

# 14. Technically altered wood products

This chapter gives an extremely brief overview over a few frequently used products made from technically altered wood—plywood, particleboards, granulated cork stoppers, hardboards, pencils and paper.

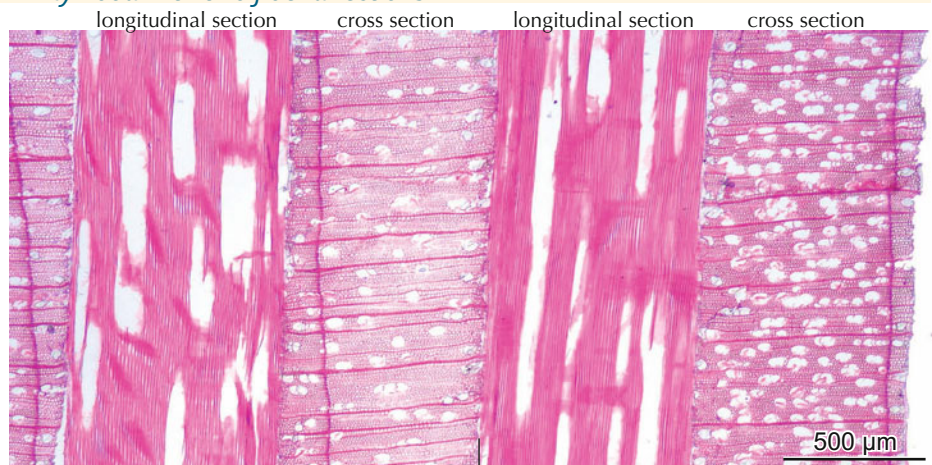
Naturally grown wood used to be one of the most valuable removable resources in pre-industrial times. Today, large industries modify wood from its natural form and structure, and change its physical and chemical properties to create products that suit modern human needs. In construction, shrinking and swelling

of materials is an undesirable feature. This can be avoided with the production of plywood, particleboards and hardboards in which the fiber direction of the wood is artificially altered. Fibers in plywood run horizontally and vertically, particleboards and cork stoppers have fibers running in all directions, and hardboards feature compressed wooden structures. These processed products do not react in an anisotropic way anymore. For other products, the formal design has priority, e.g. in wooden pencils. Paper industries chemically disaggregate wood species with long fibers.

## Plywood with two fiber directions



14.1 Macroscopic aspect of glued plywood.



14.2 Microscopic aspect of a multi-layered plywood. Longitudinally and vertically oriented layers stabilize the board.

## Chipboards and particleboards with various fiber directions



14.3 Macroscopic aspect of various chipboards, consisting of small wood particles and synthetic products.



14.4 Chipboard with large particles and large spaces with synthetic fillers (white).



14.5 Particleboard with small particles in polarized light. The synthetic fillers are not birefringent.

Hardboards

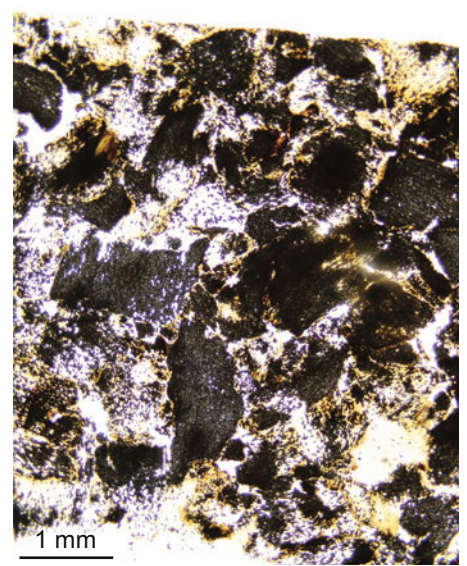


14.7 Compressed wooden structure of *Populus* sp. The intensity of the compression is reflected in the bending of the rays.

Granulated cork stoppers



14.8 Wine cork stoppers.

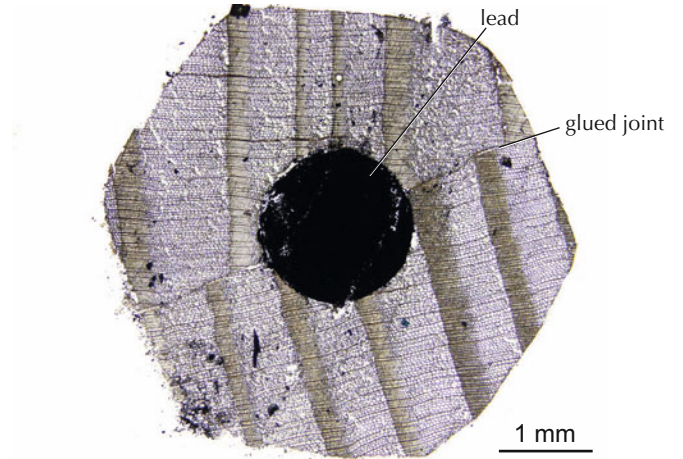


14.9 Chips in a cork stopper. Cells of small particles are filled with air (dark).

Wooden pencils

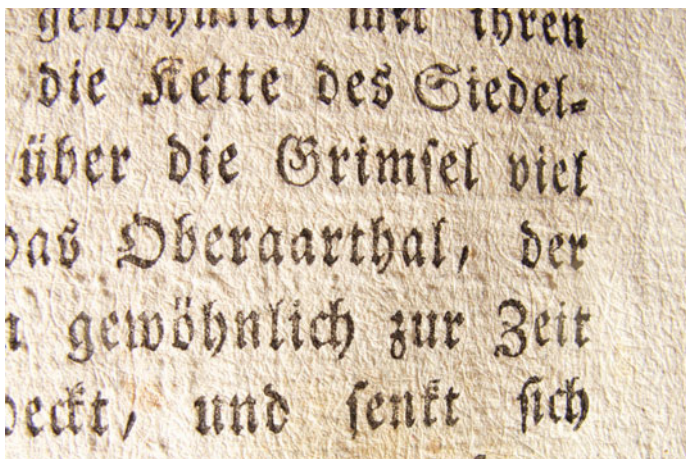


14.10 Wooden pencils with paint coating. The lead is embedded in a holder of *Thuja*, *Juniperus* and many other species.



14.11 Cross section of a lead pencil with a holder of *Larix* wood.

Paper



14.12 The ground-up wood pulp is visible in this old book page.



14.13 Macerated conifer tracheids with a length of up to 4 mm.

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