

Building Bigger Things

Unit III Member Manual

National 4-H Wood Science Series

4-H 4423

Reprinted September 2006

Oregon State | Extension
UNIVERSITY | Service



Acknowledgement

This educational material has been prepared for 4-H use by the National 4-H Wood Science Committee composed of representatives of Extension Service, U. S. Department of Agriculture, and the Cooperative Extension Services of the State Land Grant Universities. Special thanks are extended to the Weyerhaeuser Company Foundation for financial and technical assistance. This material is published by the National 4-H Council, 7100 Connecticut Avenue, Chevy Chase, MD 20815.

National 4-H Council is a not-for-profit educational organization that utilizes private resources to help expand and strengthen the 4-H program. 4-H is the youth education program of the Cooperative Extension Service of the State Land Grant Universities and the U.S. Department of Agriculture.

Programs and educational materials of National 4-H Council are available to all persons regardless of race, color, sex, age, religion, national origin or handicap. Council is an equal opportunity employer.



Contents

Note to Parents and Home Helpers	2
Introduction	3
Learning About the Forest Products Industry	4
Economics of the Forest Products Industry	5
Careers in the Wood Products Industry	6
Learning More About Wood Itself.....	7
Names of Woods (Wood Species).....	7
Structure of Wood.....	8
Identifying Hardwoods and Softwoods by Structure and Appearance.....	10
How Moisture Affects Wood	11
Woodworking Tools and Machinery	13
Marking Gauge	13
T Bevel.....	13
Miter Box.....	14
Clamps	14
Wood Chisel	15
Planes	16
Sharpening Wood Chisels and Plane Irons.....	18
Power Tools	19
Bench Grinder	19
Drill Press	20
Belt Sander	21
Woodworking Plans	22
Glossary	31

Note to Parents and Home Helpers

Your 4-H'er is now moving into the third unit of the 4-H Wood Science project series, "Building Bigger Things." Through your support, this member has been able to participate in woodworking projects and activities that helped him/her learn about wood as a product and to construct items from wood.

At this point, your 4-H member is probably continuing in Wood Science because of personal interest, positive experiences, or because of the enthusiasm that you, club leaders, or other members have generated. You can help your 4-H'er keep up his/her initiative by continuing to be personally involved and interested in the project.

In this unit, new concepts of wood science are introduced. Activities and experiments are provided that can help youth better understand these concepts. In addition, youth learn how to use new tools and machinery for constructing items from wood. The provided learning experiences, woodworking tools, and plans for constructing items from wood are now

becoming more sophisticated, so your 4-H'er is going to depend on you for help. You can see that he/she has positive experiences in this unit by:

- Helping the 4-H'er understand new concepts being taught
- Assisting, when needed, in completing the activities and experiments provided within
- Helping to locate wood samples
- Helping select items for their personal woodworking projects that they can realistically complete
- Working with club leaders to plan, supervise, and chaperone group activities, as needed, and to help provide transportation
- Being available to lend a hand, if needed, while your 4-H'er is working on his/her project

Remember, 4-H'ers learn by doing, so DON'T DO THE WORK FOR THEM, but give all the support you can to your 4-H'ers and leaders!



Introduction

This is Unit III of the 4-H Wood Science project series, "Building Bigger Things."

In the previous two units you learned a variety of things: how to measure, mark, cut, sand, and smooth wood; how to use wood finishes; how to buy and use lumber and plywood; and how to use a variety of woodworking tools in constructing items from wood. You also learned how wood is harvested and processed into usable wood products. But there are still many things that you need to learn about wood in order to use it properly when building your projects.

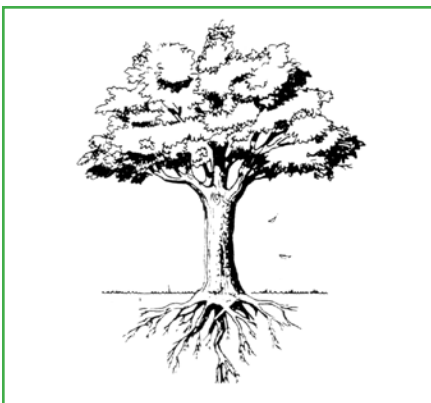
Science is learning about things — why things are the way they are and how we can change them to make them better or easier to use. Wood Science is learning about wood.

In this unit you will learn more about wood itself. You will learn how woods are named and classified, more about the physical characteristics and properties

of wood, and why one wood works better than another for a specific woodworking project. You will learn about economics of the wood products industry and how various products are made. You will be introduced to more woodworking tools and machinery, allowing you to gain new skills in constructing items from wood. You'll learn all these things through your participation in individual and group activities, by completing the activities and experiments in this manual, and through the items you choose to make as your own personal woodworking projects.

Set goals for what you want to accomplish this year in the Wood Science project, keeping in mind your abilities and skills. Several woodworking plans are included in the back of this manual. Select items to make from these plans; but, you are also encouraged to use plans from other sources.

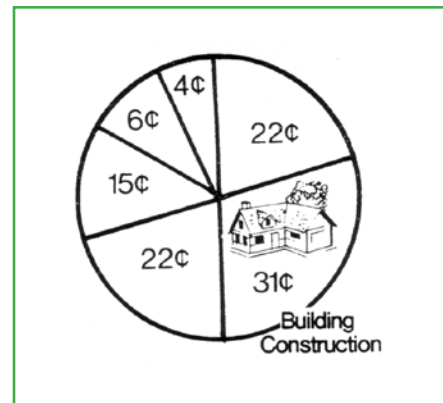
In Unit III you will learn more about...



Wood Species



Structure and Properties



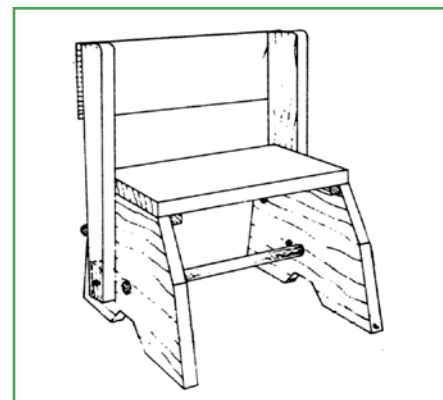
Economics



Careers



Tools



Woodworking/Plans



Learning More About the Forest Products Industry

The forest products industry is made up of many different types of companies. Some are very large with factories all over the world that produce a wide range of wood products. Others are very small and may only produce one type of product in one location. Some companies do everything, from growing the trees to selling the product to you at a local lumber yard or building houses with the products. Others may only be involved in one part of the process of getting wood from the tree to its final use.

As part of your project work, activities are suggested that will help you learn more about how we get wood products — some of the processes, costs, and people involved. Local libraries, wood products companies, forest products trade associations, and other forest products companies are good sources of information, too.

Activities: Exploring the Forest Products Industry

- A. Learn all you can about the manufacturing and marketing of one or more wood products. This could be a piece of lumber, plywood, paper, or a piece of furniture. Visit your local lumber yard. Find out what kinds of wood products they sell and where the products come from. Visit a furniture store. Find out what woods are used to make furniture. If you have a sawmill, pulpmill, furniture plant, or other wood processing plant nearby, find out how specific products are made. Report what you have learned to your club, or plan a special presentation for another club.
- B. Sketch a diagram of the wood processing plant you visit, so that you can teach other club members how the manufacturing plant works. This can be a group activity.
- C. Learn more about career opportunities in the forest products industry and also in woodworking.
- D. Help your club plan tours of industries and places in your local area that process and market wood products, such as lumber yards, sawmills, furniture manufacturers, processing plants, cabinet makers, etc.
- E. Ask your leader or parent to help you organize a “Wood Bowl” contest for your club. The competition can be between individuals within your club, or your club can compete as a team against other clubs. Use what you have already learned to help you develop questions for the Wood Bowl.



Economics of the Forest Products Industry

America is a timber-using country. The average volume of timber used per person each year in the United States is about 65 cubic feet. This is the amount of wood that is in a tree 22 inches in diameter with a 40-foot trunk. It takes a forest nearly the size of a football field to grow that much wood. Since we use so much lumber, let's take a look at the cost of each process involved in getting the timber from the forest to the consumer.

Growing timber is only a small part of the total cost of wood products. Out of each dollar spent on producing and distributing wood products, the cost of growing and caring for the trees is about 4 cents.

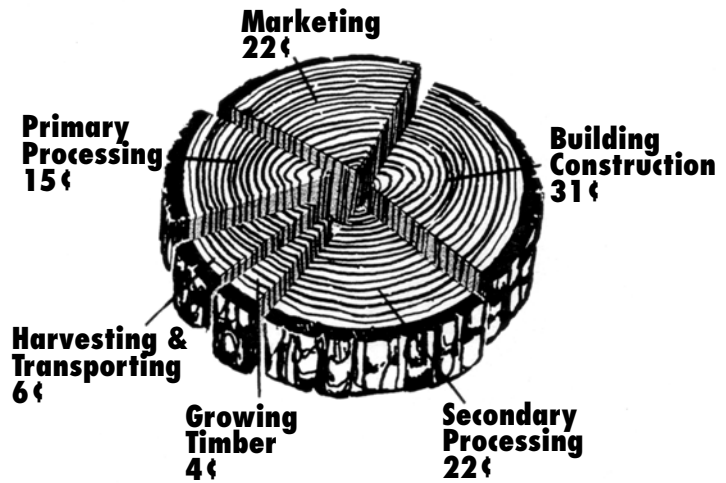
Many different people are involved in growing trees. Professional foresters manage timber lands for private companies, for the U.S. Government, and for states. They also help farmers and landowners manage their timber. It takes college training to become a professional forester. Many foresters have forestry technicians working with them. You can learn to be a technician in a 2-year program after high school.

Almost 60 percent of our timber is grown by farmers or other private individuals, so anyone can be a part of the timber growing phase of forest products.

Harvesting and transporting timber is the second step. The cry of "timber" rings out in the forest and a tree crashes to the ground. This begins a tree's long trip toward becoming the wood in the project you build, the paper on which this page is written, or the pencil you use at school.

Harvesting and transporting the logs require many types of employees, many very skilled in their particular jobs. Truck drivers, equipment operators, and maintenance men are needed in addition to skilled fellers and buckers. Harvesting and hauling the timber from the woods costs about 6 cents out of each dollar spent on the final wood product.

Processing is the third step. It begins with "primary processing." Primary processing activities include sawmilling, pulp and paper production, and



Dollar Value of Wood Products

plywood and particleboard manufacturing. Primary processing costs about 15 cents out of each dollar spent on the final wood product.

Users don't always want to buy lumber or other primary processed products. They may want products that have been further manufactured, such as furniture, cabinets, and flooring from lumber; book cases; corrugated boxes from paper; and other items from wood. This is called "secondary processing," and it accounts for 22 cents of every dollar spent on the final wood product.

Marketing wood products is the fourth step. Many people are needed to make and sell the products consumers want. Much of the lumber is sold by building supply stores and lumber yards where consumers choose what they need. Other forest products are sold at specialized stores, such as office supply stores, furniture stores, and hardware stores. (Think of the stores in your town that sell wood products.) Getting the wood from the factory to the consumer costs about 22 cents out of every dollar spent on the final product. This not only includes shipping costs, but it also includes the cost of wholesalers, distributors, and retailers.



Building construction is another large part of the forest products industry. Most homes and small buildings are made from wood. The average home being built in the U.S. today contains the equivalent of about 1,500 board feet of wood. It takes about 24 good sized trees (22 inches in diameter with a 40-foot trunk) or many more small trees to make this much wood. The building industry is active in all areas of the country and offers many job opportunities for people who enjoy working with wood. The building construction industry accounts for the remaining 31 cents.

As you can see, a lot has to happen to a tree before it becomes a wood product. The tree in the forest makes up only a very small part of the value of the final product. Each additional step makes the wood more valuable. The values shown in the illustration on page 5 are averages for the whole wood products industry. Each individual product would be divided differently. For example, the wood in a fine carving would naturally cost more than a similar amount of wood in a fence post.

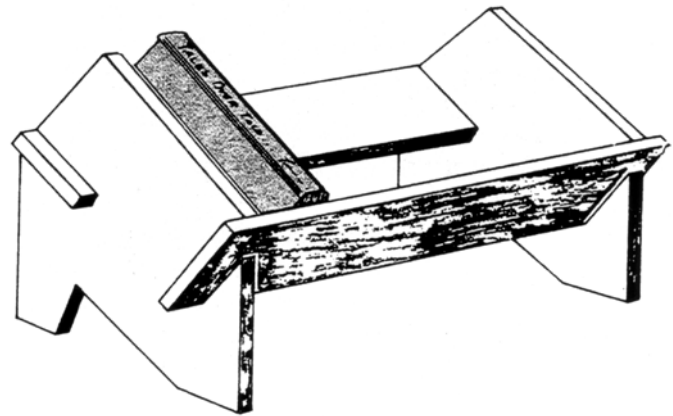
Activity: Trace The Flow of Wood Products You Use

Give a report on how one wood product (lumber, plywood, hardboard, etc.) you use to build a woodworking project was produced. Design a flow chart to help you illustrate the steps. You may also want to learn how other wood products are made. For instance, if you want to build the book rack shown here, you will need two types of wood products—lumber and plywood. When the book rack is completed, it holds another wood product—books; and books are printed on paper. So your flow chart could show how the wood product gets from the tree to lumber or plywood; from the tree to book rack; or from the tree to book.

Careers in the Wood Products Industry

There are many job opportunities in the wood products industry. This industry employs about one out of every 20 working Americans. Some of the job opportunities have previously been mentioned. It takes a lot of mill managers, lumber graders, kiln operators, wood chemists, salesmen, equipment operators and servicemen, and many others to bring wood products to customers.

For more information on careers in wood science and technology, write to the Society of Wood Science and Technology, One Gifford Pinchot Drive, Madison, Wisconsin 53726-2398.



Book Rack