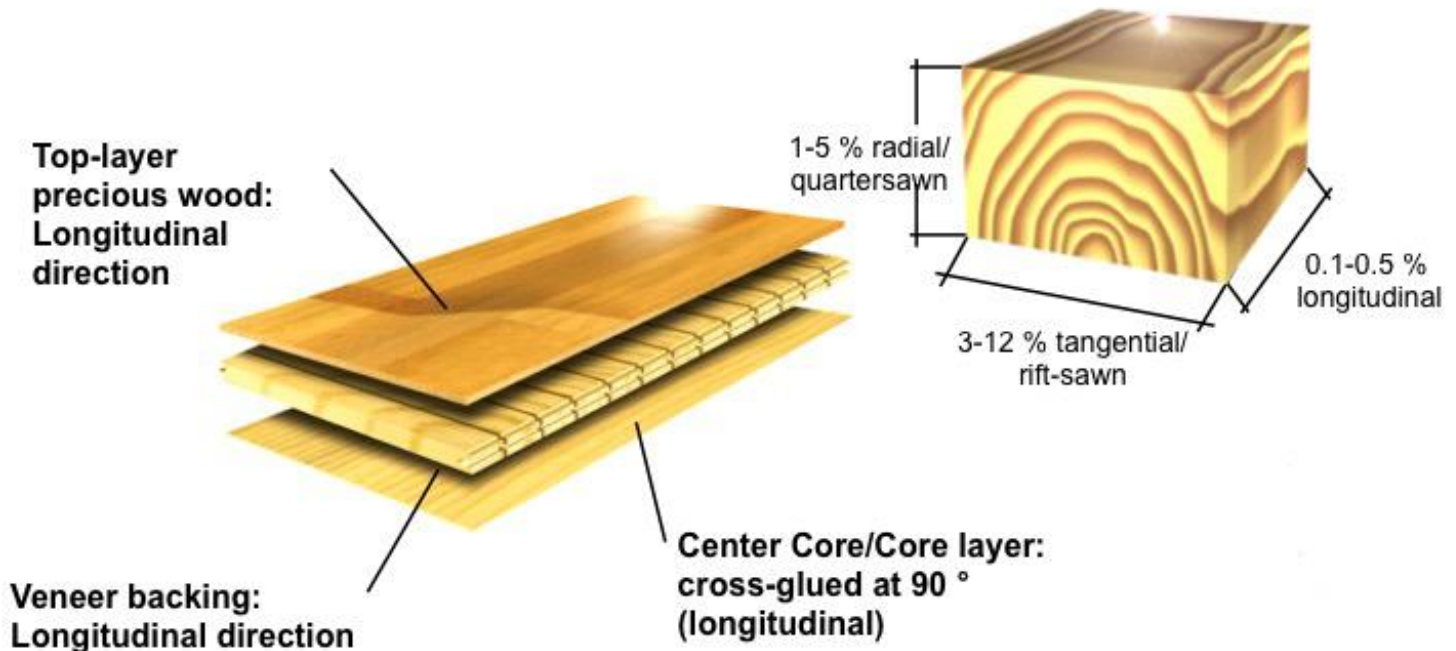


- As the wood dries, the free water evaporates first.
 - Once the free water has completely evaporated the **Fiber Saturation point is reached** – at app. 30 % wood moisture content.
- Below this point, the cell membranes contract as the contained water evaporates until the moisture content is 0 % (oven-dried).
- Shrinkage will only occur below Fiber Saturation Point.

Quelle: Vgl. Zentralverband Parkett und Fußbodentechnik, Fachbuch für Parkettleger, 2001, S. 152 ff

Shrinking and Swelling – why a multi-layer-construction

- Wood will shrink/swell differently depending on the direction of the growth rings
- Gluing odd numbered layers of wood together at a 90 °- angle strongly reduces the shrinkage/swelling, at the same time giving higher dimensional stability



The core-layer – different types of construction

- **HDF - MDF**
 - High Density Fibre board – Medium Density Fibre board
 - „Layers“ of wood fibres forming a „homogeneous“ material
- **Particle Boards**
 - „Layers“ made from wood chips forming a more or less „homogeneous“ material
- **Ply-Wood**
 - Veneer layers glued together at a 90 °-angle
 - min. 3, generally 5 or 7 layers (more: “Multiplex”)
- **Core-layer type**
 - Solid spruce finger strips (not glued together)

Wood's Hardness: measured in Brinell (DIN EN 1534) = Determination of the resistance of a wooden surface against indentations

- The hardness according to Brinell is measured by the diameter of the indentation produced by a steel ball pressed onto the surface under determined circumstances.



$$H_B = \frac{F}{\pi/2 D (D - \sqrt{D^2 - d^2})}$$



Diameter of the steel ball $D = 10 \text{ mm}$
Force applied $F = 1000 \text{ N}$ (500 N)
15 s time force is built up
25 s time force is maintained

The Taber-Test – a measure for abrasion resistancy

- The IP-value is reached when the first full ring of abrasion is seen on the sample's surface.

■ Sand-Paper Method

- Rubber wheels coated with sand-paper
- Between 200 and 500 revolutions
- Parquet and Laminates

■ Falling Sand Method

- Leather wheels: with every cycle sand is applied to the surface and vacuumed off after evolution of wheel.
- Parquet

