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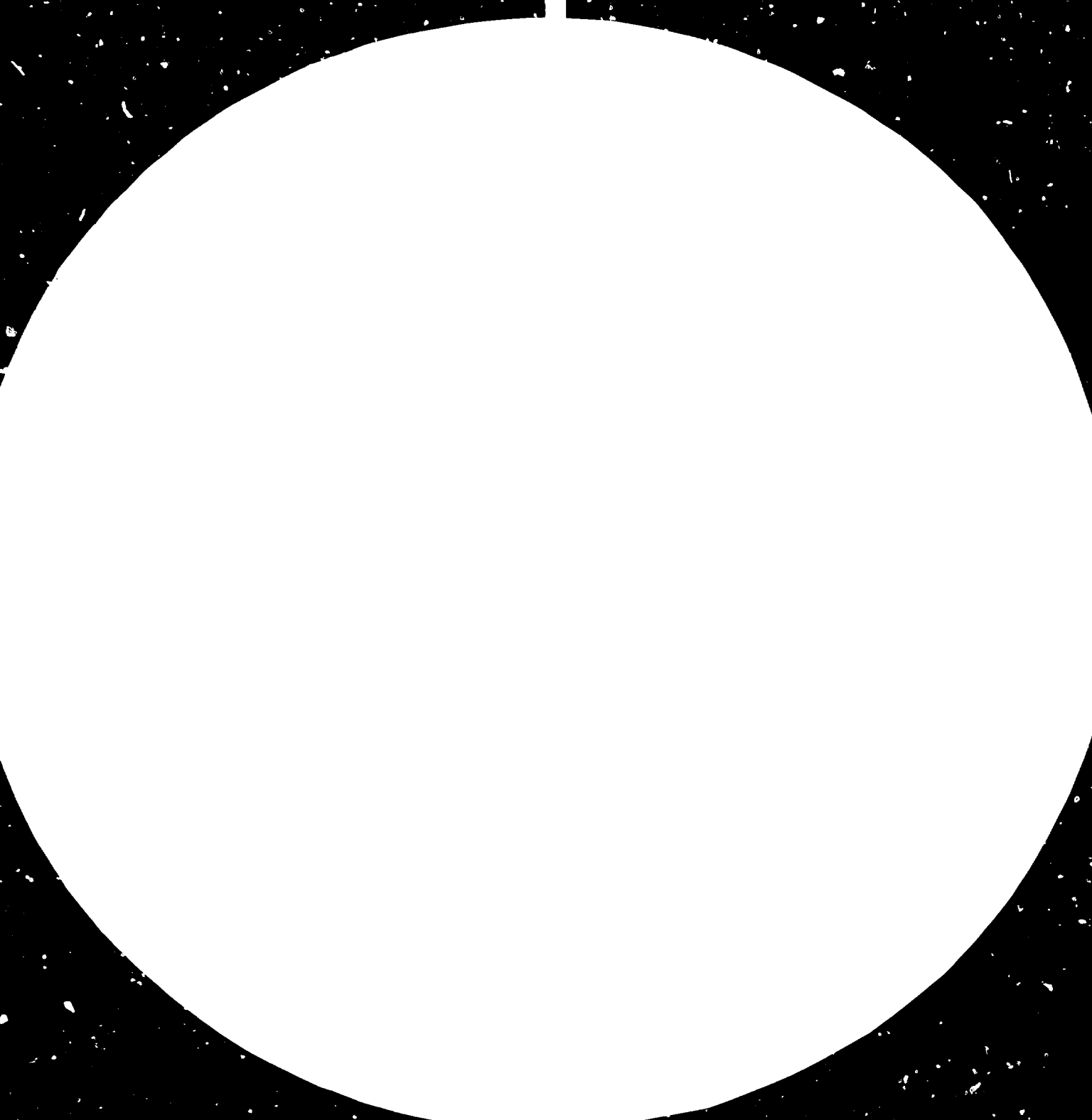
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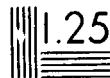
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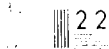
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A BRIEF ACCOUNT OF CHINA'S WOOD INDUSTRY *

by

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062031

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I. WOOD RESOURCES AND THE PRODUCTION OF MAJOR PRODUCTS*

China has a total forest area of 120 million hectares, covering 12.7% of its territory. The existing timber stock volume is about 9,500 million m³, equal to 10 m³ per capita.

Within China, the climate ranges from the cold temperate to tropical zones. China is rich in forest plants and tree species. There are more than 2,800 arbor species, of which about 1,000 are used for industry, 500 of them are frequently used.

Some important industrial tree species are larch, Korean pine, spruce, fir, Chinese fir, masson pine, ash, basswood, birch, maple, schima, oak and castanopsis.

Other valuable species are nanmu, camphor tree, true walnut and Chinese mahogany. Among the fast-growing species are poplar and paulownia, which are adaptable to the north and middle part of China. These trees, with diameters of about 40 cm. at 10 years, can be used as timber. Chinese fir, which can be cut for timber at 20 years, is adapted to the broad area to the south of the Yangzi River. China also is rich in bamboo forest resources.

Timber production for industrial use (excluding fuel wood and timber for local use) in the People's Republic of China has increased from a little more than 5 million m³ at the beginning of the liberation (October 1949) to 46.7 million m³ in 1980.

Annual sawnwood consumption has grown during the same period to 13 million m³ or more, from 3.4 million m³. Production in 1980 of wood-based panels (including plywood, fiberboard and particleboard) was 920,000 m³, as well as that of furniture was 43 million pieces.

II. MAJOR WOOD PRODUCTS INDUSTRY

1. Lumber

About 40% of industrial roundwood is sawn into lumber. Nearly half of this total is processed by sawmills located in or near the forest areas, most of which were constructed in the 1950s. The equipment is quite old, and operations are in the process of technical transformation. With the technical evolution of recent years, mills with improved mechanization and semi-automated systems have been installed. In developing its lumber industry, China has become capable of manufacturing various kinds of sawmill machines.

*The production data of Taiwan Province are not included.

Modern sawmill techniques, such as twin bandsaws for sawing small diameter logs, twin horizontal double bandsaws, multiple bandsaws and chipping saws, are being developed. Ripping by milling and cutting machines and scale-measuring by photoelectric scanners also are under study and development.

In order to minimize long-distance transportation of logs, China's lumber industry will continuously develop lumber processing in forest areas. Scattered small mills will be reorganized. These mills combine lumber production with the production of chips, plywood and other wood-based panels. Different technological processes and equipment will be adopted for rational and economical use of wood, to raise wood utilization rates and productivity.

About 15 to 20% of lumber in China is dried in dry kilns. Most lumber is air-dried or delivered green to users. It therefore is necessary to increase drying productivity, improve drying technique, improve loading and unloading mechanization, and make use of automatic control in lumber drying aiming at gradually drying all lumbers which should be dried.

2. Wood Preservation

Within China, the climate ranges from the cold temperate to tropical zones. With such a diversity of conditions, there are many kinds of harmful organisms to be dealt with, such as fungi, white moths (termites), wood-boring beetles, and marine wood-boring beetles. If logs in the timber yard are not chemically treated through the summer season, they will deteriorate and be degraded.

The government therefore pays special attention to wood preservation. Since the founding of the People's Republic of China, proper wood storage and preservative treatment work has been conducted by the departments of railway, building construction, communications and forestry, and by the preserving plants.

Scientific research institutions have been established to conduct the research on preservatives and the technological processes for treatment of sleepers, electrical posts, wooden highway bridges, pitprops and some construction wood. Rules have been worked out for wood storage and preservative treatment and white moth control stations have been set up in many locations.

All sleepers are preservative-treated, so are the electric posts on the main lines of communication. Most of the pitprops and timber for building construction are not treated, however. Future emphasis will be placed on research work on preservatives and efficient technological processes for treatment of lumber and pitprops, as well as construction materials for doors and windows.

3. Plywood

Plywood has a longer history in China than any other wood-based panel. At the time of liberation, only a few mills with relatively simple and crude equipment existed. The total production capacity was only 10,000 m³.

Plywood production by 1980 had expanded to 300,000 m³, through expansion and replacement of equipment and the establishment of a series of new enterprises. Capacity of these mills falls in the small to medium range. There are 11 mills with annual capacity of 10,000 to 20,000 m³, the others produce about 5,000 m³.

Before the mid-50s, plywood production techniques were quite backward. Plywood produced with blood and soybean glue was only for interior use. Since the 1960s, however, weather-resistant exterior-grade plywood and densified laminated plywood have been produced. Basswood plywood and shuttering for concrete formwork are exported by China.

The continuous operation of veneer manufacture in the mid-60s was realized in some mills.

Glue-spreading, lay-up, pre-pressing and hot-pressing operations were organized as one production line in a few mills. Some progress has also been made on plywood techniques, product quality, varieties and the transformation of the equipment in the past 30 years or more, but manual operation is still predominant.

As average log diameter produced in China is 30 to 40 cm., the main plywood product is thin panels (thickness about 3 mm). Because too much work has to be put into veneer-jointing and splicing, as well as the production management is inefficient, the productivity is quite low.

Sliced veneer is widely used for interior wall panels in modern buses and railroad cars, high-quality furniture, musical instruments and wood-based cabinets for clocks. The main tree species for plywood production are Chinese ash, basswood, masson pine, etc., while walnut, camphor wood, oak, ash and teak are used for decorative veneer.

Blockboard production is an important component in the field of glue-jointed wood products. In China, fitches and small pieces of wood frequently are joined together to form cores. Cores are also made by using paper honeycomb structures. Veneer or plastic overlays are laminated on both sides of the core stock to make blockboard. The board is used mainly for manufacturing doors, caravan trailers, table-tops for sewing machines and furniture.

4. Fiberboard

Fiberboard production started in China since 1958. The country built a number of small mills, and imported from Sweden a complete plant with an annual capacity of 18,000 t. To satisfy the Chinese situation, two types of wet-process hard board plants with capacities of 2,000 and 5,000 t, respectively, were designed and manufactured in China, and put into operation in 1968. Over the last 10 years, more than 200 sets of these kinds of plants have been established. The total capacity is about 530,000t.

Since this type of plant is suitable to fiberboard production in areas with scattered forest resources or mill's residues, less investment and quick project start-up, it plays an important role in the present fiberboard industry in China.

The fiberboard is used mainly for manufacturing doors, furniture, packing boxes and portable houses or mobile homes. In order to develop new varieties of products and new technology relying upon our own technique efforts, a soft-board plant and a dry-process fiberboard plant were constructed in 1970 in Shanghai. At present, the work on introduction, research and manufacture of medium-density fiberboard (MDF) are being developed.

5. Particleboard

China imported a complete extruded particleboard plant from Western Europe in 1950s; the same time, we started developing the technology and equipment for flat-pressing particleboard, however, due to shortage of synthetic resin, the development of particleboard production came late to China. Present particleboard capacity is only 60,000 m³. Chinese researchers designed a plant in 1973 with a flat-pressing process and production output of 50 m³/day and was put into operation.

At the same time, technological research on a cement particleboard plant was conducted. The plant is now under trial operation. A turnkey particleboard plant using the flat-pressing process, with annual capacity of 30,000 m³, has been imported and put into operation. In recent years, the better situation for synthetic resin supply in China the production technique and quality of particleboard as well as the surface treatment of the board, have been improved. It is undoubted that the development of the particleboard industry will be quickened.

6. Adhesives and the Surface Treatment Technique for Wood-based Panels

Adhesives for wood-based panels in China are produced mainly at plants attached to wood processing operations. About 80% of plywood adhesives is synthetic resin, of which 80% is urea-formaldehyde and the rest is phenol-formaldehyde, melamine

resin, and so on. All adhesives used for particleboard production are UF resin. UF and PF resin, tege-film, PF resin for impregnation, melamine resin and polyvinyl acetate emulsion were all developed and put into use during the 1950s and early 1960s.

To suit the development of techniques for wood-based panels and surface treatment, modified melamine resin, rubber resin adhesive, binary polymer resin adhesive and EVA hot melt adhesive were developed in the 1970s. Biological adhesive is also being studied.

In addition to the application of fancy veneers for surface decoration of wood-based panels used for railroad cars, furniture and musical instruments, the melamine resin paper laminates were put into use in the 1960s, and a plant with the annual capacity of 2 million m² for each of Shanghai and Beijing was constructed. In more than 10 provinces and municipalities, small plants were constructed in the 1970s. The annual production now is about 10 million m².

The products are used mainly for such things as furniture, cars, ships, building decoration, table-tops for sewing machines and cabinets for radio and television. Through manufacture and research efforts, the quality of products has been gradually improved and many varieties in design and color are being developed. To save paper and reduce production costs, a wear-resistant decorative laminate without surface overlay paper has been developed.

To improve hot-pressing efficiency and save energy, hot and hot-modified melamine resins and new technology have been developed. To develop new varieties of decorative laminates, complete plants were imported in the 1970s for thin decorative paper and PVC film overlay by rolling pressing, directly printing on the surface of the wood-based panels and micro-veneer production. These plants are under operation in combination with the raw materials of China.

7. Furniture

Furniture production in China has a long history. There was furniture such as narrow tables and other types as early as two thousand years ago. The Ming furniture in the 17th century possessed very highly artistic quality and high-level of production skills, however, China's furniture production was in manually operated backward condition over a long period of time. After the founding of the People's Republic of China, under the care of the government, the scattered handicraft producers and private enterprises were organized on a voluntary basis into furniture plants with stress on collective ownership. The production scope was expanded to share out the work and cooperate with one another in accordance with the

specialties, thus the development of productivity was promoted, and semi-mechanized and mechanized production were step by step developed from manual labour. At present, the national level of mechanization in average is about 40% and the higher level is about 60%. The new techniques and equipment such as ultra-infrared drying, photo sensitive curing paint, painting mechanization and some special and combined machines are being used and developed. The raw materials used for furniture production have also been developed from solid wood alone to the combination with wood-based panels, steel, aluminum alloy and plastic, etc. The portion of blockboard, particleboard and fiberboard used for furniture production is being gradually increased. The local raw materials in different places are also used for producing bamboo, cane, willow and white ash pole furniture, and many varieties have been developed. In some big and medium cities, furniture made of steel, steel and wood, and aluminum alloy, has been also developed. The transition of the structure for modern furniture has been made from frame structure to panel and "knockdown" structure. The folding, assembling and multi-use furniture has also been developed. A batch of furniture machinery manufacture factories have been organized in the whole country to provide various kind of woodworking machines to the furniture industry.

The main task of the furniture industry is to improve the product quality, production technological process and the level of mechanization, and develop the design and varieties to suit the needs of internal and external markets.

III. FACTORS OBSTRUCTING THE ADVANCE OF CHINA'S WOOD INDUSTRY AND COUNTERMEASURES

1. Insufficient Timber Resources

China is a populous country with insufficient forest resources. The existing timber stock volume per capita is only about 10 cubic meters, less than one-eighth of the world's average; whereas the annual per capita timber consumption for industrial use is merely 0.05 cubic meters, about one-thirteenth of the world's average.

National economic development and improving the people's livelihood both call for larger supplies of timber and wood products. Meanwhile, the serious dearth of forest resources has become the main obstacle to development of the wood industry. Consequently, steel, cement and plastics are being used as wood substitutes in building construction and for making railway sleepers and furniture. On the other hand, rational and comprehensive utilization of wood is still at a low level. The utilization ratio of wood, from the felling of logs to the manufacture of finished products, is estimated at less than 50%. A good deal of the residues from

felling and processing is thrown away. A lot of wood--in the form of construction materials, pitprops, etc.-- are used without being dried or treated with preservatives. A substantial amount of high-quality timber for different purposes is not used rationally. In order to solve these problems, efforts should be made to develop rational and comprehensive utilization of wood, and emphasis should be placed on the production of wood-based panels. Small amounts of wood may be imported when necessary.

Wood substitutes can temporarily mitigate the contradictions between the supply and demand of wood products. But in the long run, substitutes such as steel are not necessarily economical. Cement, on the other hand, seems to have a better future. It is, therefore, necessary to make concrete analyses and studies of the different kinds of substitutes, and to work out long-term technical policies and plans with regard to materials.

China's vast territory encompasses many barren hills and plains suitable for afforestation. From a long-term point of view the fundamental way to solve the problem of insufficient wood resources is to strengthen the tending of existing forests, vigorously promote a mass afforestation movement, and set up various specialized wood production bases. Relevant government departments are adopting effective measures in these respects.

2. Lack of an Independent System for the Wood Industry

Logging and part of the wood processing industry are under the Ministry of Forestry, whereas the manufacturing of wood products is distributed among the construction, communications, light industry, materials and other industries. Owing to the fact that a large proportion of wood is supplied in the form of logs, that the processing of wood is scattered all over the country, and that it is impossible to concentrate the residues from processing, the utilization rate of wood is low and the production capacity of wood-based panel mills remains small. Some products which should be dried or treated with preservatives are left untreated. Equipment manufacture cannot keep up with the needs of the wood industry development. In variety, quality and quantity, the production of auxiliary materials fails to meet the demands. All these factories inhibit the development of the wood industry.

In this connection, it is necessary first of all to transform the forestry regions--now producing mainly logs--into bases for the manufacture of lumber, wood-based panels, semi-finished products and other wood products in order to change the present structure of product distribution. Urban enterprises should concentrate on the manufacture of high-quality wood products. Secondly, production of equipment and accessories should be strengthened, and the supply of raw and auxiliary materials should

be gradually filled out. An independent system for the wood industry should be set up to link together the processing of lumber, the manufacture of equipment and auxiliary materials, and marketing, so as to ensure the development of the industry.

3. Low Technical and Management Levels

The technological level in China's wood industry is far behind that of the economically developed countries. The variety of its products is limited and their quality is low. The problem now is how to develop the wood industry effectively under the present circumstances of limited resources, insufficient funds and excessive population. Our experience shows that emphasis should be placed on the development of small and medium-sized mills, as this conforms to the conditions in China, i.e., scattered raw material sources, limited amount of funds, low level of technology and abundant labor power. Such small and medium-sized mills have attracted considerable interest in some of the developing countries. However, whether in the lumber or wood-based panel industries, in-depth investigations and studies should be conducted, on the basis of assimilating advanced technology from abroad, on ways and means of serializing and modernizing production techniques and obtaining the best economic results. In the furniture-making industry, considering that China has a big population, and that each family has relatively little living space or purchasing power, more folding, composite and multi-purpose furniture with wood-based panels and metal or wood-based panels and plastic structures should be designed. Production of traditional-style furniture should also be kept up, so as to meet domestic needs and increase exports.

Problems confronting other countries such as the short supply of energy and the environmental pollution have also to some extent affected the development of China's wood industry. Attention should be given to finding prompt and appropriate solutions to these matters.

Modern and scientific enterprise management is needed for China's wood industry. It is necessary to learn the advanced experience from other countries and, in the light of the characteristics of China's social economy, to strengthen the links among supply, production and marketing, conduct market investigations, make supply-and-demand forecasts, and work out scientific management systems for small and medium-sized enterprises. Experiments should first be made at selected points to gather experience, and the results should be gradually popularized.

It is, therefore, important for us to strengthen the scientific research in wood industry, energetically expand our international contacts and various forms of international cooperation, and import advanced technology and scientific management methods from abroad, so as to speed up the development of China's wood industry.

