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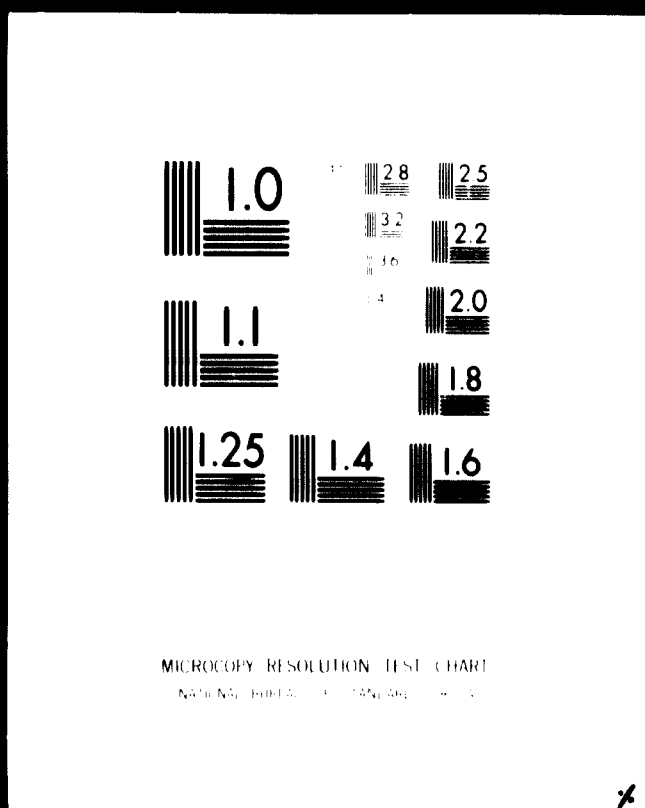
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Distr.
LIMITED

ID/WG.256/10
24 November 1977

ENGLISH

United Nations Industrial Development Organization

Seminar on Furniture and Joinery Industries
Lahti, Finland, 1 - 20 August 1977

TRADITION AND TRENDS IN THE FURNITURE AND
JOINERY INDUSTRY IN INDIA*

by

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id.77-8412

Introduction

Furniture is a part of a person's way of life. Every man needs it. Furniture contributes to the functional comforts and aesthetic value of a building. Its design should, therefore, reflect the individual needs and tastes with due emphasis on comfort. It could be assumed that the demand for furniture will increase with improvement in living standards.

Furniture and several joinery products such as door and window shutters have traditionally been made from wood and are as elsewhere in the world, some of the earliest forms of wood utilisation in India too. Wood is still a dear and favoured raw material for furniture and joinery despite advancements in such competitive materials as alloys, plastics and fibres.

India has a rich tradition in ornamental and carved furniture made from timbers like teak, rosewood, walnut and white cedar. These traditional ornamental furniture made by the highly skilled Indian craftsmen have been famous throughout the world as the trade had its origin back in the Moghual period. Even today, historical influences and social customs still play an important role in design and use of materials in furniture and joinery in India. The adoption of newer materials like wood-based panels and decorative laminates and contemporary designs which have resulted in better functional efficiency and novel aesthetic approaches is presently limited to only sophisticated furniture and joinery.

Timber resources of India

Judging from the international standards, the forest area in India is comparatively low. Per capita forest area is 0.15 hectare compared to the world average of 0.5 hectare. India is a vast country with a variety of climatic conditions. Forests in India are made up of about three million hectares of coniferous forests and 70 million hectares of non-coniferous forests, which is 22.7 per cent of the total geographical area. Over 150 timber species of commercial value grow in Indian forests.

Pioneering work has been carried out by the Forest Research Institute, Dehra Dun on determining the physical-mechanical properties, durability and suitability characteristics and grading of Indian commercial timbers. Over 100 standard specifications have been brought out in the field of timber and allied products by the Indian Standards Institution. Recommendations for maximum permissible moisture content for timber used for different purposes including furniture and joinery under various climatic zones have also been made taking into consideration the prevalent atmospheric conditions in different regions.

Species of woods which have been identified as suitable for furniture and joinery making are given in Table 1. Out of these, only a few broad-leaved timber species like teak, rosewood, sissoo, padauk, white cedar and walnut and coniferous species such as deodar, kail and spruce have been popular for the manufacture of furniture and joinery products. Certain characteristics such as durability, good dimensional stability, attractive grains and good finishing qualities of these species have made them most desirable furniture and joinery timbers down through the ages. But in recent years, the supply of these timbers has been dwindling and the cost has shot up considerably. The use of lesser known species of timbers have not been successful for a variety of reasons.

TABLE 1

Common Furniture and Joinery Timbers of India

<u>Trade name</u>	<u>Botanical name</u>
Teak	<i>Tectona grandis</i>
Rosewood	<i>Dalbergia latifolia</i>
Sissoo	<i>Dalbergia sissoo</i>
White cedar	<i>Dysoxylum malabaricum</i>
Kaila	<i>Adina cordifolia</i>
Kokke	<i>Albizzia lebbek</i>
Amari	<i>Azadirachta indica</i>
Chaplash	<i>Artocarpus chaplasha</i>
Chikrasay	<i>Chukrasia tabularis</i>
Padauk	<i>Pterocarpus dalbergioides</i>
Walnut	<i>Juglans regia</i>
Dhup	<i>Canarium cikinense</i>

Mulliam	<i>Fagara budrunga</i>
Ganari	<i>Gmelina arborca</i>
Dhaman	<i>Grewia</i> sp.
Kanju	<i>Holeptelea integrifolia</i>
Chemp	<i>Nichelia champaca</i>
Hollook	<i>Terminalia myriocarpa</i>
Laurel	<i>Terminalia tomentosa</i>
Bijasal	<i>Pterocarpus marsupium</i>
Bentak	<i>Lagerstroemia lanceolata</i>
White chuglam	<i>Terminalia bialata</i>
Birch	<i>Betula</i> sp.
Teem	<i>Teona ciliata</i>
Feen	<i>Calophyllum</i> sp.
Fali	<i>Falaquium ellipticum</i>
Indian oak	<i>Quercus</i> sp.
Kalaciris	<i>Albissia odoratissima</i>
Satinwood	<i>Chloroxylon swietenia</i>
Thony	<i>Diospyros melanoxylon</i>
Aini	<i>Artocarpus hirsuta</i>
Kindjal	<i>Terminalia paniculata</i>
Mango	<i>Mangifera indica</i>
Deodar	<i>Cedrus deodara</i>
Spruce	<i>Picea smithiana</i> Boiss
Kail	<i>Pinus wallichiana</i>

The present estimates of demand and supply of timber in India indicates that the country is heading fast towards a timber famine. The yield from the forests in India is too low mainly because the present exploitation is limited to only twenty per cent of the available species. Furthermore, the actual utilisation from any tree is only 36 per cent of its volume against a figure as high as 85 per cent in many developed countries.

To utilise secondary species for furniture and joinery purposes, a number of integrated schemes of saw-mills, seasoning kilns and preservation plants are required. Existing facilities particularly seasoning and preservation plants are not adequate to meet even the country's present requirements. Except for a few large scale organised saw-mills situated where timber resources concentrate, the rest of the mills are small and without modern saw milling equipment. The

existing machine design centres have not shown sufficient interest in wood working machines. In general, the wood processing industry in India is still in the making although the country has made remarkable progress in steel, textiles and even plastics.

The science and technology of wood has evolved considerably but its practical application both to the growing and harvesting of wood and for the utilisation of the products is not yet adequately developed in India. The main end-use for wood is still as a fuel (See Table 2). If wood science and technology is properly applied to the growing, harvesting and use of woods in India, the per hectare yield would increase several fold and a more rational approach could be achieved in the utilisation of the country's rich forest resources. Furthermore, industrialisation based on forest resources can contribute to the all round economic progress of the country.

Table 2

Recorded out-turn of industrial and fuel wood (in thousand cu. metres)

	<u>1972-73</u>	<u>1973-74</u>
1. Industrial wood		
(i) Logs for sawing, veneers and sleepers	4,503	5,068
(ii) Unspecified industrial wood	5,180	4,640
2. Fuel wood including wood for charcoal	<u>16,143</u>	<u>16,534</u>
Total:	<u>25,826</u>	<u>26,242</u>

The breakdown of the above total, when classified as coniferous and non-coniferous wood, is given below:

Coniferous wood	1,670	1,669
Non-coniferous wood	24,156	24,573

Source: Central Forestry Commission, New Delhi.

Wood-based panels

In India an organised large scale wood-based panel industry has been developed only in the last three decades. Since independence, production of wood-based panels is ever on the increase and in the past decade or so, India has made fruitful efforts to produce sophisticated plywood products and enter the world market. The country's plywood

production has exceeded 50 million square metres (4 mn basis) whereas particle board and fibreboard have achieved only non-significant growth rates due to environmental as well as quality and price factors. The installed capacities, actual production and capacity utilisation of plywood, particle board and fibreboard during the past decade (1960-197) are given in Table 3.

It is a matter of serious concern that the particle board industry, which is the fastest growing wood-based industry in other countries is not progressing well in India. The installed capacity of particle board is over 45,000 tonnes, but the actual production has remained at practically the level of 15-18 per cent of the installed capacity. High resin cost, lack of knowledge on various application techniques, particularly in the furniture and joinery industry, and poor standardisation of products for specific end uses are some of the handicaps to the full utilisation of particle board in India. As in the case of many countries in Europe and America, particle board can be a potential furniture making material in India too if suitable techniques tailored to the different environmental and economical conditions prevalent in the country are developed. There is a need to develop particle boards for various end uses under tropical conditions.

The future of the particle board industry in India is very promising as the country has adequate resources not only of wood but also of agricultural residues such as rice husks, coconut husk, etc. Rice husk is available to the extent of about 17 million tonnes per year and the quantity available will be steadily increasing. Work of an exploratory nature at the Indian Plywood Industries Research Institute (IPIRI) has indicated that exterior grade boards can be made from rice husk for such end uses like roof and wall cladding and secondary structural members. If the process developed at the Institute in this field is commercially exploited and suitable techniques in the application of rice husk board in the furniture and joinery industry are developed, there cannot be any dearth of materials for mass production of furniture and joinery products in the years to come.

TABLE 3

Production and capacity utilization in the three wood based panel industries

Year	Plywood		Particle board			Fibreboard			
	Installed capacity million m ²	Actual production million m ²	Capacity utilization	Installed capacity Tonnes	Actual production Tonnes	Capacity utilization	Installed capacity Tonnes	Actual production Tonnes	Capacity utilization
1961	30.10	15.36	51	6,000	738	12	22,500	6,958	30
1962	34.47	17.26	50	5,000	703	12	22,500	11,156	50
1963	34.47	20.43	59	10,250	3,399	33	22,500	11,288	50
1964	31.47	20.36	59	23,000	5,940	26	22,500	13,250	62
1965	34.47	22.77	66	23,000	6,100	35	20,500	18,537	45
1966	36.60	22.33	61	24,700	7,083	29	20,500	17,600	43
1967	36.60	25.27	69	44,900	7,815	17	20,500	12,960	32
1968	36.75	28.23	77	44,200	8,130	18	20,500	19,103	47
1969	36.75	28.10	76	44,900	7,760	17	20,500	25,000	62
1970	36.75	32.00	87	44,200	6,900	20	20,500	24,000	59

Source: IPIH Journal, Vol. 4, No. 1, 1974.

Hardware and adhesives

Furniture made with traditional joints such as tongue and groove, mortise and tenon and dovetail are normally fastened with wooden dowels, nails and screws. Requirements of hardware and fasteners have to be specially looked into when wood-based panels and plastic laminates are to be used either exclusively or in combination with solid wood in the industrial manufacture of furniture and joinery products in large series. Apart from the traditional hardware and fasteners like hinges, nails, screws, bolts and dowels, special attention has to be given to the development of hardware suitable for furniture especially when mass production of knock-down, unit or modular furniture is planned.

The use of glues in the furniture and joinery industry in general started many centuries ago. Animal glue has been in use in the furniture and joinery industry in India since many years. In recent years there has been an increasing trend in the use of polyvinyl acetate (PVA_o) based adhesives in furniture making. PVA_o based adhesives are freely available as an aqueous dispersion under various trade names. This adhesive is very popular in the furniture and joinery industries as it is a versatile adhesive for use with porous adherends such as paper, textiles, wood and leather. Cold setting UF resin adhesives also find restricted application in the furniture trade, mainly for fixing the joints.

An adhesive recently developed in IPIRI for structural laminated wood products for use under exterior exposure conditions can also find application in the furniture and joinery industry. This adhesive is based on phenol-resorcinol and formaldehyde and is designed for assembly gluing and will set at normal room temperature.

Present situation of furniture and joinery industry in India

In general there is no specific furniture manufacturing unit in India but both joinery and furniture are often done on the same shop floor. There is no committee or organisation which is collecting systematic information or documentation regarding the status of the wood furniture industry in the country.

At present, there are only a few organized furniture manufacturing units and their production is usually restricted to costly wood and steel furniture. The major requirements of furniture and joinery are therefore being met by small units generally known as "carpentry shops". Most of these small units have not attained a satisfactory level of production sophistication and assembly line techniques and still remain a craftsman's activity. Parts of furniture and joinery are mostly hand fitted. There is still very little mass production in the furniture and joinery industry in India. Besides the absence of technological modernisation, this situation arises from the fact that furniture shops cater to buyers who insist on made-to-order products. These comprise the majority of the market. Despite lack of automation facilities in the majority of units, the quality of furniture and joinery made of favoured species of wood such as teak, rosewood, white cedar, etc., having traditional designs and joinery techniques is usually of good aesthetic standard. The production of such quality furniture is low and demand is very high. It has, therefore, presently become a luxury for the common man. Furniture made of lower grades and lesser known species of woods have not been functionally and aesthetically successful for a variety of reasons. Plywood and other wood-based panels are, therefore, gradually finding their appropriate place in the furniture industry.

Bamboo and cane furniture is also manufactured in some parts of the country which provides employment to a large section of rural population. It is interesting to note that in recent years, India has made considerable progress in steel furniture. Steel furniture is exclusively used in most of the hospitals in India. It is also common in public offices. Furniture consisting of steel and wooden frames and components with rexine and plastic foam upholstery is not uncommon these days.

Although plywood is well known in India, as a material for furniture making, it has been, except for a few types of cabinets, always combined with wood elements to make furniture. In many cases, the function of plywood, particle board and hardboard in furniture has been merely as a cladding or covering material to conceal wood elements. Usually 19-25 mm thick block-board and rarely 19 mm thick plywood is used for making furniture parts for cupboards, table tops or sides, rests for

cots, etc. It is estimated that the present use of plywood including block-boards in furniture making in India is estimated to be over five million m². Particle board and hardboard also find similar uses in furniture making but have been far less spectacular. Technological developments at all levels are yet to be made in India for making mass produced furniture or unit, modular or knock-down furniture, making use of the available resources of timber and panel materials both for domestic consumption and for export. There is an unlimited demand for the export of furniture in knock-down condition.

The housing shortage in India runs into several millions. As with furniture, there is an ever increasing demand for functionally suitable low-cost door and window frames and shutters. The use of different panel materials in combination with non-utilized species of timbers has to be promoted in the mass production of various low-cost building joinery components to cater to the country's housing needs.

Research and development

At present there is no centre for developing designs, technology, marketing information, quality control schemes, etc., for the furniture and joinery industry in India, except for the initiative taken by the Indian Standards Institution to bring out a few specifications and codes of practice.

Realising the high potential of various wood-based panels for furniture making, the Indian Plywood Industries Research Institute (IPIRI) has recently initiated some work on developing furniture from plywood and other panel materials. Investigations so far carried out at the Institute on plywood as a material for furniture has revealed that it is possible to make strong, rigid and aesthetically sound all-plywood knock-down and unit furniture for everybody beginning from cheap rural types to any degree of sophistication for any situation by using the appropriate grade of plywood. (See page 11).

Commercial grade plywood 15 - 16 mm thick is adequate for most types of furniture if simple slotted construction or self tapping insert and screw joints are adopted. An example of an all-plywood cot based on this principle is shown in the Figure attached. The main advantage of all-plywood furniture is that only one type of raw material, namely, plywood, is required to make any type of furniture starting from simple teapots to wardrobes, cots, dressing units, etc. using simple joints

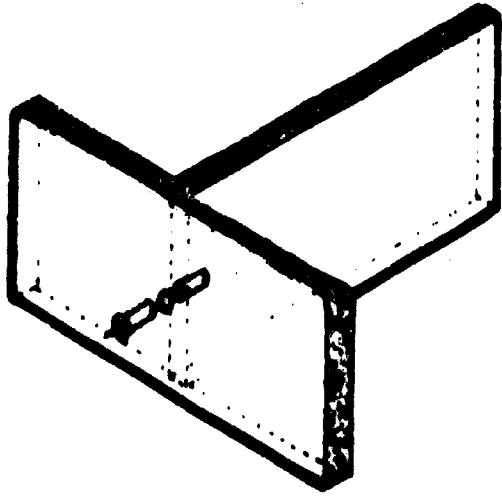
like slotting, screwing, dadoing, rabbeting, etc. involving little or no hardware. These joints can be worked out accurately with simple carpentry tools. Plywood is best suited for mass production of unit and knock-down furniture without much mechanisation. Small scale or cottage industries for manufacturing all-plywood furniture require very small investments. Only the most essential and usual carpentry tools and a few power tools like a circular saw and a small band saw or jig saw are required and they are available indigenously.

There is great scope in India for the use of lesser known species of woods and wood-based panels in making furniture that is acceptable both functionally and aesthetically. There is also scope for setting up of large scale industries for the production of sophisticated furniture particularly in knock-down condition in view of the unlimited demand for export provided an overall technological development is made within the country. Presently most of the machinery and even the technical know-how are to be imported for such industries to be set up in the country.

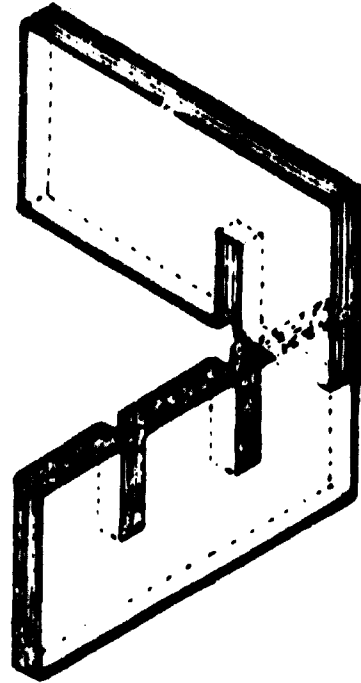
Furthermore development work in the field of furniture design, machinery, processing, testing, standardisation and also for drawing up suitable projects for setting up organised industries suiting the prevalent Indian conditions is imperative to up-grade the industry from the state of craftman's activity to an export oriented mass producing industry.

UNIDO has agreed to provide the services of an expert to this Institute for a period of one month to draw up a project on furniture development, testing, standardisation and quality control and identification of the actual fields in which expertise and assistance are to be provided and draw the specifications for the testing equipment to be provided by UNIDO.

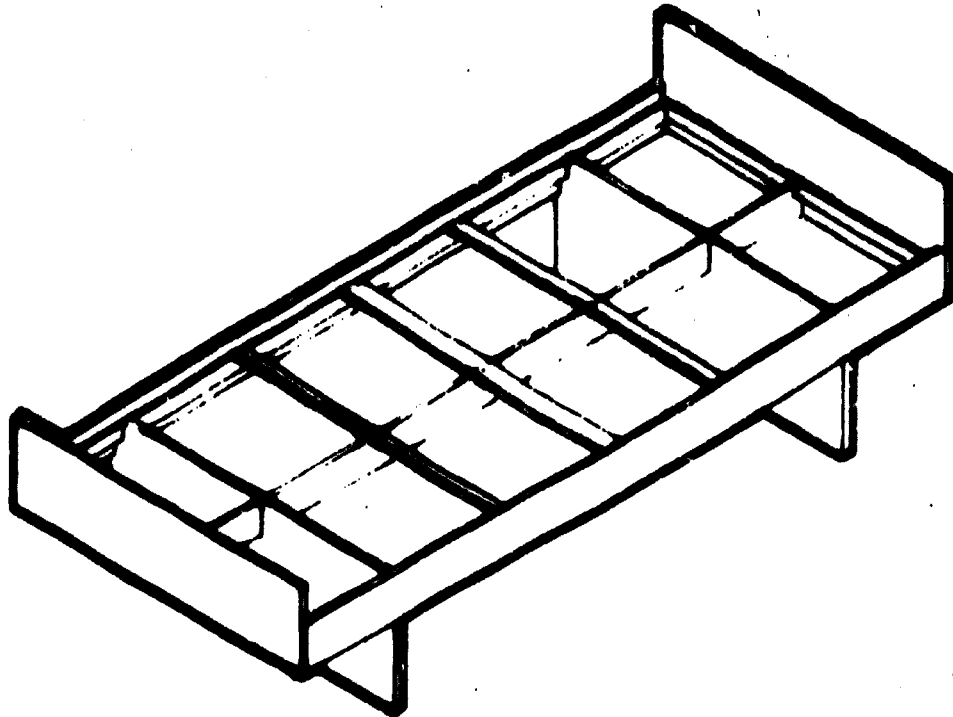
ALL-PLYWOOD KNOCK-DOWN FURNITURE JOINTS



**SELF TAPPING THREADED
INSERT AND SCREW JOINT**



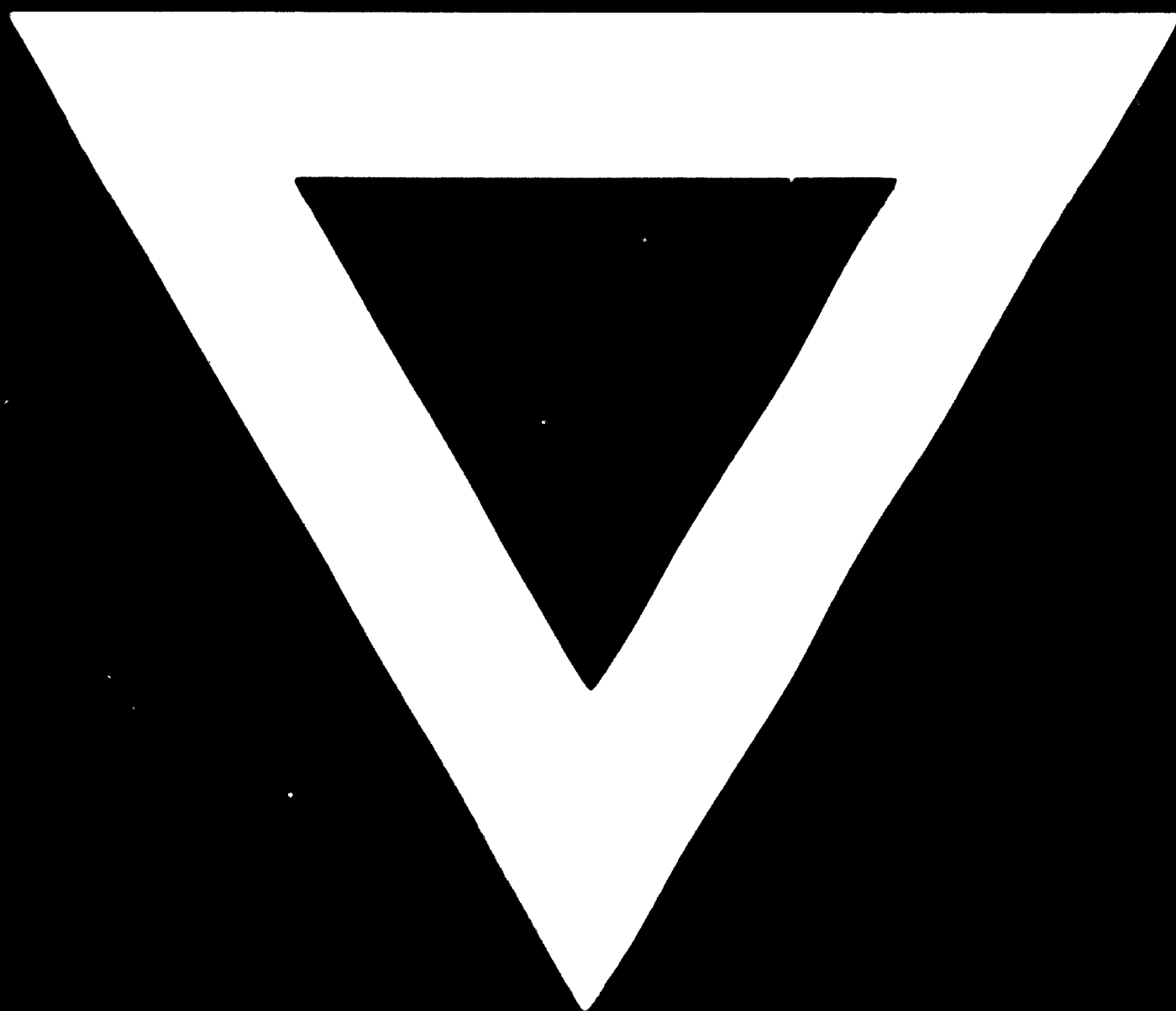
SLOTTED JOINT



ALL-PLYWOOD KNOCK-DOWN COT



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