TECHNOLOGY

# The New Look in Wood

**Wood has a bigger future today than ever before. Competition from plastics has stimulated scientists to develop plastics from timber and to find new uses for tree products.**

By HENRY W. PIERCE

➤ ONE of the oldest building materials known to man—wood—is taking on a new look.

It has uses today undreamed of 25 years ago. In chemistry, agriculture and construction, wood is surpassing many plastics now on the market.

Oddly enough, many of wood's new uses are arising from what lumber technologists consider the biggest problem facing the industry today, that of waste, chiefly sawdust, shavings and chips. Practical uses for this "refuse" are continually being found in laboratories.

Sawdust, for example, has long been considered one of the most useless by-products of the pulp mill. The high cost of transportation has kept industry from fully exploring its possibilities. However, English scientists recently found a way to convert sawdust into fertilizer. They spray a solution of bacteria concentrates onto sawdust and allow the mixture to decay. The result is a sort of chemical compost.

A use has also been found for wood chips and shavings. These fragments, once wasted, are now being made into particle board, which consists of random chips of wood held together by a bonding agent. When planed and polished, it has a smooth, attractive surface. Persons striving for originality in home decoration have used it for wall paneling and flooring.

## Particle Board Useful

Particle board is providing Americans with "mahogany" furniture at low cost. As core board, an inexpensive base on which more costly wood can be fixed, it enables furniture manufacturers to market strong, inexpensive furniture with an attractive appearance.

Because Europe's timber supplies are much more depleted than those in the United States, particle board has been used more extensively in Europe than here. The cost of particle board, equal to that of raw lumber, has slowed its popularity in this country.

Partly because of its popularity abroad, particle board is gaining worldwide importance. The United Nations has underlined its significance by scheduling an international conference on particle board, hardboard and insulation for January, 1957.

Hardboard, another wood product, has also gained world recognition. Unlike particle board, however, hardboard has come into general public use as a building material.

Hardboard was discovered accidentally in the early 1920's by William H. Mason, a research scientist. One day, while performing laboratory experiments with wood, Mr. Mason put a board in a cold press and forgot it. Somehow heat got into the press. When Mr. Mason returned several hours later he found the board transformed into a hard, dense material.

Development of hardboard led to further experiments to find new uses for wood, not only by private companies but by the Government. Research in this field led a scientist to suggest that the entire future of wood will be determined by rearrangements of its fibers.

Increasingly, the future of wood depends on what are called laminating processes. Laminated wood consists of boards pressed thin and squeezed together in layers under heat. Truck bodies can now be made entirely of laminated wood. Bridges are sometimes made of it. Even church arches have been built of the material.

The Navy has recently started building laminated wood minesweepers. The new vessels, unlike the metal ones used in the Korean War, will not be endangered by magnetic mines. The wooden minesweepers of World War II were made of regular sawed lumber and were not satisfactory for prolonged sea duty.

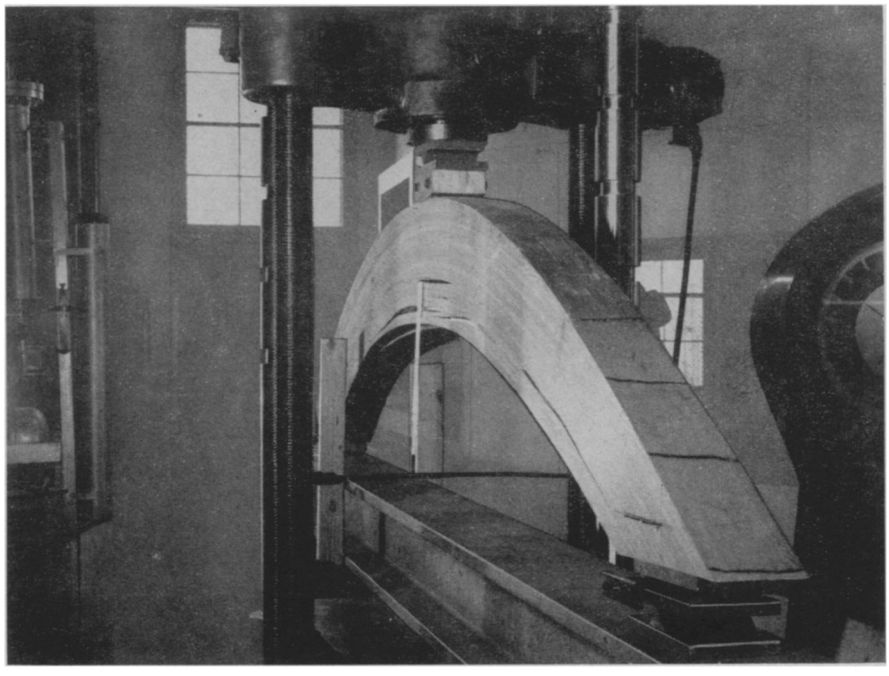
Few persons realize it, but about half the body of most telephones, fountain pens and steering wheels consists of wood. Ground up into "flour," wood serves as a filler or base, reducing the cost of these items by extending the supply of expensive synthetic resins used in their manufacture.

Industry is continuously on the lookout for new ways of converting wood into plastics. One reason for this is the fact that wood is limited in its shape and size as it grows on trees. When cut into boards, much wood is wasted. Made into plastic, however, wood can be shaped at will. The by-products from the manufacture of one plastic can often be used for another.

The problem of waste is well illustrated by a mythological highwayman, a fellow named Procrustes. The fabulous Greek giant put his victims to bed and then tailored them to the size of the bed with an axe.

This is what happens to a tree when it is converted to lumber.

Wood is composed of cellulose fibers and a substance called lignin. The cellulose is



*LAMINATED SHIP WOOD—A big beam similar to this, made from laminated wood, is now part of the hull of many minesweepers. The strength test shown here proved to the Navy that minesweepers could be made entirely of wood, ending the threat of destruction by magnetic mines.*

the main body and lignin is the bond that holds the cellulose together. Without lignin, wood is a loose bundle of fibers. Without cellulose, it is a porous sponge of lignin.

Paper is composed of cellulose. If you tear a piece of paper in half and hold it up to the light, you will see a tiny fuzz along the torn edge. Occasional hair-like strands will project separately. These are cellulose fibers.

Cellulose is used as a base for 70% of the better plastics on the market today. Celluloid, the first of all plastics, was named after cellulose.

High-grade wood pulp is the source of cellulose acetate, nitrate and ester plastics. It is also the source of rayon.

Besides material for plastics, trees yield chemicals important in a variety of products from cosmetics to soil restorers, which is where lignin enters.

## Lignin in Many Products

Lignin is an ingredient in some hand lotions and scalp tonics. It is used in several bactericides, in fire extinguishers and as a road binder. A mixture of lignin and concrete is sometimes used as a base for building materials. Synthetic flavoring for some vanilla ice cream is made from lignin also.

Lignin has a big future in conservation. The chemical can be used to restore soil for farming in heavily forested areas. Combined with elemental phosphorus and nitrogen, lignin encourages the formation of topsoil.

A pilot plant has recently been established by Crown-Zellerbach Corporation in Camas, Wash., for producing dimetal sulfide from lignin.

In most pulp mills, however, lignin is still regarded primarily as a waste product. Scientists have not found a way of putting to use large amounts of the chemical. Unfortunately, industrial pulping seriously degrades lignin, a fact that has not encouraged research.

## Search for Lignin Plastic

Uses for lignin and methods of extracting it constitute the frontier of the least explored, least known and least understood country in the wide realm of timber.

If it were completely understood, there is reason to believe the entire future of the wood and plastics industries would be altered. A lignin plastic, in which lignin resins would form 50% by weight of the final product, could so drastically increase the world's plastic output that there would not be a market for all of it.

No large-scale processing of lignin exists at the present time because its uses are so limited. Chemists specializing in this branch of research say, however, they are on the threshold of finding a general use to which lignin can economically be put.

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*Sheep* turned into a corn field prior to harvest may result in faster, more economical corn picking; they clear away lower corn leaves, weeds and grass.

GENERAL SCIENCE

# Russian Declassification

➤ THE RUSSIANS are now declassifying atomic information faster than the United States, for the first time.

The disclosures about the Soviet experiments on controlled thermonuclear reactions made by Dr. Ivan Kurchatov at Harwell were definitely of a kind that would not have been let loose under U.S. security regulations, despite their non-military nature.

Heretofore, the United States has beat Russia in announcing atomic progress. At the Geneva Atoms-for-Peace conference, the Soviet scientists consistently lagged in producing hitherto secret information.

The Soviet scientists have told more of what they know than U.S. scientists have been allowed to. This does not mean they are ahead of the U.S. in thermonuclear research. They probably are not, although this is not known for sure.

The U.S. has a full-blown research on the peaceful H-reaction, centered at five large laboratories. The official word is that we are 20 years from possible useful thermonuclear power, but there might be a breakthrough faster.

There are tremendous technical difficulties. It is necessary to have temperatures of several million degrees to fuse the heavy hydrogen (deuterium) or perhaps lithium and beryllium atoms, converting their matter into energy. Nothing like a metal vessel can confine such temperatures. The reaction would have to take place in gaseous discharge, self-contained in what the physicists call a "hot plasma." Magnetic and electrical means would be used to create the temperatures. The discharge would not be steady.

Once the fusion reaction got underway, the temperatures would rise further and the trick would be to take out the energy released and use it. Neutrons would be produced, indicating fusion. The Russians are reported to have thought they were producing neutrons, but these were evidently not from actual fusion.

American physicists are convinced, many of them, that if the AEC got its controlled thermonuclear research information out in the open in a modern Smyth report there would be faster progress, without detriment to the defense effort. A few fringe research reports have been released.

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