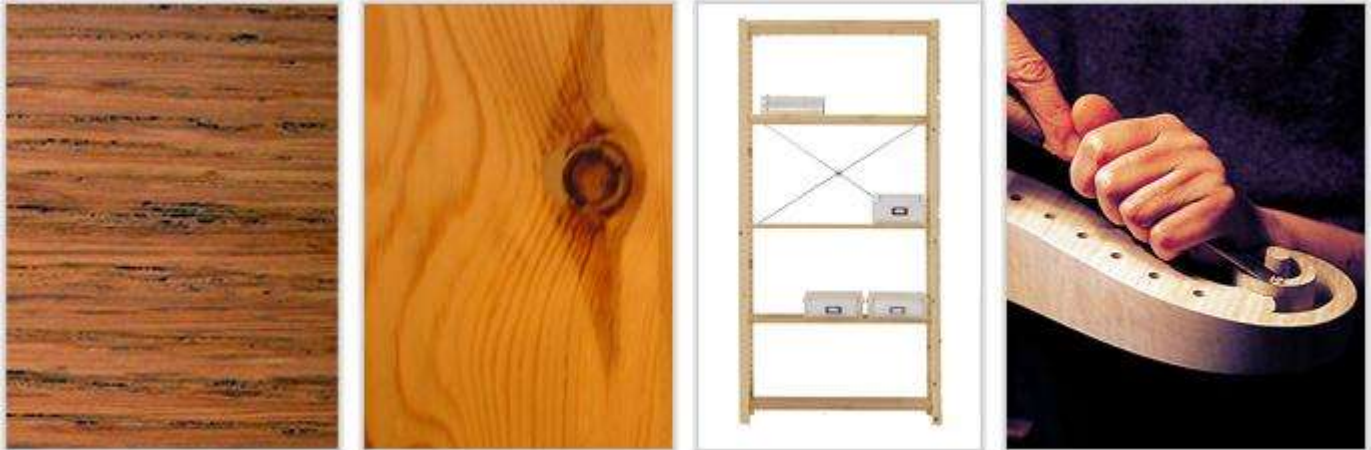


Description

Image



Caption

1. Close-up of the material along the grain. 2. Close-up of the material along the grain. ©ANSYS, Inc. 3. Pine shelf. © Chris Lefteri 4. The making of a musical instrument. © Chris Lefteri

The material

Wood has been used to make products since the earliest recorded time. The ancient Egyptians used it for furniture, sculpture and coffins before 2500 BC. The Greeks and the peak of their empire (700 BC) and the Romans at the peak of theirs (around 0 AD) made elaborate boats, chariots and weapons of wood, and established the craft of furniture making that is still with us today. More diversity of use appeared in Mediaeval times, with the use of wood for large-scale building, and mechanisms such as pumps, windmills, even clocks, so that, right up to end of the 17th century, wood was the principal material of engineering. Since then cast iron, steel and concrete have displaced it in some of its uses, but timber continues to be used on a massive scale, particularly in buildings.

Composition (summary)

Cellulose/Hemicellulose/Lignin/12%H₂O

General properties

| | | | | |
|---------|--------|---|------|-------------------|
| Density | 470 | - | 625 | kg/m ³ |
| Price | * 1.29 | - | 2.01 | GBP/kg |

Mechanical properties

| | | | | |
|--|--------|---|------|----------------------|
| Young's modulus | * 8.7 | - | 15 | GPa |
| Yield strength (elastic limit) | * 36.3 | - | 62.3 | MPa |
| Tensile strength | * 61.6 | - | 128 | MPa |
| Elongation | * 1.7 | - | 2.9 | % strain |
| Hardness - Vickers | * 2.97 | - | 8.28 | HV |
| Fatigue strength at 10 ⁷ cycles | * 19.2 | - | 42.8 | MPa |
| Fracture toughness | * 2.98 | - | 7.08 | MPa.m ^{0.5} |

Thermal properties

| | | | | |
|---------------------------------|----------------|---|--------|------------|
| Maximum service temperature | 120 | - | 140 | °C |
| Thermal conductor or insulator? | Good insulator | | | |
| Thermal conductivity | * 0.218 | - | 0.382 | W/m.°C |
| Specific heat capacity | 1.66e3 | - | 1.71e3 | J/kg.°C |
| Thermal expansion coefficient | * 2 | - | 11 | µstrain/°C |

Electrical properties

| | |
|------------------------------------|----------------|
| Electrical conductor or insulator? | Poor insulator |
|------------------------------------|----------------|

Optical properties

| | |
|--------------|--------|
| Transparency | Opaque |
|--------------|--------|

Eco properties

| | | | | |
|-------------------------------------|-------|---|-------|-------|
| Embodied energy, primary production | 11 | - | 12.2 | MJ/kg |
| CO2 footprint, primary production | 0.547 | - | 0.603 | kg/kg |
| Recycle | ✗ | | | |

Supporting information

Typical uses

Flooring, furniture, handles, veneer, sculpture, wooden ware, containers, cooperage, laundry appliances, sleepers (when treated), building construction, boxes, crates, planing-mill products, sash, doors, general millwork, framing, sub-flooring, sheathing, boxes, crates, pallets - but these are just a few. Almost every load-bearing and decorative object has, at one time or another, been made from wood.

Links

ProcessUniverse