C.S.I.R.O.

Forest Products Newsletter

1955##202

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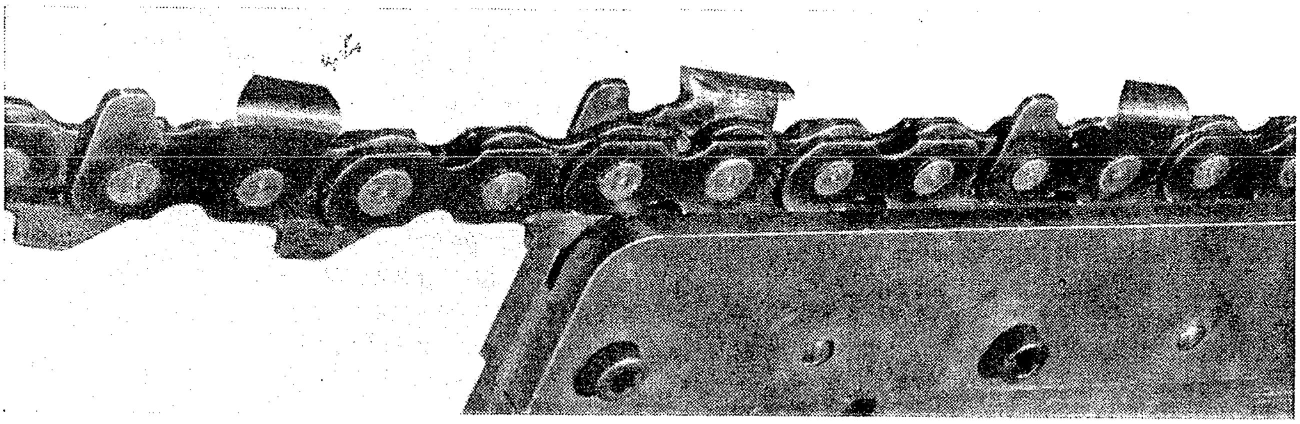
NUMBER 202 MELBOURNE JANUARY 1955

Sharpening Gouge-type Power Saw Chains

By W. M. McKENZIE, Utilization Section

THE gouge type of sawing chain, alternatively called planer, chipper, chisel, etc., is illustrated below. The diagrams overleaf show the various angles of a gouge-type tooth. In the assembled chain there is only one type of tooth, the cutter (left and right), which performs simultaneously the work of cutters and rakers in a scratch-type chain. Hence there are only about a quarter of the number of teeth compared with a scratch chain. Each cutter has a depth gauge in front of it, which prevents it from biting too deeply.

Touching Up.—The main advantage of this gouge type of chain is that it can be sharpened in roughly a quarter of the time usually spent on scratch chains. However, touching up must be more frequent, because while the front edge of a gouge tooth may be still sharp, it quickly develops a shoulder, which tends to prevent the tooth from biting. Thus although one touch-up per day might suffice for a scratch chain, more would be necessary for a gouge chain of the same steel. While manufacturers use better steels in gouge chains, frequent light touching up is still good practice.



The gouge type of sawing chain.

The only other regular, less frequent operation needed to keep a gouge chain cutting smoothly is jointing the depth gauges to make them uniform. Makers supply a gauge for this operation, with instructions.

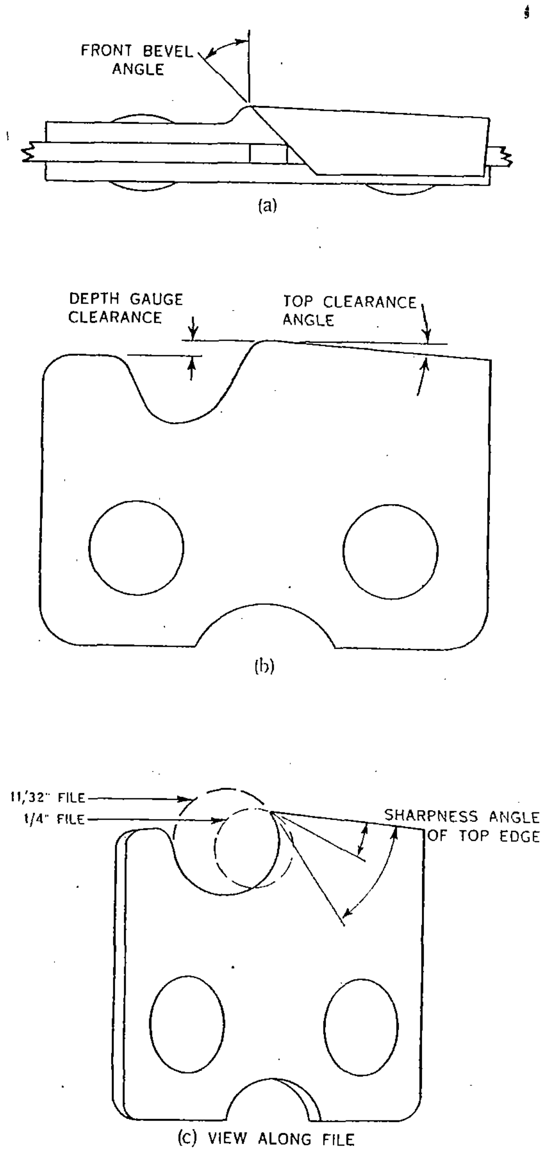
Making a Chain Cut Straight.—If a chain runs off, jumps, or grabs, and the above operations do not cure it, it is necessary to make the cutting teeth uniform in height. This can be done with a double jointing post of the type used for scratch chains, which is used in the same way. (See chart on "Maintenance and Sharpening of Power Saw Chains", published by C.S.I.R.O. Division of Forest Products.)

It may be too drastic to make the heights completely uniform in one operation, but the average heights of the teeth on each side should be similar.

Making a Chain Cut Faster.—If a chain is sharpened, cuts smoothly, but does not load the engine sufficiently unless the cutter bar is pressed heavily, the cutting rate may be increased by increasing the depth gauge clearance. This should be done only when the above conditions apply. It should be done very cautiously, because depth gauge clearance can be reduced only by lowering the cutting teeth and shortening the life of the chain. When supplied by the maker, the depth gauge clearance of a chain should be small, so that it can be adjusted for cutting any particular wood by increasing it 0.005 in. at a time.

Cutting rate may also be increased by reducing the sharpness angle of the top cutting edge (diagram (*c*)). However, this angle should not be reduced so much that the edge becomes too weak, and a reduction is advisable only with soft timbers.

Reducing the Demand on the Engine.—If a chain cuts well but the teeth bite too deeply, tending to stall the motor, its performance can be improved by filing at a greater horizontal angle to the square position. This increases front bevel angle (diagram (*a*)), reduces the power demand of a chain, and allows it to cut more smoothly, though somewhat more slowly. As with depth gauge clearance, this step should be made cautiously by increasing the horizontal angle of the file 5° at a time. In very hard or knotty timber, it may be necessary for smooth cutting to increase the angle until the engine is loaded rather lightly most of the time and the chain cuts slowly. The cutting rate may then be restored by increasing depth gauge clearance, again by cautious steps.



The angles of a gouge-type tooth.

Overcoming Lack of Set.—Lack of set cannot be overcome in gouge chains, as it can in the scratch type, simply by setting the tips of the teeth out with hammer and punch. However, there is one way in which binding due to lack of set can be cured to some extent. This is by increasing the front bevel angle as above. For instance, in a chain that had slightly too little set for sawing radiata pine, so that it jammed repeatedly, increasing the front bevel angle greatly improved performance.

Sawing — In Quest of Efficiency Part VII

By D. S. JONES, Utilization Section

Influence of Tooth Set on Cutting Efficiency — Swage or Spring Set?

Bandsaws, frame saws, and circular ripsaws can be either spring set or swage set and it is often habit or convention which determines the type of set used in any locality or mill. Work has been done in various laboratories to determine if one type of setting has any advantage over the other.

Investigations in Sweden that involved the cutting of 25,600 logs on a 24-in. frame saw revealed that for the same cutting accuracy a thinner swage-set blade could be utilized than if a spring-set blade were used. This resulted in a material saving of about 10 per cent. The power requirements for each type of setting appeared to be the same for the same width and depth of cut. The blade with swage-set teeth lasted longer than a chromium-plated spring-set blade and gave a surface as smooth or smoother. It could be ground three or four times between swagings.

The work of the Swedish Timber Research Institute with swage-set and spring-set frame-saw blades was done on two frame saws in a Swedish sawmill. It was found that there was no difference in power required or in the cutting quality produced by the two types of blade, but the swage-set blade retained its accuracy longer because the teeth had no tendency to spring inwards with use. Equipment was installed to measure the temperature of the blades and it was shown that the temperature increased during a shift more with the spring-set than with the swage-set blades. This indicated that the spring-set teeth did not retain their keenness as long as the swage-set teeth. Temperature measurements also revealed that the swage-set blades were more sensitive to inaccurate setting up than the spring-set blades.

The Norwegian Institute of Timber Technology conducted experiments on spring-set and swage-set circular saws. Blades of four different gauges were used. The average power consumption was found to be slightly higher for swage-set than for spring-set saws, but the difference was of no practical significance. Tests on cutting accuracy showed that the thinner blades cut less accurately than the thicker blades, but the inaccuracy was less with the swage-set than with the spring-set saws. Cutting accuracy was better with small depths of cut than with large depths of cut irrespective of blade type. Both swage-set and spring-set blades cut less accurately with increased feed speed.

The tests made by Russian investigators show that cutting and feeding power were 1.2 to 1.3 times greater with swage-set than with spring-set teeth. Swage setting did not give as good a surface for larger sets because the teeth chipped.

In the next article of this series the discussion on the relative merits of swage and spring setting will be concluded.

VISITORS

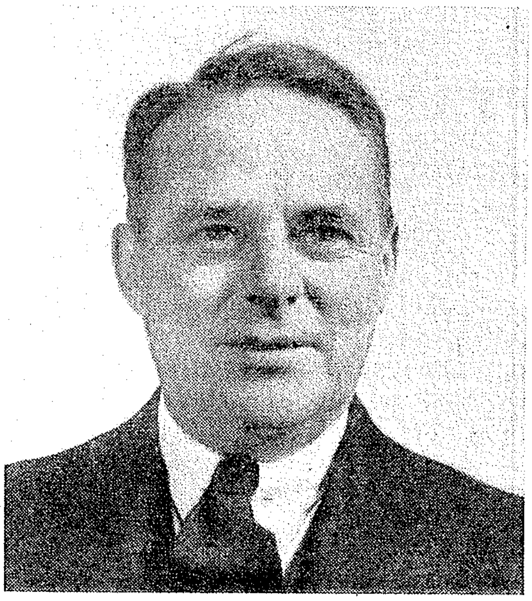
A visitor from New Zealand who left for home in November was Miss Margaret E. Lancaster, M.Sc., of the Forest Research Institute, N.Z. Forest Service, Rotorua. Miss Lancaster, who is a mycologist, has been working for some months at the Division to broaden her experience in timber mycology. In particular, she has been studying fungi causing blue stain in radiata pine and their effect on the strength of the timber.

DONATIONS

Donations to the Division of Forest Products for the month of November included £100 from Miss Julia Hale in appreciation of assistance given by the Division.

Details are as follows:

Rawlings Bros., Bruthen, Vic.	£2	2	0
Riverina Sawmilling Co., Wagga, N.S.W.	£25	0	0
Miss Julia Hale, Vic.	£100	0	0



Dr. H. E. Dadswell, Assistant Chief of Division and Officer-in-Charge of the Wood and Fibre Structure Section of the Division of Forest Products, has accepted an invitation to visit the University of Washington, Seattle, U.S.A., as Walker-Ames Professor in Forestry for the first quarter of 1955. He left for the U.S.A. during December.

This invitation is a recognition of the world-wide reputation which Dr. Dadswell has earned in wood technology, and in addition to being a compliment to him personally it reflects the standing which the Division has attained beyond the boundaries of Australia.

Before returning to Australia in May Dr. Dadswell will pay short official visits to the Forest Products Laboratories, Madison, Wisconsin, and the Institute of Paper Chemistry, Appleton, Wisconsin.

SAWDUST BRIQUETTES

Sawdust may be briquetted for use as fuel by pressure alone, but only if the sawdust is dried uniformly to about 12 per cent. moisture content. Briquetting machines with a daily output of 10 tons and upwards have been developed in the U.S.A. and Switzerland and many of them are operating successfully alongside plants overseas that produce large quantities of dry shavings or dry sawdust.

REVIEW

1954 Forest Seed Directory

Published by Food and Agriculture Organization of the United Nations, Rome, Italy. Obtainable in Australia through Messrs. A. J. Goddard Pty. Ltd., 255 George Street, Sydney, Australian sales agents for F.A.O. publications. Australian price 3*s.* 2*d.* plus local postage, less 10 per cent. to Government Departments.

The directory is clearly presented in three sections, the third and main section being an alphabetical list of species with reference to the countries from which seeds are available. Reference is by numbers, which are given in relation to countries in the first section.

The second section is an alphabetical list of countries included, with the addresses of registered suppliers in each country. Relatively few commercial dealers are listed and their inclusion does not imply any recommendation of individuals or firms or their wares, or a guarantee of their business standing or financial responsibility. Commercial dealers wishing to be included in future editions should submit to their national forest agency their names, together with species of seeds available (botanical names) and a statement of willingness to provide Certificates of Quality and Origin to buyers on request. Copies of these certificates are included at the end of the directory.

TIMBER SEASONING CORRESPONDENCE COURSES

In future a certificate will be issued to all students successfully completing the Kiln Operator's Correspondence Course to an approved standard. Arrangements have been completed to issue the certificate to all past students in this category.

As from January 1, 1955, a fee of one guinea will be charged for the Preliminary Seasoning Course, and four guineas for the more advanced Kiln Operator's Course.

This Newsletter is prepared for general circulation by the Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne, S.C.4, and will be supplied free on request to members of the timber trade and timber users who wish to keep abreast with current developments in the field of forest products.

Printed by C.S.I.R.O., Melbourne

C.S.I.R.O.

Forest Products Newsletter

1955##203

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NUMBER 203 MELBOURNE FEBRUARY 1955

SELECTION OF TIMBER

By R. F. TURNBULL, Utilization Section

A COMMON TENDENCY in ordering timber is to ask for material that cannot be obtained without some unnecessary selection. The timber trade endeavours to limit the number of grades into which production or stock is sorted and finds the special selection expected by some individuals quite impractical. The public generally are likely to obtain better services if they recognize some of the considerations that lie behind timber grading.

During growth, trees are exposed to many hazards which leave their marks in much of the timber logged and milled. When converting logs to sawn timber, the sawmiller endeavours to eliminate as many faults as possible, but finds some timbers, especially pines, characterized by knots which are the sectioned bases of branches in the original tree, and others, particularly hardwoods, characterized by gum or kino which has been laid down in the trees after injury. The grain of sawn products may not be straight because the tree was bent during growth. The above faults, with the addition of blemishes resulting from the activities of forest pests, limit the quantity of faultless timber that can be recovered.

Resources available today do not allow production to be confined to timber free from every real or imaginary blemish. The sawmiller has to ensure the maximum yield of industrially usable timber, sort it with regard to the requirements for different purposes, and offer it for sale in the respective qualities in the proportions in which these can be produced. While customers ask only for faultless timber, irrespective of service requirements, the demand for this sort of timber will quickly overtake supply and the disposal of other sorts will be hindered. It is necessary for the consumer as well as the sawmiller to recognize that certain characteristics in mill run timber are not detrimental in certain uses.

Timber is graded from considerations of either appearance or strength.

The appearance is most important in furniture, fittings, mouldings, floors, doors, windows, and other items which are on display. Even in these uses, however, all timber is not finished with a clear coating. Some furniture, mouldings, doors, etc. are painted. Large areas of floors are covered with linoleum or carpet and in other circumstances other opaque coverings may be applied. It is wasteful to meet the costs of eliminating minor blemishes which may detract from the appearance of timber finished in the clear and then utilize that timber under some screening material. It would be more economical to estimate what pieces or areas are to be finished in the clear and what are to have some covering, and then to order requirements accordingly. If the supplier knows these requirements he can make available for the covered uses material containing imperfections which will not lower the quality of the finished job any more than an imperfection permissible in the highest grade will detrimentally affect the clear finish. A dissection of the order in this way can assist the production of both grades, expedite delivery, and effect economy. For these reasons the sawmilling industry offers dressing quality timber in select grade suitable for clear finishing and standard grade suitable for covering.

When strength is the basis of grading, appearance is of minor importance. A timber component for a structural frame with appearance marred by small defects which do not reduce its strength or the resistance to deflection will be just as suitable for that use as a piece in absolutely unblemished condition. Supply of the latter for framework only reduces the quantities available for the furniture or joinery trade and prevents the scarce material from being used to advantage.

Wood technologists have actually determined the effect that knots, holes, slope of grain, gum pockets, and other defects in various sizes and locations have on the load-bearing capacity of timber sections. From this work it is possible to compute what defects may be permitted without reducing the strength of the timber section below a certain percentage of the strength of clear timber. Such computations have been made in preparing grades for structural timber. A select grade has been described in which defects are limited to the types and sizes that do not reduce the strength of the worst piece in the grade below 75 per cent. of the strength of clear timber. A standard grade of structural timber has also been described in which the permitted defects ensure that the worst piece shall have not less than 60 per cent. of the strength of clear timber. On the basis of these grades and further data on the strength characteristics of the timbers used in Australia for building and construction, a "Handbook of Structural Timber Design" has been completed for the use of those designing structures in timber. By using this handbook, the engineer may select the appropriate cross section for beams spanning from 3 ft to 20 ft and for columns with effective strength from 3 ft to 35 ft for timbers of certain strength ratings in select and standard grades.

From the same basic technical data a pamphlet has been prepared for the use principally of the architect and builder, recommending the sizes and spacings of the various components commonly used in dwellings. This pamphlet, "Building-Frames: Timbers and Sizes" (C.S.I.R.O. Pamphlet No. 112), is recognized in the Victorian Uniform Building Regulations. The pamphlet and the grades on which it is based make allowance for many of the defects which mar the appearance of scantling timber and many of the fears and complaints regarding timber with gum veins, knots, and other imperfections are unjustified. A rational utilization of available supplies has been attempted and if the recommendations were applied more widely, the excellent properties of many of our Australian timbers would be used to greater advantage than in the past.

DONATIONS

The following donations were received by the Division of Forest Products during December 1954:

Saxton Timber and Trading Pty. Ltd., Moe, Vic.	£105 0 0
N.Z. Forest Products Ltd., Auckland, N.Z.	£125 0 0
Furness Ltd., Edwardstown, S.A.	£50 0 0

McCASHNEY INCINERATORS

Excessive smoking from a McCashney incinerator may mean an over-loaded unit. However, it may also be due to a poorly adjusted air supply. Marked flaming accompanying the smoke often means too much air, whereas steady smoking and poor burning usually mean too little air. Failing satisfactory combustion by trial-and-error adjustment of air quantities, a pitot tube can be used to measure air velocity in the air duct.

Sawing — In Quest of Efficiency Part VIII

By D. S. JONES, Utilization Section

In Part VII of this series the work done in Norway, Sweden, and Russia to study the relative merits of swage and spring setting saw teeth was reviewed.

In England, Harris states that for frame saws either spring setting or swage setting is satisfactory, but swage setting is preferable because it permits faster feeds. He warns, however, that care must be exercised when the teeth rub against the wood in both directions of the stroke, because under these circumstances swage teeth "would be likely to press somewhat heavily on the wood". If the teeth are spring set they should be square fronted to prevent any tendency to deflect laterally in the cut. Swage setting is recommended for bandsaws.

It would appear from the data available at the present time that the principal difference between the two types of setting is the better cutting stability of the swage-set saw, which allows thinner blades to be used. As well as effecting a significant material saving, this can have other important consequences. For example, when a swage-set bandsaw is used in a breaking-down rig it becomes practicable, if other conditions allow, to break down the logs to boards of the required sawn thickness.

The evidence indicates that swage-set saws consume more power than spring-set saws, the magnitude of the difference varying according to the conditions of cutting. This power difference might be explained by the following considerations. If a swage-set and a spring-set blade with the same tooth pitch are running under exactly the same conditions, each tooth of the swage-set blade will be removing exactly the same *volume* of material as each tooth of the spring-set blade, but will be removing only half the *depth* of material. This means that as far as tooth bite is concerned, the swage-set blade has effectively twice as many teeth as the spring-set blade. It has been shown in previous articles of this series that decreasing the chip thickness by increasing the number of teeth has an adverse effect on cutting efficiency. Therefore a swage-set blade with the same number of teeth as a spring-set blade would appear to be at a disadvantage, and the efficiency of swage-set saws might be improved by increasing the tooth pitch. It is, in fact, usual to specify a slightly greater pitch for swage-set than for spring-set teeth.

Swage setting is commonly used on wide bandsaws in Australian sawmills, but for other applications the decision between swage setting and spring setting is not, with our present knowledge, a simple one. Much research work needs to be done, especially on circular saws, to determine how the many other factors involved in sawing affect the efficiency of swage-set and spring-set blades. The Division of Forest Products hopes to do this work in the course of its sawing research programme.

The next article of this series will discuss work done overseas to test the influence of saw and feed speeds on cutting efficiency.

REVIEW

Annual Report on Wood Protection, 1951 - 52

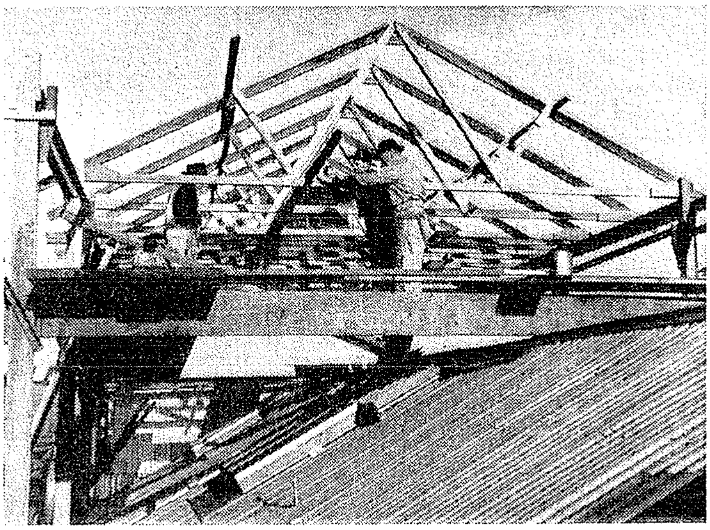
Founded and previously edited by Willy Kinberg, present volume edited by Gunther Becker and Gerda Theden. Published by Springer-Verlag, Berlin W 35, Reichpietschufer 20, Germany. Price not stated.

Printed in both German and English, this handbook is a systematically arranged collection of abstracts of papers on various phases of timber preservation. It is divided into four main sections, namely: Arrangement of Contents and Classification References; Reviews; Bibliography; Index. For workers in the field of timber preservation, the handbook provides a useful reference to papers published in all countries during the period covered.

Light-weight Nailed Roof Trusses

A second-storey addition to the Division's woodworking shop has provided an opportunity to study under service conditions modern developments in structural timber design. The illustration below shows a hanging beam being fixed on to a series of nailed trusses of 20 ft span and 4 ft 6 in. spacing built to a design developed by the Commonwealth Experimental Building Station. Judging by the inquiries made to the Division, this C.E.B.S. truss is becoming increasingly popular with home builders.

Novel types of floor beams for this building have been designed and manufactured in the Division and an article on these will be featured in a forthcoming issue of the Newsletter.



Talks on Timber Seasoning for Adelaide

MEMBERS of the timber industry in South Australia will be interested to know that the Division of Forest Products, at the request of and in cooperation with the Timber Development Association of Australia (S.A. Branch), proposes giving a series of lectures in Adelaide within the next few weeks. The series will consist of talks by Messrs. G. W. Wright and G. S. Campbell of the Division on air seasoning techniques; shrinkage, swelling, and collapse; kiln operation; plant layout and handling for kilns; the design of modern seasoning kilns for sawn timber (particularly radiata pine) and veneers; predriers; miscellaneous drying methods (including furnace kilns and super-heated steam kilns) and kiln installation and drying costs.

Information on the exact dates and venue of the class is available from the Timber Development Association (S.A. Branch) or the Division of Forest Products.

No fee is being charged, and members of the sawmilling, timber seasoning, veneer, and plywood industries or the furniture trades are welcome to the talks.

The course will be given during the daytime and is expected to take about one week.

Advance advice of probable attendance should be sent as early as possible to the Director of Development, Timber Development Association (S.A. Branch) Ltd., 17 Currie Street, Adelaide, S.A.; or to the Chief, Division of Forest Products, C.S.I.R.O., Yarra Bank Road, South Melbourne, Vic.

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Forest Products Newsletter

1955##204

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NUMBER 204 MELBOURNE MARCH 1955

Pattern Making Timbers used in Australia

By M. A. WILLIAMS, Utilization Section

POSSIBLY few people realize the important role played by wooden patterns in the production of metal castings. The pattern maker must interpret drawings of the required casting, and make possible its reproduction as a model through the medium of timber, which has proved itself to be more versatile and easily shaped than any other material. The timber pattern is subsequently used for producing a mould into which metal can be cast. As many as 10,000 castings may be made from a single pattern.

Although machines such as bandsaws and planers may be used to some extent, pattern making is largely a craft involving hand tools. The pattern must be shaped as simply as possible for the convenience of the moulder. When intricate designs are involved the pattern is generally fabricated in a number of pieces which can be separated in order to extract them from the mould. These parts are commonly held in place by dowels or dovetailed connections.

If large patterns are carved from a solid block, trouble is inevitably experienced with warping and distortion caused by shrinkage in the storeroom and swelling in the damp sand of the foundry. For these reasons, a number of components are usually employed even in simple patterns, and on large pieces, a small gap is often left between joints to allow for swelling when left in the sand. This swelling frequently occurs even though patterns are treated with water-resistant coatings.

The main requirements for pattern making timbers are that they should:

(a) be free from defects and without sapwood wherever possible,

(b) be thoroughly seasoned (i.e. to a uniform moisture content of approximately 12 per cent.),

(c) have a low ratio between the shrinkage of backsawn and quartersawn faces,

(d) be capable of being cut cleanly either along or across the grain.

It is the pattern maker's responsibility to ensure that the above points are observed and that the pattern is constructed to ensure minimum shrinkage by a judicious arrangement of pieces. Even though point (c) applies, the shrinkage either across the face or depth of a board is always considerably higher than along the length.

Finally it must be emphasized that patterns should be carefully stored under cover if there is a possibility of their re-use. If sapwood which is moderately or highly susceptible to Lyctus borer (as indicated by the letter S in the accompanying list of hardwoods) is included in a pattern, care should be taken to ensure that the wood is immunized against attack, and painted as soon as possible after cutting and shaping.

Timbers used by Australian pattern makers include the following, which are arranged not in order of preference but alphabetically.

Softwoods

Black pine (Q'ld.)
Brown pine (N.S.W., Q'ld.)
Bunya pine (Q'ld.)
Douglas fir (Oregon) (North America)
Hoop pine (Q'ld.)
Huon pine (Tas.)
Kauri (Q'ld., N.Z., Indonesia, Borneo)
King William pine (Tas.)
Klinki pine (New Guinea)
Parana pine (South America)
Port Orford cedar (North America)
Redwood (California)
Sugar pine (North America)
Spruce (North America)
Western red cedar (North America)
Yellow pine (North America)

Hardwoods

Bollywood (N.S.W., Q'ld.) (S)
Brush mahogany (N.S.W., Q'ld.) (S)
Candlenut (Q'ld.) (S)
Coachwood (N.S.W.)
Katsura (Japan)*
Mahogany (Central America)*
Milky pine (Q'ld.) (S)
Myrtle beech (Tas., Vic.)
Negrohead beech (N.S.W., Q'ld.)
Pacific maple (Pacific Islands)
Queensland maple (Q'ld.)
Red cedar (N.S.W., Qld.)
Silver silkwood (N.S.W., Q'ld.) (S)
White beech (N.S.W., Q'ld.)

* *Sapwood susceptibility not known.*

Library of the Division of Forest Products

By M. I. HULME, Librarian

IT MAY NOT generally be known that the Division's library, besides being the centre of research for officers of the Division, is open to all those who deal with timber or forestry and to students, for purposes of reading, and on a restricted basis, of borrowing. (In the matter of loans preference is always given to institutions which have a qualified librarian.)

The library consists of some 6,000 volumes and 30,000 pamphlets covering the field of research on timber and other forest products and the basic sciences relating thereto; and by purchase, exchange, or loan some 500 periodicals are received currently.

So that the greatest use may be made of all this literature, extensive author and subject indexes comprising some 140,000 cards have been drawn up, and from these and the standard reference works held in the library, information can be supplied in answer to almost any inquiry. Some 75 fairly comprehensive bibliographies on a wide range of subjects have been drawn up over the years, the original inquiries for these having come from countries as far afield as Brazil and Ethiopia. These lists of references can readily be brought up to date.

There is attached to the Division a photocopying service whereby articles which are not readily available to inquirers can be copied. The library itself holds many hundreds of microfilms of articles, the originals of which are not otherwise obtainable in Australia.

A translation exchange, initiated at the last British Commonwealth Forestry Conference, between the various forest products research laboratories within the British Commonwealth and the U.S. Forest Products Laboratory at Madison, Wisconsin, has resulted in a great number of translations, mostly of articles of current interest, being received in our library. We, in our turn, have drawn up a list of the translated articles held in the Division's library, and have distributed a great number of copies to the cooperating bodies. One recent request for copies of 96 translations included in our list was fulfilled within three months.

The library of this Division is one unit in the widely-spread chain of C.S.I.R.O. libraries, and by means of the central union catalogue for all C.S.I.R.O., held in our Head Office at East Melbourne, books and other publications can be located and borrowed from any other branch of the Organization. This, of course, gives the Divisional officers access to a very wide range of scientific literature.

Timber Mechanics Work in Western Australia

Amongst the visitors to the Division during January was Professor K. L. Cooper of the University of Western Australia. Professor Cooper, a former officer of the Division, spent several weeks in Melbourne discussing aspects of C.S.I.R.O. research in timber mechanics at the University Engineering School.

The Division has transferred some of its staff to Western Australia and has commenced work on a project to investigate the influence of various defects on the strength of scantling timber. To date testing has been confined to one size of jarrah, but it is proposed to extend this work to other sizes and to karri.

The selection of the timber from sawn timber stocks so that different types of defects are properly represented is no small problem in the investigation. However, the Timber Merchants and Sawmillers Association of W.A. is coöperating with the work and is supplying all the test timber necessary.

Because of the general shortage of research workers in Australia, the staffing of the project in W.A. has been particularly difficult, and possible means of overcoming this was one of the matters discussed with Professor Cooper. The Division is interested in developing research in timber in the Australian universities, so that engineering students may become familiar with timber as a structural material and realize the important applications it has in engineering construction. For this reason particularly, the cooperation of the Western Australian University is welcome.

Introducing Professor Know-wood

Meet Professor Know-wood, an authority on all aspects of forest products. The Professor has already appeared in Trade Circular No. 48, and now in the Newsletter he will draw your attention from time to time to small points which are easily overlooked but are nevertheless very important.

Kiln Wet-Bulb Thermometers

In many kiln installations it is not uncommon to find the wet-bulb thermometer missing or useless. Good drying technique demands proper wet-bulb control, and this is possible only if the wet-bulb thermometer is reading correctly. Apart from instrument defects, frequent sources of wrong wet-bulb readings are dirty wicks, loose-fitting wicks, no water supply or water dripping directly on to the bulb, large metal fittings or brackets near the wet bulb, and insufficient air flow over the bulb.

Kiln Steam Coil Condensate

Where practicable, and especially if boiler fuel cost is high, it pays handsomely to return kiln condensate as hot as possible to the boiler. This can be done by draining it to a hot well and pumping back to the boiler, or by fitting a special trap in the return system. In the latter case loss from "flash" steam is prevented. At a steam pressure of 20 lb per sq. in. this amounts to about 5 per cent. of the heat in the condensate, and at 60 lb per sq. in. it amounts to about 10 per cent.

DONATIONS

The following donations were received by the Division during January:

Miss B. Manning, Oatley, N.S.W. (Donation for December)	£2 0 0
Wallis Bros. Pty. Ltd., Annandale, N.S.W.	£10 0 0
Miss B. Manning, Oatley, N.S.W. (Donation for January)	£2 0 0

Sawing — In Quest of Efficiency Part IX

By D. S. JONES, Utilization Section

Effect of Saw Speed on Cutting Efficiency

THE EFFECT of saw speed on cutting efficiency has been well established in overseas laboratories. The facts gleaned from this work will interest the Australian sawmiller particularly as he frequently meets problems associated with the speed of his saws.

Throughout this discussion the term *cutting* horsepower will be used to denote the power required to saw the timber only, while the term *total* horsepower will be used to denote the sum of the powers required to saw the timber and to overcome friction.

C. J. Telford of the U.S. Forest Products Laboratory found that *for the same feed speed* cutting horsepower decreased when saw speed increased. However, the idling power was so much greater at the higher saw speed that when this was added to the cutting power the total power increased with increasing saw speed. It is this total power that the sawmiller pays for in fuel costs or electricity bills, and Telford states that "the more efficient use of horsepower results from lower as contrasted with higher saw speeds".

TABLE 1

Carriage Speed (ft/min)	Saw Speed (r.p.m.)	Tooth Bite (in.)	Cutting H.P.	Total H.P.
60	600	0.03	1.9	10.75
60	300	0.06	3.1	7.53
80	600	0.04	3.0	11.85
80	300	0.08	4.1	8.53
120	600	0.06	5.4	14.25
120	300	0.12	6.1	10.53

The trend of Telford's results can be seen in Table 1. He used a 48 in. diameter inserted tooth saw with a kerf width of 9/32 in.

The reduction in horsepower with increased saw speed is probably due to the smaller tooth bite at the higher saw speed.

Telford also found that if the tooth bite was kept constant while the saw speed was increased, that is if the feed speed was increased proportionally with the saw speed, both the cutting and the total horsepower increased with saw speed. Table 2 shows these findings.

TABLE 2

Tooth Bite (in.)	Saw Speed (r.p.m.)	Feed Speed (ft/min)	Cutting H.P.	Total H.P.
0.08	300	80	4.1	8.53
0.08	450	120	5.8	12.44
0.08	600	160	7.1	15.95

These results would be expected because if all other conditions, including tooth bite, remain the same, the horsepower would increase proportionally with saw speed.

The Russian investigators Kayukhova and Konyukhov used 600 mm (26 in.) diameter saws with both swage-set and spring-set teeth. They reached similar conclusions to those obtained by Telford for both tooth types. They make the additional observation, however, that with an increased tooth bite the cutting quality decreased.

This discussion on the effect of saw speed on cutting efficiency will be continued in the next article of this series.

This Newsletter is prepared for general circulation by the Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne, S.C.4, and will be supplied free on request to members of the timber trade and timber users who wish to keep abreast with current developments in the field of forest products.

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Forest Products Newsletter

1955##205

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NUMBER 205 MELBOURNE APRIL 1955

Sawing – In Quest of Efficiency Part X

By D. S. JONES, Utilization Section

RATHER SPECTACULAR tests have been reported by A. L. Bershadskii in the Russian magazine "Timber Industry". He claims that vast improvements can be obtained with circular saws run at a rim speed of 20,000 ft/min, that is twice as fast as the conventional speed. The feed speed is increased about 30 per cent. to give an increased output and the power consumption is thereby doubled. It is claimed that the increased power consumption "is justified by the great advantages of high speed sawing, such as increased output and improved quality of sawing".

It is shown further, that if the number of teeth on the saw is reduced below the conventional number the increase in power consumption can be reduced. Bershadskii reports that "by spacing the teeth more widely and doubling the number of revolutions it is possible to raise the output by approximately 25 per cent. without increasing the power consumption". The effort required to feed the timber into the saw is also reduced.

There may be severe limitations to the adoption of such a marked departure from the conventional. Increased shaft speeds require correspondingly improved bearing design and alignment. However, the idea is probably theoretically sound and it is possible that when more pressing investigations have been completed the Division of Forest Products will be able to study the effects of high speed sawing on cutting efficiency.

Harris in his "Handbook of Woodcutting" recommends certain saw speeds. He says that for circular plate ripsaws 10,000 ft/min rim speed is suitable for general conversion. For resawing softwoods he recommends a rim speed of 11,000 ft/min. Speeds between 7,000 and 9,000 ft/min are recommended for the tooth speed of wide bandsaws.

These speeds are frequently claimed to be too fast for the conditions met in Australian sawmills. Circular saws are often found to "stand up" better when run slower and rim speeds of the order of 7,000 to 8,000 ft/min are quite common. The tooth speed of wide bandsaws cutting Australian hardwoods can be as low as 5,000 to 6,000 ft/min. However, no definite recommendation can be given at this stage. A great deal of laboratory and mill study work needs to be done before the position is clarified, and the Division of Forest Products hopes to do this work in the course of its research programme.

In Part XI of this series the influence of feed speed on sawing efficiency will be discussed.

Effects of High Pressure Impregnation on Softwoods

By E. L. ELLWOOD, Timber Preservation Section

THE HIGH pressure impregnation of wood with preservatives at pressures of approx. 1000 lb/sq. in. was developed in this Division primarily for the preservative treatment of refractory eucalypt heartwood.

Satisfactory preservative penetration and retention in such timbers could not be obtained by standard overseas treating methods where pressures up to 250 lb/sq. in. are generally considered a maximum because of the danger of collapsing the wood when hot preservatives are used.

High pressure treatment of eucalypt heartwood has proved most successful and some 3,500 sleepers, mainly of lower density eucalypts, have been treated for service trials.

Although it has never been claimed that high pressure treatment may be suitable for the comparatively lower density softwoods, enquiries have been received from overseas on the applicability of the process to refractory softwoods. Very limited work has yet been carried out on this aspect but investigations have been planned to study the fundamentals of pressure impregnation and the distribution of pressure within the wood under treatment, which should clarify the versatility of the process.

In scout tests of the effect of high pressure treatment on some 31 different eucalypts and 16 non-eucalypts, collapse was observed only on low density softwood timbers such as spruce and King William pine. In these tests the treatment temperature was 150° F.

In a subsequent investigation on the treatability of small round poles of Swedish spruce, it was found that the maximum pressure which could be recommended for best treatment and lack of crushing was 400 lb/sq.in. for 2½ hr with a treating temperature of 150° F.

More recently, in answer to a specific enquiry, limited tests were carried out on the high pressure treatment of Douglas fir, which can be a difficult timber to impregnate.

In these tests matched samples of Douglas fir were subjected to a range of treating pressures, and compared with a treatment carried out at a normal schedule for this timber, viz. 150 lb/sq.in. for 5 hr. Samples of radiata pine were also included in the 1000 lb/sq.in. treatment for comparison, although this species can be readily treated at standard treating pressure (150 lb/sq.in.).

Figure 1 shows the severe collapse and distortion occurring in the Douglas fir sample subjected to 1000 lb pressure for 1 hr with a creosote temperature of 138° F. Penetration was poor, and creosote retention was only 5.5 lb/cu.ft.

The radiata pine sample shown in Figure 2 was completely penetrated with creosote, and grossly overtreated with a creosote retention of 43 lb/cu.ft. No collapse was apparent.

The matched samples of Douglas fir showed that collapse began to occur at 400 lb/sq.in. pressure and a temperature of 130° F after 1 hr. The best penetration and retention (11.9 lb/cu.ft.) commensurate with the highest treating pressure and shortest schedule without inducement of collapse was obtained with a treating pressure of 300 lb/sq.in. for 2 hr at a creosote temperature of 130° F. The retention obtained in the sample treated at 150 lb/sq.in. for 5 hr with a creosote temperature of 190° F was 14.3 lb/cu.ft., but some collapse occurred with this treatment.

It is suggested that resistance to crushing under treating pressure is dependent not only on the strength of the wood in compression, but also on its relative permeability. Lack of collapse in radiata pine can be explained by rapid penetration through the wood of the preservative, which then acts as a relatively incompressible bulk by filling the cells of the wood. The Douglas fir treated at 1000 lb/sq.in. collapsed at an early stage, so retarding the penetration of the preservative.

In the case of the lower density eucalypts it is thought that the vessels may allow transmission of at least a proportion of the applied treating pressure to the interior zones of the wood thus reducing the tendency to collapse.

Although much work remains to be done, it is possible that with suitable technique the relatively impermeable softwoods such as Douglas fir may yet be treated satisfactorily with higher pressures, and consequent shorter treating times, than used at present.

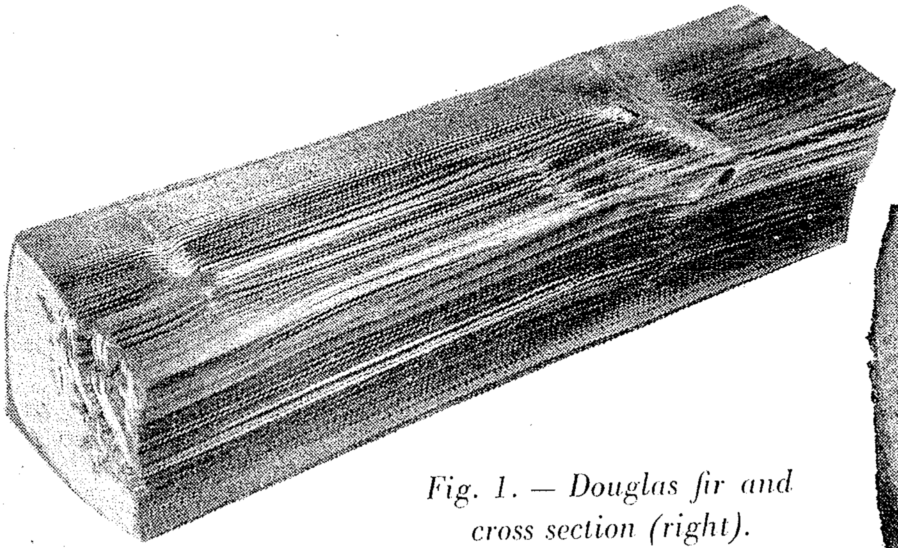
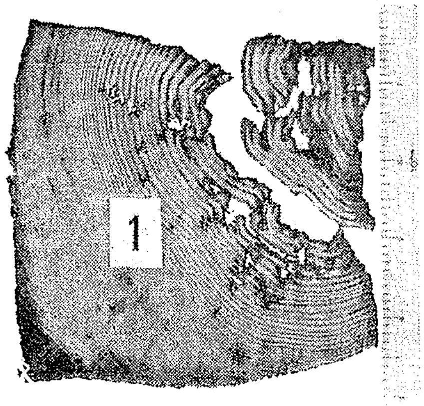


Fig. 1. — Douglas fir and cross section (right).



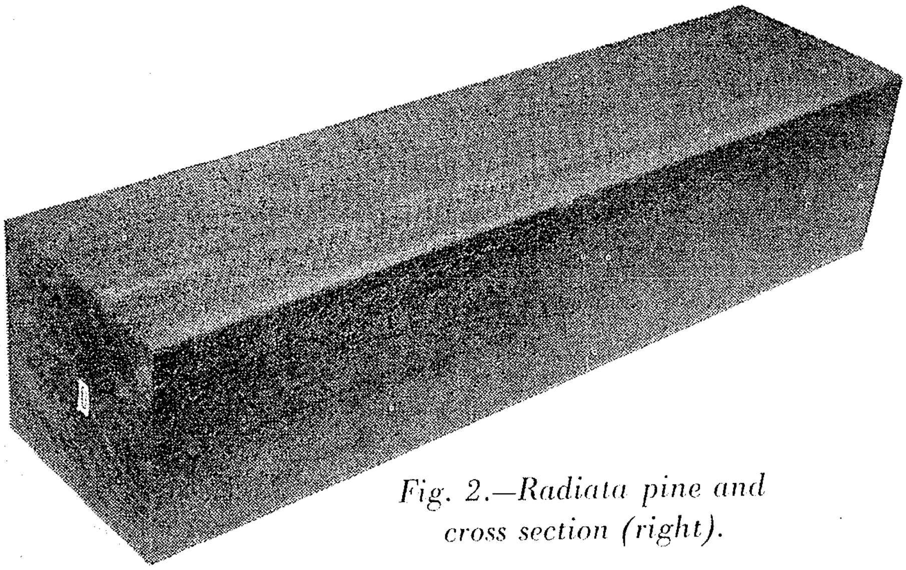
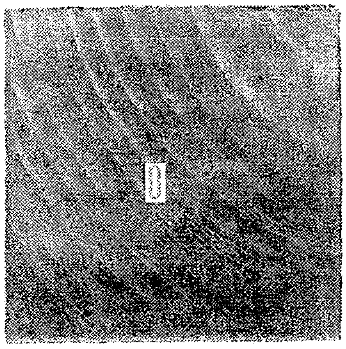


Fig. 2.—Radiata pine and cross section (right).



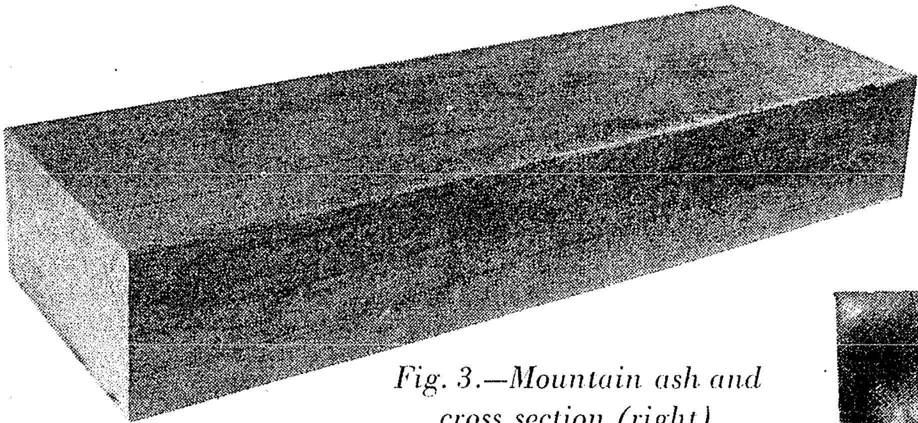


Fig. 3.—Mountain ash and cross section (right).

Appearance and extent of preservative penetration in timber samples treated at 1000 lb/sq. in. for 1 hr. with a creosote temperature of 138° F. Fig. 1.—Douglas fir. Fig. 2.—Radiata pine. Fig. 3.—Mountain ash. (The slight distortion in this sample resulted from shrinkage during drying before treatment.)

Overseas Visitors to Division of Forest Products

The Division has played a steadily increasing part in providing experience in forest products work for visitors from overseas, and in return has gained considerably from the contact established between its officers and forest products workers from other countries. Two such visitors who had spent six months or longer with the Division left to return to their home countries towards the end of March, and a third will be leaving shortly.

Mr. D. R. Bayly of the Forest Department, Sarawak, arrived in Australia early in 1954, under a Colombo Plan Fellowship. Mr. Bayly holds the Bachelor of Arts degree of the University of Rangoon, and was in the Burmese Government service. After spending about five months at the Australian Forestry School, Canberra, he has spent the remainder of his time either working at the Division's laboratories or on field trips arranged in conjunction with State Forest Services and private enterprise.

Mr. J. F. Behrens, a final year forestry student of the University of Washington, Seattle, U.S.A., arrived at the Division in July 1954, and having spent seven months as a temporary officer of the Veneer and Gluing Section, has gained experience required in connection with his studies. Mr. Behrens is majoring in forest products, and is the first student from the U.S.A. to have visited the Division for working experience.

Dr. G. Nicholls arrived at the Division in September 1954, and will shortly be returning to New Zealand to his position on the staff of New Zealand Forest Products Limited.

Dr. Nicholls obtained his Ph.D. in Chemistry at Auckland University College, New Zealand, and subsequently spent two years in post-doctorate research in the U.S.A. and two years in England, concentrating on Organic Chemistry. He joined the staff of New Zealand Forest Products in March 1954, and six months later began his visit to the Division of Forest Products to widen his experience in wood chemistry, and forest products research in general.

THE PROFESSOR SAYS . . .

Species Corrections are Important

People using electrical resistance type moisture meters should never lose sight of the necessity for correcting the readings obtained for the species of timber tested, except in the obvious case where the timber tested is the particular species for which the meter is calibrated. Meters manufactured in Australia or the United States of America are generally calibrated for Douglas fir, whereas English and European makes may be calibrated for European beech or some other common European species.

Trade Circular No. 50, "Testing Timber for Moisture Content", available on application from this Division, supplies corrected moisture content data for nearly 200 species of timber grown in or imported into this country. These data are applicable only to meters calibrated for Douglas fir.

Donations to the Division

Since this News Letter returned to a monthly basis of publication, we have been including in it a list of donations received for the month previous to its going to press. It will be of interest to contributors to know what happens to this money. Although charges for services such as standard fees for commercial tests are paid into Consolidated Revenue, donations are credited to a trust fund. This fund is used for special pieces of equipment and for other expenditure needed to increase the efficiency of the Division and the service which it can give to the industry and the public.

The following donation was received by the Division during February:

Delatite Sawmills Pty. Ltd., Seymour, Vic.	£50 0 0

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Forest Products Newsletter

1955##206

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NUMBER 206 MELBOURNE MAY 1955

Laminated Timber Construction in Australia

By J. D. BOYD, Timber Mechanics Section

PERHAPS for too long, steel has been regarded as more suitable than timber for large structures. One reason for this preference is the greater *apparent* strength of steel, but this is a misconception. Actually, weight for weight, correctly designed timber structural members are stronger than steel.

When the technique of welding was first developed, the increased efficiency of joints gave steel construction an advantage. However, timber designers have met the challenge by using ring connectors to increase joint efficiency, and by the development of glued laminated construction.

Timber structures can now be efficiently and economically fabricated for large spans and for all exposure conditions. Overseas this has been widely recognized for a long time, and many large nailed, timber-connectored, and glued laminated structures have been built. In America alone, despite extensive mechanization, approximately 4000 men are employed directly in the steadily developing production in large factories of laminated timber structures. In Australia various glued laminated structures of large span have been built, but generally the adoption of this method of construction has been slower than it deserves. This statement is supported by the fact that in cases where tenders have been called for competitive designs in different materials, glued laminated timber has been much cheaper than steel or concrete in spans ranging between 60 and 120 ft. The accompanying photograph illustrates that in addition to utility, these structures can have an appealing appearance and allow a flexibility of design which is quite outstanding in large buildings.

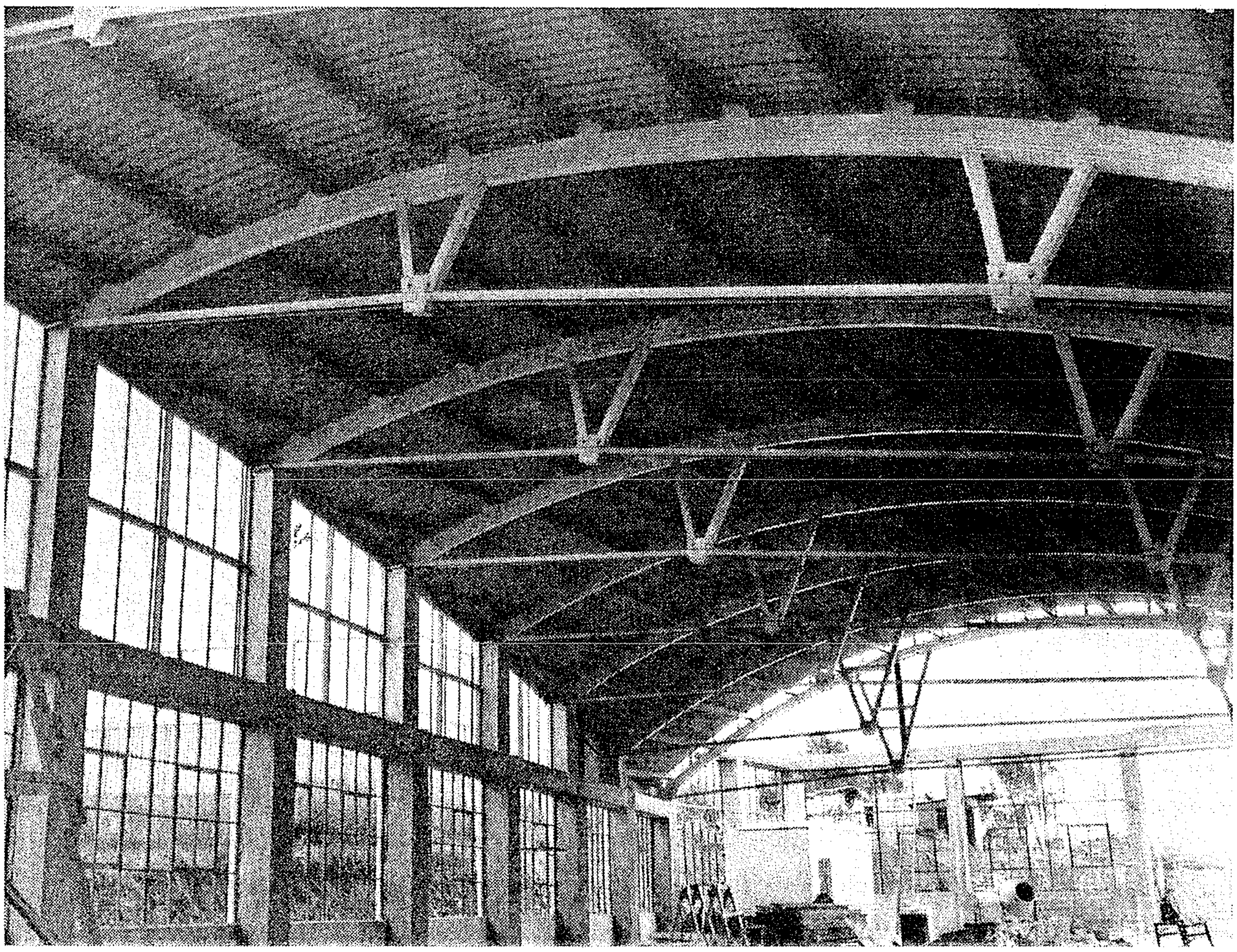
Apart from these advantages of timber, it can have an aesthetic appeal unrivalled by other materials. In halls, and particularly in churches, where usually the main framing members are left exposed to view, glued laminated timber construction allows wide freedom of architectural expression. Consequently, it has been extensively used overseas for arches and other impressive forms of construction. Surely designing in this medium is a challenge to Australian engineers and architects.

Laminated members can be manufactured with considerably larger cross-section and length than solid timber normally available. In addition they are fabricated from relatively thin seasoned boards, so that defects associated with drying become unimportant, shrinkage problems are minimized, and stability of section is assured. At the same time, by the process of laminating, timber not normally classified in the best structural grades can be used to form a member which is stronger than the best grade of solid structural timber. This is because random selection of boards ensures that blemishes are unlikely to be continuous throughout the member.

It has been stated that lack of fire resistance is a reason for avoiding the use of timber in large structures, but this too is a misconception. When wood is in the form of large cross-section members such as are formed by laminating, its fire resistance is superior to steel. In a fire a steel member loses strength rapidly with increasing temperature, and collapses after exposure to intense fires of short duration; whereas timber members lose strength only as they lose dimension, and a large member chars slowly even in an intense fire.

Clearly then, glued laminated timber has many advantages for construction purposes. Perhaps the reason most responsible for its limited use in Australia has been lack of knowledge of its valuable properties, and of the methods which should be adopted in designing such structures. To help engineers and architects in this matter, "Notes on Design Stresses and Procedures for Glued Laminated Timber" have been prepared. These will be made available on application to the Chief, Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne, S.C.4.

Laminated timber arches used in a factory building in Sydney. Note the large clear floor space and good appearance.



Sawing – In Quest of Efficiency Part XI

By D. S. JONES, Utilization Section

Effect of Feed Speed on Cutting Efficiency

WORK DONE in overseas laboratories has shown that the power consumption of saws increases as feed speed is increased. The rate of increase in power is affected by the species being cut and the type of saw used. However, although more power is required at the high feed speeds it is more economical to feed fast because the energy consumed for every square foot of sawn surface decreases. The Princes Risborough Laboratory reports that "power demand increased with feed speed, but in a relation which involved a saving of energy (kilowatt hours per 100 square feet of sawn surface) as the speed was raised". This means that the faster the sawyer feeds the piece he is handling, the less the sawmiller has to pay for fuel or power for a given sawn output.

Of course there is a limit to the feed speed that can be maintained on any bench. The limit is usually specified either by the power of the saw motor or by the behaviour of the saw. The sawyer cannot feed beyond the capacity of the saw motor, nor can he feed so fast that the saw behaves unsatisfactorily.

It was mentioned in a previous article of this series that saw teeth blunt prematurely if subjected to a scraping action rather than a cutting action. Faster feeds can often produce a positive cutting action and when they do an improvement in the life of the saw between sharpenings is noticed. This effect has been reported occasionally by Australian sawmillers. Faster feed speeds, within the limits of saw and motor capacity, can therefore have the twofold advantage of reducing energy costs and increasing saw life.

This brings to a close this series of articles reviewing the results of overseas sawing research. It is hoped that sawmillers have found the matter presented in this series both interesting and instructive. Laboratory research coupled with sawmill studies can play an important part in improving the efficiency of Australia's sawmills. The Division of Forest Products is aware of the necessity for sawing and sawmilling research applied to the special conditions existing in the Australian industry, and intends to commence an extensive programme of work in an effort to solve some of the problems which constantly arise.

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(*Concluded*)

Timber Seasoning Talks in Adelaide

AN INTENSIVE five-day course in timber seasoning, conducted as a joint project by the Timber Development Association (South Australian Branch) and the Division of Forest Products, C.S.I.R.O., was successfully completed in Adelaide on Friday, March 25. The attendance at this course was a record for South Australia and reflected an awareness of the need for keeping abreast with modern technological developments. The course was attended by some 25 representatives of the timber and allied industries in South Australia and New South Wales (two of whom visited Adelaide especially for the course), an officer of the Sarawak Forests Service (Mr. D. Bayly), and several officers of the South Australian Education Department, the South Australian Housing Trust, and the Electricity Trust of South Australia.

Well-known members of the South Australian timber industry at the opening session included Mr. A. K. Jeanes (President, S.A. Timber Development Association); Messrs. A. V. Morris and J. F. Gorman (Vice-Presidents); Mr. C. R. Lloyd (President, S.A. Timber Merchants' Association), and Mr. R. F. Spencer (Director of Development, T.D.A.). The S.A. Woods and Forests Department was represented by Mr. R. E. Brown, and the Education Department by Mr. J. S. Walker (Superintendent, Technical Schools), Mr. H. Macklin-Shaw (Inspector of Manual Training), and Mr. J. E. Eddy (Headmaster, Building and Furniture Trade School).

The course comprised a series of 15 talks, appropriate practical work, and plant visits. Subjects covered included air seasoning, shrinkage and collapse, stacking and handling, plant layout, the design and performance of modern timber seasoning kilns (including superheated steam kilns), predriers, the prevention of degrade, the use of moisture meters, the sizing of boilers and the estimation of fuel requirements, kiln control and operation, kiln installation and drying costs, veneer drying and redrying, and miscellaneous methods of kiln heating. Plant visits were made to Messrs. Lloyd's Timber Mills Ltd., Wadlow Ltd., and Walter and Morris Ltd.

Organizers for the course were Mr. R. F. Spencer (T.D.A.) and Mr. A. P. Wymond (Division of Forest Products). Lecturers were Messrs. G. W. Wright and G. S. Campbell of the Division.

PROFESSOR KNOW-WOOD SAYS . . . .

Limitations of the Electrical Moisture Meter

ONE of the most important factors limiting the application of an electrical moisture meter is the presence of any preservative in the wood to be tested. The presence of soluble salts, such as borax or traces of salt left from contact with sea-water, seriously affects the indications of the electrical resistance moisture meter. Since there is such a diversity of preservatives used at varying concentrations, the task of preparing a correction table to cover even the more common ones becomes impracticable. Work is, however, being carried out to try and develop a moisture meter which will not suffer from the above limitations.

DONATIONS

The following donations were received by the Division during March:

Victorian Hardwood Co. Pty. Ltd., Melbourne	£100	0	0
North Queensland Saw-millers' Association, Cairns	£100	0	0

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Forest Products Newsletter

1955##207

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Notched Beams

By N. H. KLOOT, Timber Mechanics Section

IT IS SOMETIMES necessary in timber construction to notch a timber beam. The ends may be notched to maintain a certain level (Fig. 1), or the beam may be notched anywhere along its length to house a strut or to pass over a crossing member (Fig. 2). The influence of these notches on the strength of the beam is seldom appreciated by builders, particularly the amateur home-builder. A simple example will serve to show how seriously notches of the type illustrated affect the strength of the beams. Take, for instance, a 4 by 3 in. member notched at the ends as in Figure 1. The following table shows how the strength of the full depth member is reduced according to the depth of the notch.

Depth of notch in 4-in. side	0	½ in.	1 in.	2 in.	3 in.
Loss of strength	0	1/4	1/2	3/4	19/20

As can be seen, even quite a small notch of ½ in. depth in a 4 in. section reduces the strength by as much as a quarter.

This serious weakening effect can, however, be reduced and perhaps eliminated. If the notch is cut away as in Figure 3 at a slope of about 1 in 3, the strength of the beam is not nearly so seriously affected as by the square-edged notch.

Taking again the example of the 4 by 3 in. member notched up to 1 in. deep, cutting back the notch as in Figure 3 will restore its strength to that of the unnotched beam. For notches deeper than 1 in. the beam strength is double that of the same beam with a square notch of the same depth.

It may seem strange that by cutting away more wood, the strength of the beam is improved. The explanation lies in the fact that a square notch, such as shown in Figure 1, leads to a very high concentration of stress at the corner of the notch but the tapering back reduces or removes this stress concentration. The same principle is applied in many other fields of design.

In beams notched at or near the centre, as in Figure 2, the strength is reduced to that of a beam of the net depth, i.e. if a 1 in. notch is cut in a 4 in. deep member, the strength is only that of a 3 in. deep beam. This means that the load-carrying capacity of the original 4 by 3 in. is reduced by 7/16—nearly half. If the saw-cut goes beyond the bottom of the notch, a stress concentration makes conditions considerably worse.

From what has been said, the home-builder may feel somewhat concerned about the strength of various parts of the house structure where, for some reason or other, he has been forced to cut notches. Fortunately the picture is not always as serious as it might first appear. The critical consideration for most timber members in house-frames and other buildings is stiffness rather than strength. Because it is undesirable that a floor joist or bearer, to quote two examples, should deflect noticeably when one walks over a floor, the sizes of these members are frequently larger than would be required to be just safe to take the load that comes on them. Notches, if they are not too long or too deep, do not seriously affect a beam's stiffness, i.e. it acts as though it were un-notched. This means that shallow notches cut in floor or ceiling joists to maintain a level for the floor or ceiling do not make these beams appreciably more flexible and, because usually joists are over-size as far as strength is concerned, the shallow notch does not reduce the load-bearing capacity sufficiently to make them unsafe.

There are, however, many instances in which the design of a timber member is based on strength requirements. Also, it may happen that a beam, such as a joist or bearer, originally designed for stiffness is severely notched, perhaps even to half or more of its depth. In such cases it is well to appreciate the seriousness of the effect of notches and to understand the way in which such effects may sometimes be reduced or even eliminated.

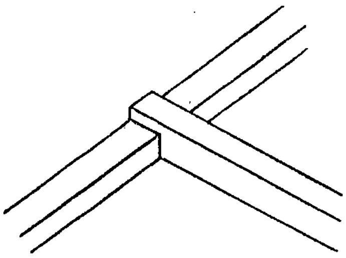


Fig. 1

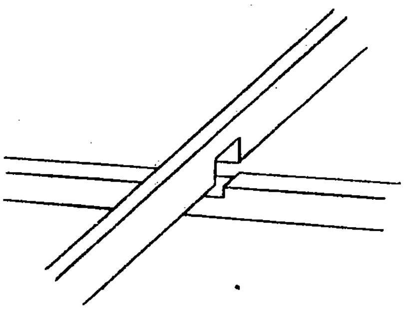


Fig. 2

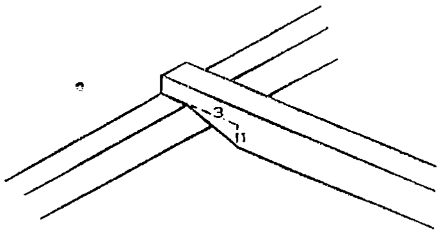


Fig. 3

Preventing Decay in Flooring

By E. W. B. Da COSTA, Preservation Section

DECAY OR "dry rot" in flooring and sub-floor timbers, with its consequent difficult, inconvenient, and expensive repair jobs, is not uncommon in Australian houses, factories, and office buildings, yet almost all decay in flooring can easily be prevented by correct construction.

The wood-destroying fungi which cause decay can attack only moist wood, and decay can be prevented if the wood is kept dry. Although flooring is occasionally moistened through inadequate damp-courses or plumbing leakages, the commonest cause is condensation. Water evaporates from the warm moist soil (moist in its lower layers even if apparently dry on top) below the building and condenses on the relatively cold flooring, especially in early winter, when air temperatures are often well below ground temperatures. Where sub-floor ventilation is adequate, the water vapour from the soil will escape to the outside air rather than condense on the flooring and any which may condense there during short periods of cold wet weather will be able to evaporate quickly before any damage is caused.

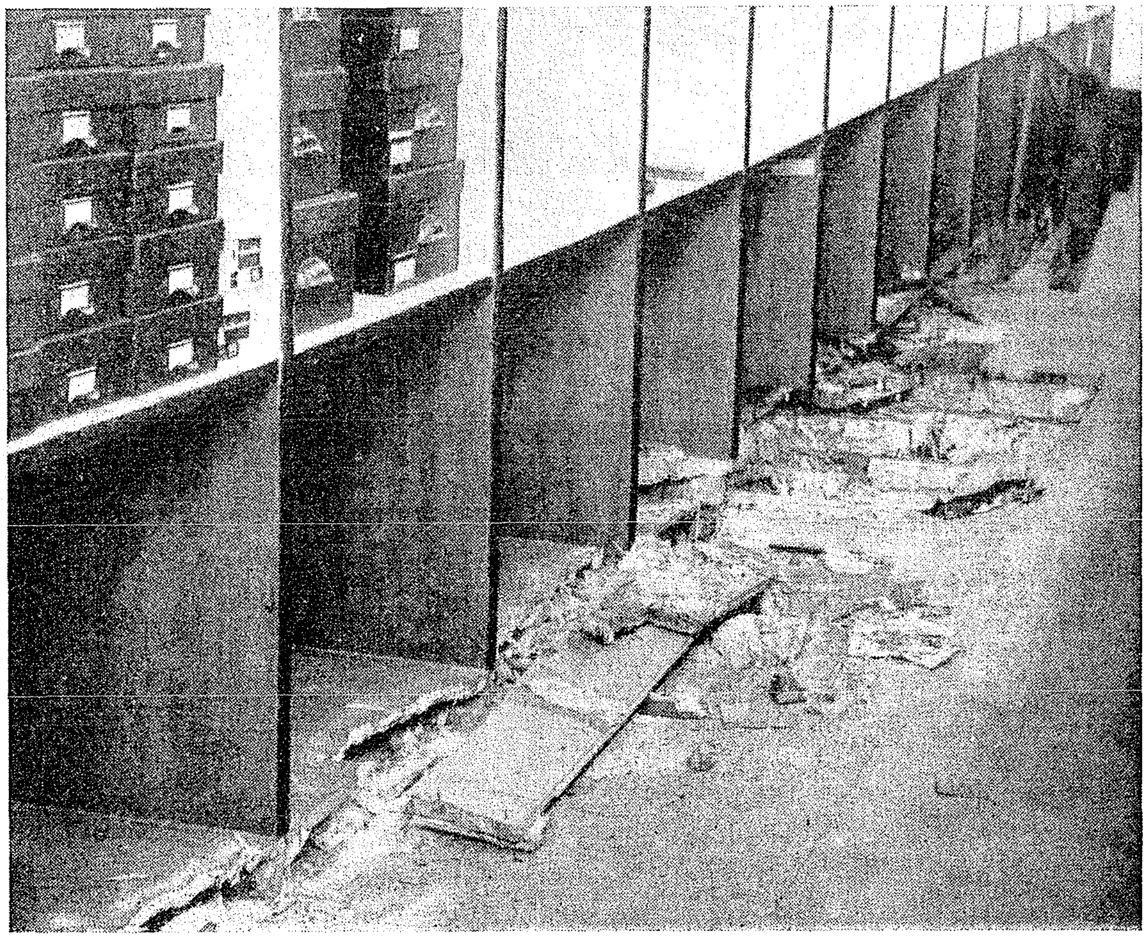
In preventing decay in flooring, the provision of adequate sub-floor ventilation is, therefore, most important. In most buildings four square inches of free air space per linear foot of external wall will be adequate, but more may be needed on wet sites, in warm, moist climates, and for wide buildings. The actual free air space must be considered, not the total area of the ventilator; in some terracotta ventilators, less than 10 per cent. of the total area is free air space, but in woven wire types this may rise to over 50 per cent.

Ventilators should be provided in all sides of any enclosed sub-floor space, or at least in two opposite sides, to allow a through current of air. They should preferably be within three feet of each corner to prevent dead air pockets in the corners. Ventilators should be well above the ground and should not be obstructed by joists or bearers or blocked by shrubs or garden plantings. All walls beneath the building must also have adequate ventilation holes through them.

Adequate clearance between the ground and the lowest sub-floor timbers is essential to good ventilation. In most sites 12 inches is adequate, but 18 inches is preferable in wet sites and 30 inches in tropical areas.

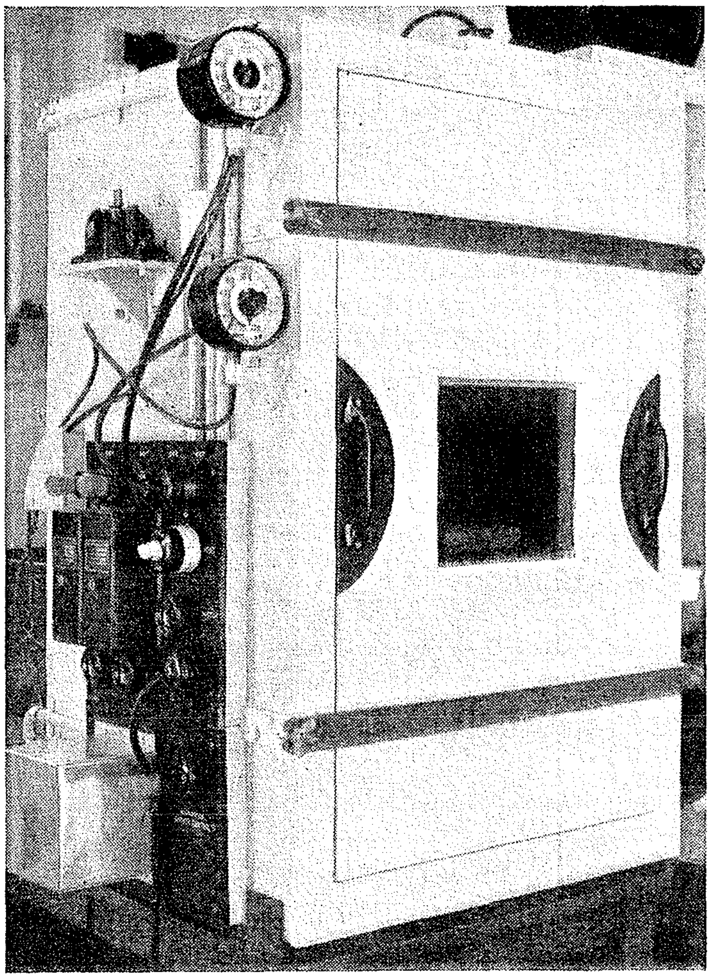
In existing buildings where provision of adequate clearance and ventilation is impracticable, an alternative measure is to reduce the evaporation of water from the soil by covering the ground with a layer of asphalted roll roofing, old linoleum, or heavy building paper. This should preferably cover the entire surface of the soil in the badly ventilated area, with two-inch overlaps at the joins, but even if only 95 per cent. of the surface is covered, it will have a very good effect.

Where none of these measures can be fully applied and the decay hazard remains high, the use of linoleum or other impervious coverings, which prevent water escaping from the wood into the room, should be avoided and floors should be of such durable timbers as red gum, tallowwood, wandoo, or jarrah, or at least of hardwood rather than softwood. If repairs are being made, the replacements, and any adjacent timbers which are accessible, should be thoroughly brush-coated with a five per cent. solution of pentachlorphenol in light oil. However, these measures should be regarded only as supplementary to those more important measures aimed at reducing condensation on the under floor surface.



Severe decay in softwood flooring of a shop after only two years' service.

Experimental Kiln for Victorian Forestry Students



Front of the kiln and the control panel.

A STUDY OF timber properties and wood technology has always been an important part of forestry education, even though it has not always been possible for students to be given extensive practical training in these fields.

To enable Victorian forestry students to obtain more intimate training in timber seasoning—an important aspect of timber utilization—a small experimental kiln designed and built by the Division of Forest Products has been made available to the Victorian School of Forestry on a long-term loan.

The kiln has a charge capacity of approximately 12 super feet. It is of timber construction and lined with waterproof plywood and copper sheathing. Heat is provided by two electric strip finned heaters having a combined rating of 1500 watts. One 9 in. diameter four-bladed propellor-type fan running at 1400 r.p.m. ensures uniform air circulation through the stack at a velocity approximating 280-320 ft/min.

A feature of the kiln is an electrically operated humidifier mounted at the back of the unit. It consists of a water supply tank and an evaporating cylinder fitted with a 1200-watt immersion heater. The cylinder is connected to a humidifying steam spray pipe inside the kiln. Incorporated in the unit is an electrically operated constant water level device to shut off power to the heater in the event of water supply failure.

The kiln conditions are controlled by two electric contact type dial thermometers operating the heaters and the humidifier through separate relay systems. Special care was taken in the design of the control panel for simple and safe operation by relatively inexperienced students. Provision is made for a safety thermostat wired into the electrical circuit and set at a temperature above any likely operating temperature required but well below ignition temperature for wood, so that power will be shut off should excessive temperatures develop in the unit.

DONATION

The following donation was received by the Division during April:

Timber Development Association of Australia (N.S.W. Branch) Ltd.	£26 5 0

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Forest Products Newsletter

1955##208 Registered in Australia for transmission by post as a periodical

NUMBER 208 MELBOURNE JULY 1955

Can End Splitting of Logs be Controlled?

By J. D. BOYD, Timber Mechanics Section

IN MANY HARDWOODS end splitting and resulting degrade are severe and cause serious economic loss in conversion of the timber, particularly in the rotary peeling of veneer. In Newsletter No. 173 (April 1949) it was shown that high stresses developed during the growth of a tree are released in the region of the felling cut and subsequent cross cuts, and cause the troublesome end splits. This being so, many proposed ways of avoiding the development of stress splits, such as ring-barking and seasonal felling, can have little success. The use of S-irons or barbed wire hammered into the ends of the logs are typical of other methods which have limited value because they offer little restraint to the large growth forces involved.

In view of the previous failures it was somewhat surprising to read a claim of control in a recent overseas journal,* where a technique was described for preventing extension of end splits. The apparatus illustrated (Fig. 1) is hammered into the end of the log so as to produce two concentric cuts approximately ½ in. deep and enclose radial splits then existing. Alternatively, similar grooves may be cut with a gouge as shown in Figure 2. The practical use of this appliance had been tested at the Ukrainian Institute for Mechanical Woodworking, using 150 beech logs stacked in an open yard during the summer. Exact measurements on the cross-cut faces of these and untreated control logs indicated that those having the circular cuts showed one-third the amount of splitting evident on the untreated logs.

It was decided to carry out tests on this method at the Division of Forest Products with Australian species. Accordingly, some logs of mountain ash from Toolangi, near Melbourne, were selected during February 1955, and comparisons made between the amount of splitting in gouge-cut and untreated ends. Figure 3 is typical of photographs taken a few minutes after cross-cutting and shows the first gouge cuts opposite the ends of splits. The gouge cuts were extended immediately afterwards to form two concentric circles cut to a depth of approximately 1 in. Figure 4 shows the log some five days afterwards. It is clear that the splits have extended across the gouge cuts. Comparative observations made on the end without the gouge cuts, and also on other logs, indicated that the treatment had no significant effect in limiting development of end splits in this material.

Later these logs were again cross-cut to a shorter length. One log had both ends gouge-cut to include stress splits; another

* BUCHHOLZ, E. (1954).—*Holzzentralbl.* **80** (95): 1134.

was left as cross-cut. Both were soaked for several days, then heated at 140 °F for 20 hours and subsequently placed in a veneer lathe and peeled. No clear difference between the two logs and the veneer quality was noted by the lathe operator.

Thus this technique also appears of doubtful value for reducing end splits in free-splitting Australian hardwoods.

Fortunately, however, there are other methods which, though by no means "cure-alls", are theoretically sound and may prove helpful in reducing splitting where the tendency is severe. The forces released to produce end splits come from a limited length of the log, generally only a few feet, but they are released at every cross cut. If through exposure the log end is allowed to dry, a pattern of drying checks is superimposed on the natural growth stress splits with resultant stress concentrations and considerable worsening of crack development. It is desirable, therefore, to limit drying in logs which are stored for any appreciable period. While retention of the bark and end-coating are of considerable help, shade storage and preferably pond storage are likely to be more effective.

A portion of the growth forces held in the log is released immediately on cross-cutting, but a further portion is gradually released and makes itself felt to an increasing degree over the subsequent hours and days. The consequences of this latter portion at least can be avoided if the logs are peeled immediately after cross-cutting to lathe lengths. Immediate peeling also limits development of drying checks with their intensifying effect on splitting.

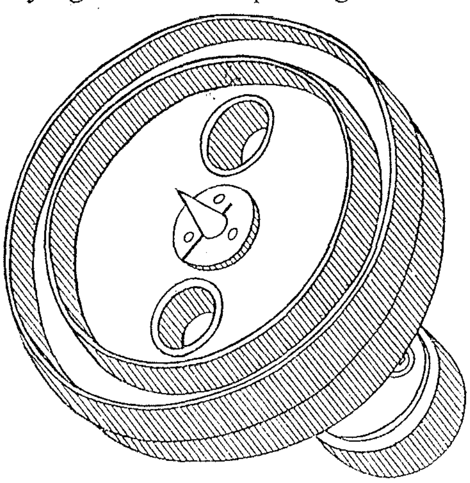


Fig. 1.

Time is critical in the conversion of timber subject to growth stress splits. Logs should be stored for the minimum practical period and in conditions which will allow the least possible drying, and those to be converted to veneer should be cut to lathe lengths only immediately prior to peeling.

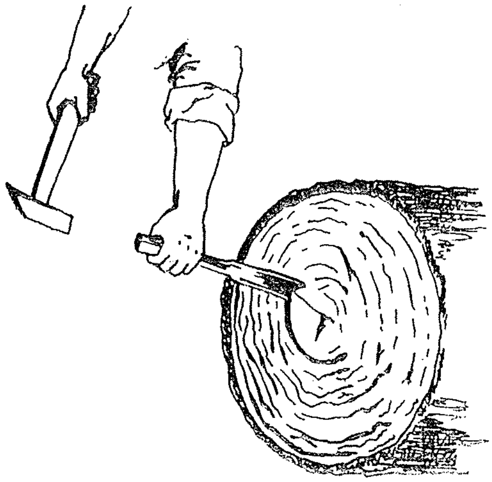


Fig. 2.

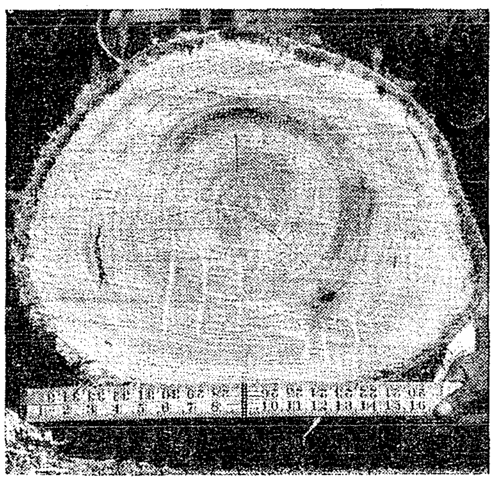


Fig. 3.

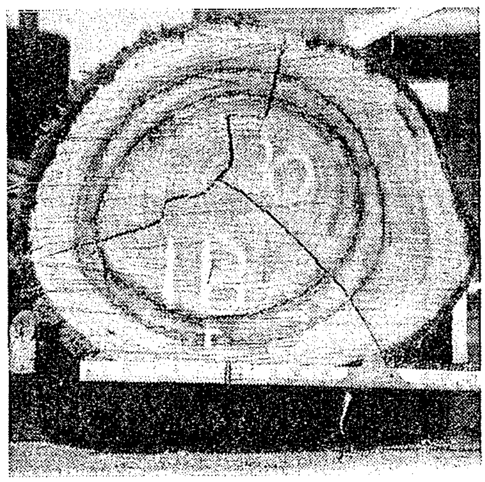


Fig. 4.

Spotted Gum

THIS IS the standard trade common name of the timber botanically known as *Eucalyptus maculata*. The name refers to the dimpled condition of the otherwise smooth white to pink bark.

Habit and Distribution

The mature tree is of medium size for a eucalypt, attaining a height of 120 ft with a diameter at breast height of 2-3½ ft. Spotted gum is found in a few isolated areas in north-eastern Victoria, and from the southern coastal areas of New South Wales extending into Queensland nearly as far north as the Rockhampton area and inland towards Roma. In the southern part of its range the timber tends to be lighter in colour and of lower density than in the northern portion, the change being progressive.

Timber

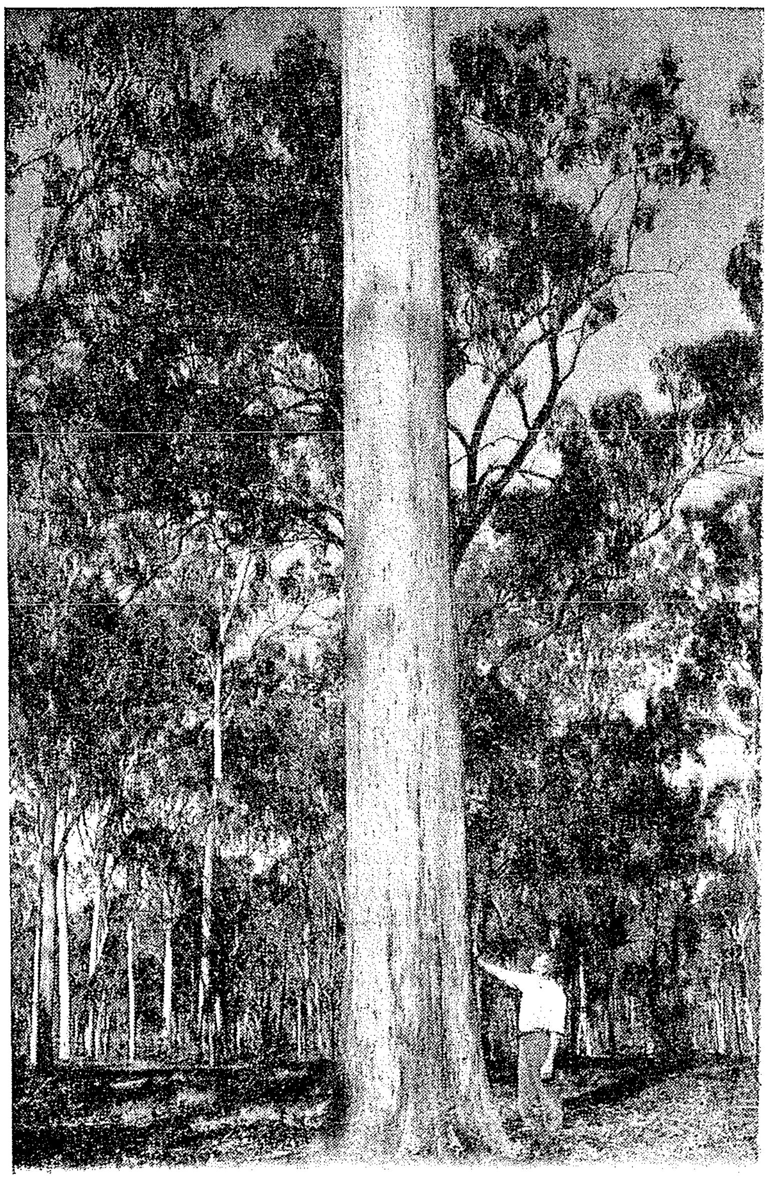
The colour of the heartwood varies from pale to definite brown with a clearly defined straw-coloured sapwood. The sapwood varies in width from ½ in. to 2 in., and is highly susceptible to attack by the *Lyctus* borer. The grain is straight or wavy and slightly interlocked. The texture is coarse. Although generally no prominent figure is present, fiddleback sometimes occurs. One of the heavier commercial eucalypts, the timber ranges in weight from 52 to 70 lb/cu.ft. when seasoned to 12 per cent. moisture content, with an average of 61 lb/cu.ft. It is a hard, strong, tough timber with a moderately high durability rating. It machines well, but with hand tools the commonly found interlocked grain tends to lift. Slight greasiness is often apparent. It is regarded as a good bending timber. The species can be satisfactorily glued if the surfaces are freshly dressed.

Seasoning

Although kiln drying from the green condition is not recommended because of a tendency to check, especially if backsawn, kiln drying can be used after a period of air seasoning. As some material of this species tends to warp in drying, stacking strips should be spaced fairly close together if it is known that cross-grained stock is present. Collapse occurs to a minor extent, but reconditioning is not advisable as the gain in size will not be appreciable and the steaming treatment will tend to reopen and extend any existing checks. In drying from the green state to 12 per cent. moisture content boards shrink 6·0 per cent. in a backsawn (tangential) direction and 4·3 per cent. in a quartersawn (radial) direction before reconditioning.

Uses

Flooring (strip and parquet), planking, decking, and framing for boats, skis (solid and laminated), veneers, axe, pick, and hammer handles, ladder rungs, meat skewers, agricultural machinery, weatherboards, diving-boards, general building construction, sleepers, and butchers' blocks.



Spotted gum in southern Queensland.
(Photo: Queensland Forest Service.)

PROFESSOR KNOW-WOOD SAYS . . .

Local timbers are stronger than imported.

Local timbers, particularly eucalypts, have now largely displaced oregon for use in house-framing and in large timber structures in Australia. However, some builders are still under a misapprehension as to the comparative strengths of hardwoods and oregon or other imported timbers.

Generally, the imported softwoods are appreciably inferior in strength to any of the hardwoods commonly used in Australia. The following table shows important strength properties of freshly cut or green material calculated as a percentage of the strength of oregon.

Timber	Bending Strength	Stiffness	Compression Strength	Shear Strength
Imported				
White Baltic	70	69	67	67
Sitka spruce	75	79	69	82
Red Baltic	79	80	78	81
Hemlock	80	79	77	87
Oregon	100	100	100	100
Australian				
Mountain ash	120	121	110	112
Jarrah	130	95	133	142
Messmate	137	115	141	144
Blackbutt	160	141	171	157

Timber does not lose strength as it ages!

Timber will last indefinitely if kept dry and protected from the weather. In Egypt recently archaeologists excavated a wooden boat which was in good condition although built several thousand years ago.

Tests on building timbers taken from old structures have shown no evidence of deterioration in mechanical properties. Accordingly, after examination to ensure that there is no decay, old timbers may be re-used with confidence in any structure.

Staff Notes

MR. STANLEY A. CLARKE, Chief of the Division, left Australia towards the end of June and will be absent in New Zealand, the United States, Canada, England, and Europe for approximately four months. Mr. Clarke is advising N.Z. Forest Products Ltd., to whom his services have been made available on various occasions, on projected plant installations and developments. On this occasion he will be accompanying the chairman of directors of the company, Sir David Henry, to study developments overseas.

DR. H. E. DADSWELL, Assistant Chief of Division and Officer-in-Charge of the Wood and Fibre Structure Section, resumed duty in May following his term as Walker-Ames Guest Professor in Forestry at the University of Washington, Seattle.

MR. H. G. HIGGINS, Principal Research Officer, left Australia in May to visit Europe and England in connexion with his work in paper physics. He will be abroad for approximately six months.

DONATIONS

THE following donations were received by the Division during May:

Hansen Consolidated Industries Ltd., Balmain, N.S.W.	£21 0 0
Penola Timber Milling Co. Pty. Ltd., Melbourne	£50 0 0
Gunnersen Nosworthy, Ltd., South Melbourne	£50 0 0
Westralian Plywoods Pty. Ltd., Perth	£250 0 0

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Forest Products Newsletter

1955##209

Registered in Australia for transmission by post as a periodical

NUMBER 209 MELBOURNE AUGUST 1955

Effect of Blue Stain on the Strength of *Pinus radiata*

By E. W. B. Da COSTA, Preservation Section

BLUE STAIN, caused by the growth of staining fungi with dark hyphae in the sapwood of green timber, is very common in *Pinus radiata*. Its detrimental effect on the appearance of case material is well recognized but recently there have been several suggestions that severe blue stain has also been associated with marked weakness and brittleness of this material.

The effect of blue stain on the strength of pine sapwood has been studied in a number of overseas laboratories, and the general conclusion reached is that severe blue stain causes a marked reduction in the toughness, or resistance to impact, of the wood but has little effect on its other strength properties. These investigations have, however, been carried out on species of *Pinus* other than *P. radiata* and the test fungi used have been different from those causing blue stain in Australia. The Division of Forest Products therefore decided to compare the strength of *Pinus radiata* sapwood heavily blue stained in the laboratory with that of comparable unstained material.

To ensure that the results would have immediate application to Australian conditions, specimens of blue stain were collected from a number of localities, representing all States except Queensland, and the causal fungus isolated and examined in each case. The fungus most commonly responsible for blue stain (*Diplodia pinea* (Desm.) Kichx.) was then selected as a test fungus. Material for the test was collected from each of three trees in a district from which complaints of brittleness apparently associated with blue stain had been received.

A number of closely-matched small specimens were cut from the outer sapwood of each log and dried out slightly, since it was found that the moisture content of the freshly sawn wood, like that in the trunk of the living tree, was too high to allow the staining fungus to grow. These specimens were infected by dipping them in water containing a heavy suspension of small fragments of the blue stain fungus. They were then stored at a temperature of 77 °F and a relative humidity of over 95 per cent., conditions favourable to rapid stain development. Sample specimens were withdrawn after 2, 4, 8, and 12 weeks for comparison of their strength properties with those of closely matched untreated and unstained specimens from the same log.

The specimens were severely stained after even two weeks' storage and rapidly became much more deeply and uniformly stained than they ever would in commercial use. Nevertheless, the strength tests, even after 12 weeks' storage, showed no significant decrease in either bending strength (modulus of rupture) or resistance to impact (toughness). As these two properties are those most closely concerned in the serviceability of a box, staining of this type apparently does not have any marked effect on the strength of *Pinus radiata* cases. Blue stain is objectionable for other reasons but these results indicate that the low strength observed in certain case material must be due to other causes.

In this test, the strength of the stained timber was measured in the green state (actually, at a high moisture content, 140-150 per cent.) whereas the moisture content of the wood in cases in service would be only 10-15 per cent. Although it was considered unlikely that this would have any effect on the application of the results to timber in service, it was thought desirable to check this point. Accordingly, a further batch of specimens was infected in the same way, stored at 77 °F and 95 per cent. relative humidity for 12 weeks, and then air dried to 12 per cent. moisture content before testing. The tests again failed to show any significant differences in strength between the heavily stained specimens and comparable unstained dry material.

A number of other fungi had occasionally been found to be associated with blue stain in the various samples collected, and four of these were used as test fungi in the same fashion, the infected specimens being stored for 12 weeks in each case. Although blue stain was produced by these fungi, it was much less severe than that caused by *Diplodia pinea* and again the strength tests failed to show any significant difference between the stained material and comparable unstained wood, whether the specimens were tested green or at 12 per cent. moisture content.

The conditions which favour severe blue stain development are also favourable to the rapid development of wood-destroying fungi, and in a timber so readily decayed as *Pinus radiata*, severe blue stain may be accompanied by incipient decay with consequent loss of strength. Also the poor appearance of stained cases alongside bright timber must adversely affect the sales of the produce packed therein, especially with food cases and in export markets.

Blue stain can usually be completely avoided, at little cost, by such measures as the prompt utilization of logs and billets or kiln drying or rapid air drying of boards, and by the use of protective surface applications of stain preventives. Detailed advice on these control methods may readily be obtained on application to the Division of Forest Products or to the State Forest Services.

STAFF

Mr. J. D. Boyd, M.C.E., A.M.I.E. Aust., who has been acting as Officer-in-Charge of the Timber Mechanics Section of the Division since Mr. K. L. Cooper resigned to accept the Chair of Civil Engineering at the University of Western Australia, has been appointed Officer-in-Charge of the Section.

PROFESSOR KNOW-WOOD SAYS . . .

Sapwood is as strong as heartwood.

From time to time the question is asked if sapwood should be excluded from timber in structures in which strength is important. Providing there is no serious decay, or insect hazard, timber containing sapwood is satisfactory and quite as strong as heartwood.

DONATIONS

The following donations were received by the Division during June:

Kilndried Hardwoods Pty. Ltd., Launceston, Tas.	£20 0 0
Softwood Products Pty. Ltd., Mt. Gambier, S.A.	£105 0 0
Marton Sash, Door and Timber Co., Marton, N.Z.	£6 10 0
Dartmoor Pine Mills Pty. Ltd., Mt. Gambier, S.A.	£157 10 0
Queensland Timber Stabilisation Board, Brisbane	£250 0 0
Bright Pine Mills Pty. Ltd., Bright, Vic.	£100 0 0
A. A. Swallow Pty. Ltd., Melbourne	£100 0 0

Kiln Drying of Ramin (*Gonystylus* spp.)

GENERALLY SPEAKING, ramin can be regarded as a species which seasons rapidly and with relatively little degrade apart from checking in thicker backsawn material. It does not seem to collapse appreciably and steaming treatments at 212 °F should be avoided as they have the effect of re-opening surface checks. A slight amount of cupping may occur in backsawn material, but careful stacking of the timber and some weighting of stacks should minimize this. As only a few days are required to kiln dry from the green state this practice is likely to be attractive economically with the added advantage over air drying of eliminating blue stain.

Quartersawn stock 1 in. thick can be dried satisfactorily from an initial moisture content of 45-50 per cent. to a final moisture content of 12 per cent. in 2-3 days using the schedule set out in Table 1.

Table 1

Recommended Kiln-drying Schedule for Green 1-in.-thick Quartersawn or Mixed Sawn Ramin and 2-in.-thick Quartersawn Ramin

Moisture Content Change Points (%)	Dry-bulb Temperature (°F)	Wet-bulb Depression (°F)
Green	140	10
30	140	20
20 to final M.C.	160	30

Backsawn stock 1 in. thick tends to check readily and in material used in experiments there was a significant difference in the seasoning degrade of backsawn boards from different trees, possibly because the two classes recognized in Borneo (hard ramin and yellow ramin) were represented. However, material with an initial moisture content of 40-60 per cent. was dried satisfactorily in 2-3 days using the same schedule as that recommended for quartersawn stock.

In general, partial air drying prior to kiln drying gives good results and reduces the kiln drying time by about one day, but in very hot weather there is a risk of excessive surface checking of backsawn material and under such conditions kiln drying from the green state under a properly controlled drying schedule is to be preferred.

The work done on 2-in. stock showed it to behave in much the same way as the 1-in. stock, normal allowance being made for thickness difference. Quartersawn material can be dried from an initial moisture content of 45 per cent. to a final moisture content of 12 per cent. in 6 days using the schedule given in Table 1, and backsawn stock of the same initial moisture content can be dried in 8-9 days using the schedule given in Table 2.

Work done indicates that a saving in kiln drying time of 2-3 days for 2-in. quartersawn stock and about 4 days for 2-in. backsawn stock might be made by partial air drying, but further work is required to establish the optimum conditions for drying 2-in. backsawn material.

Table 2

Tentative Kiln-drying Schedule for 2-in.-thick Backsawn Ramin

Moisture Content Change Points (%)	Dry-bulb Temperature (°F)	Wet-bulb Depression (°F)
Green	120	5
30	130	10
25	140	15
20	160	20
15 to final M.C.	160	30

For the relief of drying stresses a short high-humidity treatment (6 hr for 1-in.-thick stock, 12-24 hr for 2-in.-thick stock) at a dry-bulb temperature of 160 °F with a wet-bulb depression of 10 °F is recommended on the completion of kiln drying.

The Use of Dieldrin for Eradication of Borers

THE AVAILABILITY of the new insecticide dieldrin in Australia and its very successful use for many purposes, including control of the Argentine ant, has brought inquiries as to its application for eradicating borers in flooring, furniture, decorative woodwork, etc.

Dieldrin (pronounced "deel-drin") is a complex organic compound now available in flake form and in concentrated solutions. The dry flakes are not soluble in water but dissolve in various organic solvents such as mineral turpentine, dieseline, or diesel fuel oil (up to about 10 per cent.) or in kerosene (about 3 to 8 per cent. depending on the type of kerosene).

Dissolved in a light oil to make a 0·5 per cent. solution (i.e. 1 oz of dry flake dieldrin in 1½ gal of lighting kerosene), it is very suitable for eradicating borers in interior woodwork. The solution should be applied liberally so that as much as possible drains into the borer holes. On vertical or under-surfaces it is desirable to inject the solution into some of the holes with a small syringe.

At present small quantities of flake dieldrin are not always easily purchased but the concentrated solution (usually containing 15 per cent. dieldrin) in small bottles can be obtained in most cities. This may be diluted to the 0·5 per cent. strength with lighting kerosene. It should be noted that the concentrated solution may contain an emulsifying agent to permit mixture with water. This does not prevent dilution with kerosene for borer eradication.

The permanence of dieldrin treatments has still to be established. However, if the wood is well soaked, protection for a few years will probably be obtained. If desired, dieldrin can be mixed with pentachlorphenol solution which is also popularly used for eradication of borers.

Doubling the Life of Your Scratch Chain

GRINDING or filing solely on the front face of a chain saw tooth in touching up or in full sharpening will eventually produce a weak, high tooth (Fig. 1). Filed solely on the top, the tooth becomes too low (Fig. 2), so that set and gullet space are inadequate.

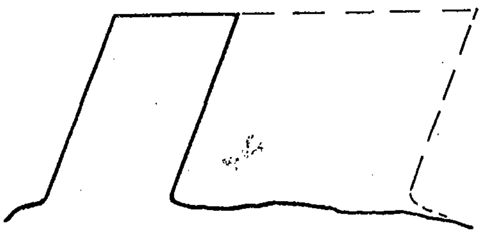

Fig. 1.

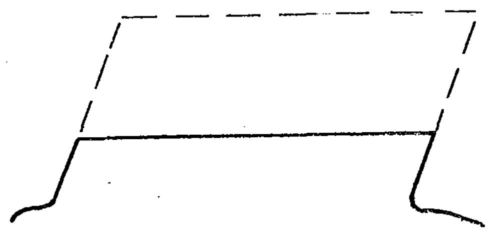

Fig. 2.

When touching up a tooth that has become rounded on top, or removing the flat produced by jointing in full sharpening, it is preferable to grind or file half on the front face, half on the top of the tooth. Then the effect on either length or height is halved, and thus the number of allowable sharpenings is doubled, the two effects becoming critical more or less simultaneously (Fig. 3).

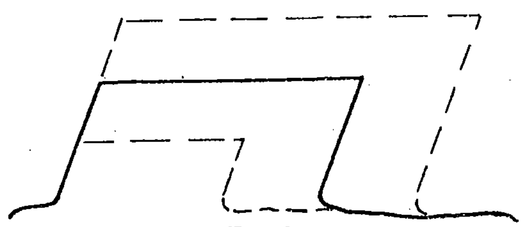

Fig. 3.

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Forest Products Newsletter

1955##210 Registered in Australia for transmission by post as a periodical

NUMBER 210 MELBOURNE SEPTEMBER 1955

The On-site Protection of Building Timbers

FOR SOME unaccountable reason many people seem to forget that seasoned timber and joinery are high-quality goods easily damaged by weather. Perhaps the fact that they are often only in a semi-processed form, and usually associated with such naturally resistant products as tiles and bricks, or rough-finish material such as green framing timbers, is responsible. The fact remains, however, that great damage, much of it of an insidious nature, can be caused to seasoned timber carelessly exposed to the weather.

Water absorbed from rain causes swelling and crushed joints, with ultimate shrinkage on redrying to give unsightly open joints, and staining or raised grain. The exposure of "raw" surfaces to the sun can cause surface checking or end splitting, severe shrinkage, and cupping or other forms of distortion. Even if damage is not apparent this unwise exposure may give rise to later failures in surface and finishing treatments.

The value of a few simple precautions at the building site which will ensure protection to seasoned timber or joinery stock cannot, therefore, be over-emphasized. Unfortunately the builder is not able to ensure that deliveries will be accepted only in good weather or to a pre-determined time-table. However, the effects of unfavourable weather can often be kept to a minimum by speedy attention to common-sense protective measures.

If covered storage is not available on the site, protection can be given by a tarpaulin, "Sisalcraft" paper, or similar type cover; this should be large enough to cover the goods entirely without leaving exposed ends or sides. In some cases sheet iron or asbestos sheeting could be used to advantage.

Do not allow seasoned timber to be unloaded direct on to the ground. A few cross pieces laid down first (with possibly building paper spread over the cross pieces) will act as supports and keep surface water from the lower layers. If building paper is used underneath the pile, it should be arranged so that it does not form a collecting basin or reservoir for water during periods of rain.

If advantage is taken of covered space and this space is enclosed by fresh brickwork or has been freshly plastered, make sure that door and window openings are left open so that air can circulate through it. Otherwise high humidities can build up and the moisture content of the timber increase to undesirable levels.

When window or door frames have been placed in position but not firmly fixed, apply temporary bracing to reduce the risk of distortion and resultant misalignment.

Pay special attention to the protection of the milled edges of flooring before installation, and to the further protection of the floor surface after laying while tradesmen are working in the building. A layer of sawdust or building paper is effective in this regard. If flooring is particularly dry do not cramp too tightly, especially if site conditions are not well drained or indifferent provision is made for under-floor ventilation.

Make sure joinery stock (including window and door frames) and weatherboards are given an effective coating of priming paint, before delivery if possible, or as early as possible after delivery.

Bleaching of Wood

THE FOLLOWING procedure has been found suitable for bleaching a wide range of timbers. Dark-coloured woods can be made several shades lighter and light-coloured woods can be bleached to a "blond" finish. There is no record of the bleaching reagents interfering with subsequent polishing operations.

The bleaching should be carried out on wood which has been cut and dressed and is ready for assembly or, alternatively, it may be applied to the assembled article. The bleaching is effected by one or more applications of aqueous ammonia followed by hydrogen peroxide.

The details are as follows:

Solution A: *Aqueous Ammonia.*—Made by diluting one part of 0·880 ammonia with five parts of water.

Solution B: *Hydrogen Peroxide.*—This may be used in the concentrated form (100 vol.) or if the material is bleached readily it may be diluted up to five times with water.

Solution *A* is applied to the wood by means of a swab or mop and is immediately followed by solution *B* applied in a similar manner. The article is allowed to dry thoroughly and the above process repeated if necessary. If these two treatments have not produced a marked reduction in the colour intensity the colouring agent is of a type which does not bleach readily and further treatment will have little effect. If the treatment has been effective, further applications of solutions *A* and *B* may reduce still further the colour of the wood.

After the article is thoroughly dry it should be *lightly* sanded to remove any roughness due to the water "lifting the grain" of the wood, and then polished in the usual manner.

Ammonia and hydrogen peroxide may be purchased at most retailers of industrial chemicals. Both chemicals should be stored in a cool place when not in use, and as hydrogen peroxide deteriorates on standing, it is inadvisable to buy larger quantities than are required for any particular job.

The ammonia fumes make it advisable for the bleaching to be done in the open or in a well-ventilated room. Care should be taken to avoid undue contact between either of these chemicals and the skin.

DONATIONS

THE following donations were received by the Division during July:

Millars Timber and Trading Co., South Melbourne, Vic.	£21 0 0
Exchange Yard (Proprietary) Ltd., Kempton Park, Transvaal, South Africa	£5 0 0
Anode Latex Co., North Coburg, Vic.	£25 0 0
Hearn Industries, Victoria Park, W.A.	£50 0 0

The Drying of Red Meranti (*Shorea* spp.)

By G. S. CAMPBELL, Seasoning Section

ALTHOUGH the Division of Forest Products has not carried out experimental work on the seasoning of red meranti, numerous inquiries for a drying schedule for this species have warranted a survey of literature to ascertain its probable behaviour during seasoning under Australian conditions.

Meranti is imported into Australia under various names, some of the more common being Borneo cedar, Philippine mahogany, and seraya. Both the dark red and light red varieties are produced from the same group of *Shorea* species, and although there are minor anatomical differences between some of the timbers of this group, dark red meranti is segregated from the light red solely on the basis of colour. The former is usually heavier, harder, stronger, and slightly more durable than the latter. The average air-dry density of dark red meranti is from 40 to 45 lb/cu. ft., whereas for light red meranti it is about 35 lb/cu. ft.

Kiln-drying Schedules for Red Meranti

Thickness	Moisture Content Change Points (%)	Dry-bulb Temperature (°F)	Wet-bulb Depression (°F)
1-in. and 2-in. mixed sawn stock	Green	120	5
	60	120	7
	40	130	10
	35	130	15
	30	140	20
	25	150	25
	20 to final M.C.	160	30
2-in. mixed sawn stock	Green	115	5
	40	120	10
	30	130	15
	25	140	20
	20 to final M.C.	160	30

The Malayan Forest Service has indicated in a Trade Leaflet that air or kiln drying red meranti presents no serious difficulties provided normal care is taken in stacking. It appears that the rate of air seasoning is fairly rapid in Malaya. The following information will serve as a guide for seasoning plants in Australia.

In Malaya, air drying red meranti under cover from a moisture content of approximately 60 per cent. to one of 18 per cent. occupies some 2 to 3 months for 1-in.-thick boards, $3\frac{1}{2}$ to $4\frac{1}{2}$ months for $1\frac{1}{2}$-in.-thick planks, and approximately 6 months for 2-in.-thick stock. The shrinkage of the various types of meranti varies, but fair average figures from the green to the air-dry condition are 2 per cent. in the radial direction and 4·5 to 5 per cent. in the tangential direction. All forms of red meranti, if properly seasoned, are reputed to "hold their shape well".

The kiln-drying schedules on this page are recommended by the Division of Forest Products for red meranti.

A stress relief treatment, comprising a dry-bulb temperature of 160 °F with a wet-bulb depression of 10 °F, should be given for 24 hours per inch of thickness at the end of kiln drying.

The times required to kiln dry red meranti previously air dried to a moisture content of about 25 per cent. are 2, 3, and 4 days for 1-in., $1\frac{1}{2}$-in., and 2-in.-thick stock respectively. Figures are not available for kiln-drying times from the green condition, but it is thought about 7 to 9 days may be necessary for 1-in.-thick boards, with proportionately longer times for thicker material.

The following species obtained from Malaya may be regarded as having somewhat similar properties to red meranti.

Bintangor (*Calophyllum* sp.). This species dries moderately rapidly, but is prone to warp unless carefully stacked.

Geronggang (*Cratoxylon arborescens*). The species seasons rapidly without serious degrade.

Mengkulang (*Tarrietia* sp.) is also reputed to season rapidly and without serious degrade.

Nyatoh is often sold in Malaya as red meranti; it seasons moderately rapidly without trouble.

The two latter species are reported to have a dulling effect on sharp-edged tools.

PROFESSOR KNOW-WOOD SAYS . . .

Check These Points in the Manufacture of Flush Panel Doors

Difficulties are still encountered with sinkages in hollow-core flush panel doors. Where complaints are received, manufacturers should check the following points which have been found to cause the trouble:

- Use of excessive quantities of glue, forming a large bead between plywood and core.
- Use of glue containing a large quantity of water.
- Excessive clamping pressure.
- Excessive clamping times.
- Non-uniform moisture content of the components.
- Varying thickness of the framing members.
- Wide spacing of frame members or thin plywood faces.
- Use of plywood with soft absorbent veneer glued to the door frame.

Productivity Data

CASE STUDY DATA ON PRODUCTIVITY AND FACTORY PERFORMANCE: VENEER AND PLYWOOD, by the United States Department of Labour, Bureau of Labour Statistics, 1953. (Our copy from the British Institute of Management, Management House, 8 Hill Street, London, W.1. Price 5*s*. stg.)

This publication is an extremely useful reference and well worth careful study. It contains a detailed survey of seven hardwood mills in the U.S.A., the plants studied ranging from less than 50 employees to almost 400, and thus facilitates easy comparison of manufacturing operations in Australian plants with those of one or more of the plants in the study. The report includes descriptions of plant layout, machinery, and organization, as well as detailed studies of times and labour required.

Main differences between U.S.A. and Australian practice appear to be the domination of mechanical driers in that country, the greater use of hot presses, and better utilization of timber by splicing and patching. The American example in respect of better utilization is definitely worth following to make the best use of diminishing resources.

Stacking for Air and Kiln Drying

WHAT is the best spacing for high, multi-packet stacks built up with fork lift trucks so that fastest drying and quickest and cheapest stock turnover can be obtained from a given yard area?

With the cooperation of several firms in industry the Division is commencing field studies to determine this point, and would be pleased to receive comments from interested persons.

APPRECIATION

Letter from Mr. D. R. Bayly, Sarawak Forest Department

IN NEWSLETTER No. 205, mention was made of the visit to the Division, on a Colombo Plan Fellowship, of Mr. D. R. Bayly of the Forest Department, Sarawak. During his stay in Australia Mr. Bayly made a number of field trips and plant visits in all States, and the following letter, received by the Department of External Affairs, will be of interest to all with whom he made contact.

Writing from Sarawak on June 20, Mr. Bayly says: "Since my return from Australia I have been wanting to express my gratitude and appreciation to all the Departments and organizations in Australia who contributed in making my course such a success. My whole stay there proceeded without a hitch and the scope and coverage of all I wished to study and see was really excellently anticipated. Could you therefore convey this message of mine through the proper channels.

"Further I would like it known to the Australian people generally that their efforts to make one feel at home by their friendliness and generous hospitality were really appreciated and greatly treasured."

This Newsletter, prepared for general circulation by the Division of Forest Products, C.S.I.R.O., P.O. Box 18, South Melbourne, S.C.5, is issued free, on request, to members of the timber trade and timber users. Its contents may be reprinted without special permission.

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Forest Products Newsletter

1955##211

Registered in Australia for transmission by post as a periodical

NUMBER 211 MELBOURNE OCTOBER 1955

Important Commercial Timbers of Sarawak

By D. R. BAYLY, Sarawak Forest Department

(*Mr. D. R. Bayly is a Forestry Officer of the Department of Forests, Sarawak, and recently spent some nine months with the Division. During his stay in Australia, Mr. Bayly was asked many questions concerning Sarawak's forests and species supplied to the Australian market. This prompted him to write the following short article, together with some notes on the various timbers, which will be continued next month.*—Ed.).

AUSTRALIA, especially South and Western Australia, is at present importing from Sarawak an appreciable volume of timber, both sawn and in the round. The figures for 1954 were 8224 tons round and 11,355 tons sawn. Available resources could allow trade to continue and increase in the future. Accurate information concerning the main commercial species has not been readily available for the prospective importer, and this has been a serious drawback. It is therefore hoped that these notes, brief though they be, will be of value to the Australian timber trade. Further information is in preparation for a new manual entitled "Trees and Timbers of Sarawak" by F. G. Browne, the Conservator of Forests. This treatise will be published soon and will be of immense value, not only to foresters, but also to timber men and to others whose interest lies in this sphere.

The principal timbers now being exported are ramin, meranti (including meranti bunga and alan), sepetir, jongkong, kapur, keruing, sempilor, nyatoh and geronggang.

The trees occur in the peat swamp forest as well as in lowland forest extending to high hills, towards the upper limit of the Dipterocarp forest. It is practically impossible to state the definite boundaries of the occurrence of these species, except in the case of jongkong which is found only in swamp forest, and also possibly ramin which occurs mainly in the swamps.

The method of extraction employed varies with the terrain. In the swamps the normal method is to lay a light tram-line penetrating anything up to three miles into the swamp. In construction, the refinements normally associated with a railway are lacking, owing to the fact that the service life of the line depends on the availability of the timber. Once the area has been worked out, the line is taken up and relaid in another part of the forest. The primary requirements for the line are that it must be reasonably straight and level. From this, other extraction routes, usually corduroyed, radiate outwards in herring-bone fashion. These routes are worked by local native labour who fell and log the trees which are then delivered to the tram-line by "kuda-kuda" extraction. By this method the log is placed on a cradle on top of a sledge-like contrivance. The runners of this are heavily greased and the log is then pulled out on the cradle by native labour. At the tram-line the logs are loaded on to wagons and the rake hauled by either a light locomotive or jeep to the river bank. Here the logs are off-loaded into log ponds where they are rafted and are then towed to the mills by tugs.

In the lowland forest extraction has been by tractors and logging arches. Sky-lining in the rich Dipterocarp forest on steep slopes has also been done. This method is now being used to extract alan and meranti bunga from the swamps, and shows considerable promise of success. Elephants have also been employed in certain areas. In all the abovementioned methods, delivery point is the bank of a river. In rivers which are free of rapids, rafts are made up at the delivery point, the sinkers being cradled underneath the floaters. The rafts are either towed or floated down to the sawmills. In rivers having rapids the procedure differs slightly; logs float down individually to a given point where they are rafted.

The following are descriptions of the general properties and working qualities of the more important species.

Ramin

A moderately hard to heavy timber, averaging about 40-45 lb/cu. ft. air dry. It is a clean looking whitish wood with straight grain and a fine, even texture. The sapwood is usually about 2 in. wide but not readily distinguished from the heartwood.

The timber requires special care in seasoning. Some consignments after arrival in Australia develop serious face checking. This can be eliminated if the parcel is removed from the docks as soon as possible after discharge and then stripped out in the yard. (An article on the kiln drying of ramin was featured in Newsletter 209, August, 1955. —*Ed.*). Ramin is not durable in contact with the ground, and is suitable for general light construction, furniture, mouldings, and other uses where a clean whitish timber is desirable.

Meranti

Meranti timbers are obtained from a large number of species of *Shorea* and vary in colour to a very marked degree. They are sub-divided as follows into four categories based on colour. (An article on the drying of meranti appeared in Newsletter 210, September, 1955.—*Ed.*).

(*a*) *White meranti:* Mainly moderately hard and moderately heavy, averaging about 40-45 lb/cu. ft. air dry. The sapwood is fairly distinct in dry timber and is generally about 2 in. wide. The heartwood is almost white when newly sawn but becomes yellowish or even brownish with age. Because of its typically high silica content, white meranti is not easy to saw, although it makes good flooring and decking. However, it peels without difficulty and makes good plywood.

(*b*) *Yellow meranti:* Only moderately hard and heavy, varying from 32-42 lb/cu. ft. air dry. The heartwood is dull yellowish brown, darkening with age. The sapwood is highly susceptible to Lyctus attack. Grain is usually interlocked, texture coarse but even. It is an excellent joinery wood, can be sawn and planed without difficulty, and is suitable for all forms of light construction provided it is not used in contact with the ground.

(*c*) *Red meranti:* Includes all those species of *Shorea* that produce a rather light to moderately heavy-weight reddish timber ranging up to 45 lb/cu. ft. air dry. The grain is usually interlocked, texture coarse but even. The figure is not usually prominent, but quartersawn material often displays an attractive ribbon figure. Meranti bunga is a very nice red meranti, and is sold in large consignments of more or less uniform colour and weight. It saws and finishes well, and may be used as a light structural timber for furniture, panelling, plywood, boat building, and flooring.

(*d*) *Dark red meranti:* The wood is fairly uniform dark red in colour and usually has conspicuous rows of white resin canals. It is structurally similar to red meranti, from which it cannot be distinguished except by its weight which varies from about 40-53 lb/cu. ft. air dry. This timber may be used for heavy construction, decking, flooring, and furniture. Conspicuous in the group is alan, one of the heaviest forms, which is usually marketed in pure consignments under the trade name of alan.

CORRIGENDUM:

C.S.I.R.O. FOREST PRODUCTS NEWSLETTER

NUMBER 210, SEPTEMBER 1955

Page 3: Table "Kiln drying Schedules for Red Meranti".—First Column, thickness figures should read: "1-in. and $1\frac{1}{2}$-in. mixed sawn stock".

Built-up Floor Beams

SEVEN floor beams, each 20 ft span, to carry a design load of 20,000 lb each, were required for extensions to the workshops of the Division of Forest Products. Advantage was taken of this opportunity to erect several different types of beams so that their fabrication costs and efficiency could be compared and their behaviour in service studied.

All the beams were built up from nominal 6 by 1 in. kiln dried boards of mountain ash and radiata pine.

Three different beams are shown in the photographs. The fourth type of beam, not illustrated, was of glued laminated construction of rectangular cross section 21 by $5\frac{1}{2}$ in. with the outer three laminations top and bottom of mountain ash and the remainder of radiata pine.

It is anticipated that the information obtained from this study and the availability of the beams for inspection will be of assistance in answering inquiries on structural problems.

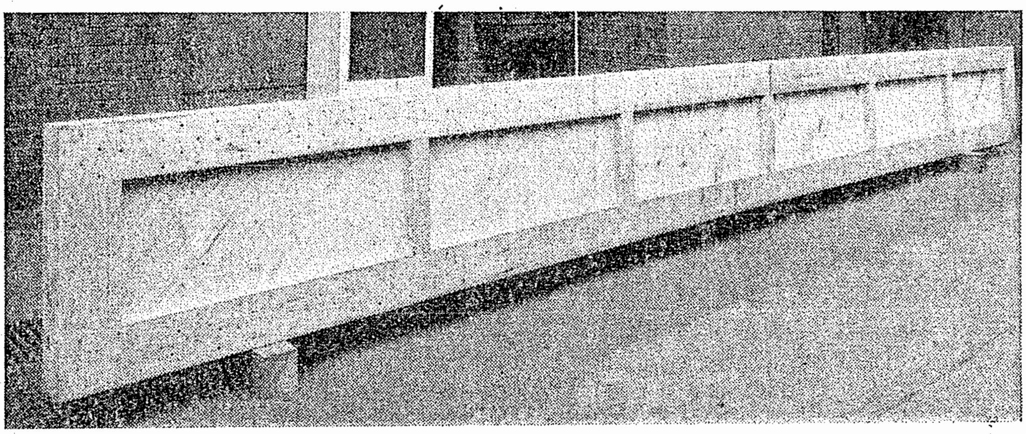

Fig. 1. — Nailed I-beams 23 by 5 in. overall cross section: flanges are mountain ash scarf jointed to give full length, web is a double layer of radiata pine boards crossed at 45°.

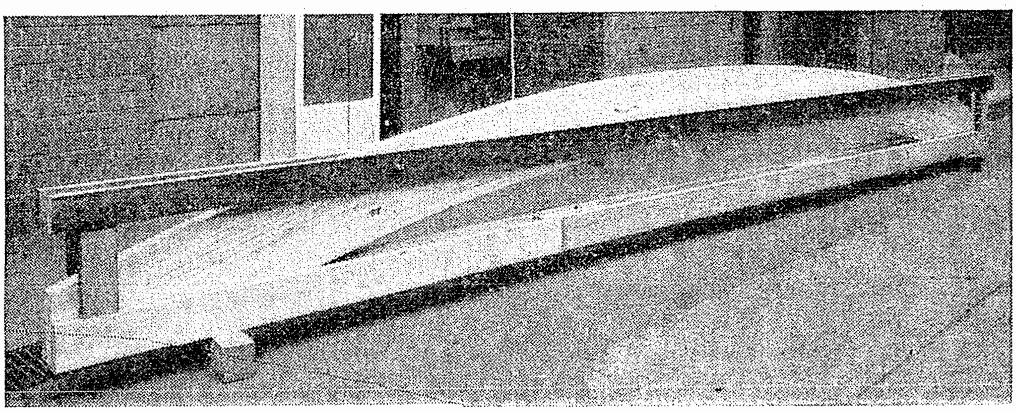

Fig. 2.—Glued laminated tied arch 12 by $2\frac{1}{2}$ in. cross section. The central 9 laminations of the arch are radiata pine, the remainder is mountain ash. The mountain ash tie is scarf jointed and glued to the arch.

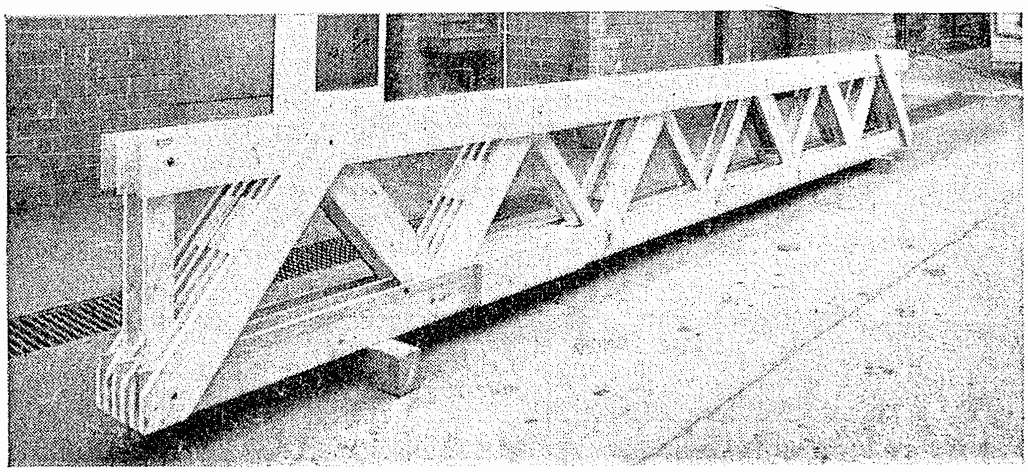

Fig. 3.—Glued truss 26 by 9 in. overall cross section. The mountain ash flanges are butt jointed and cover plated. The web members are radiata pine. All joints are glued.

Removal of Stains from Timber

BLACK STAINS are frequently observed on various wooden structures when they are exposed to the weather or are subjected to frequent wetting with water. These stains generally originate from the heads of nails used in the construction, and take the form of narrow lines extending downwards from the nail. Softwood timbers rarely show this type of stain but it occurs to a greater or lesser extent with most of the common hardwood timbers. The stains are due to the tannins in the wood reacting with the iron in the nail to produce the black iron tannate. These tannins are readily leached from the surface of the wood by water, and as they run down over the nail head they react with the iron to give the typical black stain. While these stains are of no consequence in frame work or rough constructions such as paling fences, they may leave marks on weatherboards or window frames which prevent the wood being finished in natural colours. Flooring also may be affected in a similar manner if wetting occurs.

The obvious way to prevent such stains developing in hardwood timber is by sheltering the wood from the elements until it is painted, and by promptly punching all nails and sealing the holes with putty. If iron stains have developed on the wood they may be removed by the following procedure.

Make a saturated solution of oxalic acid in water (about two teaspoonfuls to a cup of water) and apply to the stain with a cloth. Allow the wood to dry and repeat if necessary. The solution should be confined to the stained area as it has a mild bleaching action on the unstained wood. It might be necessary to wash the entire area over with a very dilute solution of the oxalic acid after removal of the stain to ensure that the colour of the finished surface is uniform. Finally, the treated area should be rinsed several times with water to remove any oxalic acid remaining. (*Warning.*—Oxalic acid is extremely poisonous if taken internally and care must be taken to ensure that neither crystals nor the solution can come into the hands of children or of others unaware of its poisonous nature.)

Brown stains sometimes occur on timber which is in contact with concrete or mortar. They may also be caused when water which has run over a concrete or brick structure comes in contact with wood. These stains usually occur in newly constructed buildings or those in the course of construction. They are caused by alkaline materials being leached from the surface of the concrete or mortar and reacting with the tannins in the wood. While these stains are not nearly as prominent as the black iron stains referred to earlier, they may be sufficient to interfere with subsequent finishing operations.

Once again prevention is better than cure, but if stains have developed and need to be removed the following procedure will generally be found satisfactory.

Wash the surface of the wood thoroughly with water to remove any alkaline material and follow this by a wash with dilute hydrochloric acid (about 1 egg cup of the concentrated acid to a pint of water). This concentration will not harm the hands providing they are thoroughly washed with soap after the work has been completed. More than one application may be necessary to remove the stain. The treatment is completed by washing several times with water to remove any remaining acid.

DONATIONS

THE following donations were received by the Division during August:

Carrel & Carrel Ltd., N.Z.	£2 2 0
Roseberry Veneer Co. Pty. Ltd., Roseberry, N.S.W.	£20 0 0
Gibbs, Bright and Co., Melbourne	£105 0 0
Perfectus Airscrew Co., Melbourne	£2 2 0
Wilson, Hart and Co. Pty. Ltd., Maryborough, Q'land.	£100 0 0
Hyne and Son Pty. Ltd., Maryborough, Q'land.	£100 0 0

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Forest Products Newsletter

1955##212

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NUMBER 212 MELBOURNE NOVEMBER 1955

Preventing Deterioration in Exterior Joinery

By E. L. ELLWOOD, Timber Preservation Section

The Problem

RECENTLY the number of inquiries relating to deterioration in exterior joinery such as window sills, frames, and sashes, has increased. The most frequent cause of trouble is decay in window sill, stanchion, and sometimes sash. This apparent increase in decay hazard is the result of a number of factors, such as inadequate supplies of the naturally durable timbers which have been largely used in the past, poor design of joints, inferior manufacture or improper glazing, and poor installation.

A recent short survey carried out in Victoria on the decay of exterior joinery in recently constructed houses showed that the all-important points were the joints and the exposed end grain of the timber. In practically every case the onset of decay could be traced to the lodging and subsequent penetration of water into opened joints or inadequately protected end grain. Although much of the trouble could be overcome by good design and manufacture of the joints and correct installation, additional treatment is justified if non-durable timbers are to be used, particularly in areas of high decay hazard.

It is not generally recognized that a paint film cannot be relied upon to provide adequate protection of a joint exposed to weathering. This is because even under a paint film, the shrinkage and swelling or "working" of wood sets up stresses which soon fracture the relatively rigid paint film at the junction. Once water has entered the joint through a broken paint film, the wood in this and adjacent regions may remain wet for a long time, as the paint coat may retard the loss of moisture. When the moisture content of the wood reaches approximately 25 per cent., then decay can commence.

The Remedy

For non-durable woods exposed to the action of weather the most reliable treatments which can be given, such as pressure impregnation, ensure that the wood is more or less completely penetrated with a highly permanent preservative. However, it is not always practicable to carry out such treatment, particularly where production is comparatively small.

An alternative, which is basically not as reliable as the above methods but which, according to overseas reports, is proving to have considerable merit, is the short-term dip or vacuum treatment of the manufactured article in a non-swelling paintable preservative with water-repellent properties. The principle behind this treatment is that by dipping the manufactured article (or its component pieces) before painting, the chemicals penetrate chiefly in the areas where they will do the most good, i.e. in end grain and joints, although the side-grain penetration may be very small in some species. The treatment does not obviate the need for subsequent painting but does have considerable advantage in small outlay, rapid treatment, and suitability for small production factories. It has the further advantage that in addition to a toxic chemical, a water repellent is also introduced which retards the absorption of moisture essential for decay.

Non-swelling and paintability of the wood after treatment depend upon using the correct solvent, which does not swell the wood or raise the grain and is sufficiently volatile to permit painting of the material within a week or less. Penetration is largely determined by the type of wood used, but is also affected by the dipping period and the type of solvent. Water repellency is achieved by adding specific water-repellent chemicals to the formulation.

In the United States of America, dip treatments with non-swelling, paintable, water-repellent preservatives commenced some 20 years ago, and have been mainly applied to pine window stock. As far as is known the protection afforded has been satisfactory. The preservative is usually applied to easily penetrated timbers by complete immersion for three minutes after all machining has been completed. In general, brush treatments are not satisfactory as penetration into crevices, etc. is not ensured. Attention should also be paid to the amount of cutting which has to be done during installation of the unit, as obviously any cutting after dipping will expose untreated wood.

Water-repellent treatments for wood products have been receiving particular attention in recent years. At present it is not economically feasible to prevent all changes of moisture content in wood. However, with suitable water repellents it is possible to reduce the rate of moisture change where wood is exposed to weather. Treated wood thus tends to remain at a more uniform moisture content with beneficial effects, such as reduced "working" of wood, less tendency for joints to open up, and less trouble in sticking or rattling of windows with changing atmospheric conditions. It may be expected that water-repellent treatments will be of particular value for hardwood joinery, where cracking or splitting sometimes does occur.

Experience in Australia with the non-swelling paintable water-repellent type of preservative is as yet very limited and work is at present in progress to determine effective penetration and dipping times for Australian timbers.

Progress studies show that hardwoods of the ash type, e.g. mountain or alpine ash and messmate, and also oregon, are fairly resistant to deep end-grain penetration by the solution, and that immersion for at least one hour is desirable. Better penetration can be obtained by heating the wood just prior to immersion. For more porous timbers, such as radiata pine, a 10-minute dip is satisfactory.

The essentials of the preservative formulation discussed in this article are that it should contain at least 5 per cent. pentachlorphenol in a reasonably volatile solvent, together with an anti-blooming agent and water repellent. It is believed that such a formulation will soon be generally available.

For further information on this subject, inquiries should be addressed to the Chief, Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne.

DONATIONS

Firms and individuals who make donations to the funds of the Division are reminded that such donations are an allowable income tax deduction in Australia, under the heading of "Gifts to approved research institutes for scientific research, etc."

The following donations were received by the Division during September:

Associated Kiln Driers Ltd., Colac, Vic.	£50 0 0
Delfor Engineering Co., Mentone, Vic.	£1 0 0

Important Commercial Timbers of Sarawak. II

By D. R. BAYLY, Department of Forests, Sarawak

Sepetir

This wood is moderately hard and rather light to heavy, varying from about 33 to 51 (average 40-45) lb/cu. ft. air dry. Sapwood is wide, light greyish brown, sometimes pinkish; heartwood has various shades of brown, usually with darker layers and streaks which often form a very ornamental figure. It is rather oily to the touch. Grain straight or slightly interlocked, texture moderately fine and even. Easy to work, takes a good polish, has good nailing qualities. Sapwood susceptible to *Lyctus* borer. Suitable for general light construction (not durable in contact with the ground), joinery, furniture, and panelling.

Jongkong

The wood is soft and light, averaging about 28-30 lb/cu. ft. air dry. Sapwood is pale and merges gradually into the heartwood, which is yellowish with a pinkish tinge when freshly cut, darkening slightly with age. The most prominent feature is the characteristic pattern of very small perforations on the longitudinal surfaces, which at a glance suggests a heavy attack by pinhole borers, though this is certainly not the case. The timber is very easy to work and takes a very fine finish. Seasoning presents no difficulty. Suitable for interior joinery, broom-heads, and other miscellaneous uses.

Keruing

Wood is rather hard, heavy, and strong, but different species show a very considerable range in air-dry weight from 40 to 60 lb/cu. ft. Sapwood is greyish or purplish brown when dry, easily distinguished from the heartwood, which is light red to dark brown or reddish brown, and usually featureless. Grain is straight, unusually so for a tropical wood, texture moderately coarse and even. Oily resin common on end surfaces. Care is needed in seasoning, as shrinkage is high. Sapwood is susceptible to *Lyctus* attack, and the heartwood is only moderately durable in contact with the ground. Its freedom from natural defects and its strength make it very suitable for use as a structural timber. Also used for flooring, vehicle construction, gymnasium equipment, and interior joinery.

Kapur

Wood is moderately hard and heavy, averaging 45-50 lb/cu. ft. air dry. Sapwood is distinct, yellow-brown with a pinkish tinge, heartwood is dark reddish brown. Freshly-cut wood has a distinct camphor-like odour and this is rather persistent in some species. Grain is slightly interlocked, texture rather coarse but even. Can be sawn and worked moderately easily, but may blunt saws and planer knives, owing to presence of silica. Nails and screws well, but does not take a high polish without filling. Excellent for medium-heavy constructional work.

Sempilor

This is a non-pored wood and is of fine, even texture. Colour ranges from pale buff to pinkish brown. The timber is moderately hard and moderately heavy, weighing 36-46 lb/cu. ft. at 12 per cent. moisture content. Works well and takes a high polish. Suitable for veneers, interior joinery, and mouldings.

Nyatoh

The colour varies from deep pink to red-brown; the weight varies from 33 to 52 lb/cu. ft. air dry but the major part of the timber is about 40 lb/cu. ft. air dry. Timber can be sawn easily, may be readily worked to a smooth finish, and takes a good polish. Grain straight or only slightly interlocked, sometimes wavy; texture even and moderately fine. Holds nails well, and presents no difficulty in seasoning. Not durable in contact with the ground. Uses include interior construction, joinery, and furniture.

Geronggang

Wood soft and light, averaging about 31 lb/cu. ft. air dry. Sapwood is pale yellow or pinkish and usually about 1 in. in width. Heartwood is a bright salmon pink when freshly cut. Grain straight, texture rather coarse but even. Can be sawn and worked without difficulty, but may blunt cutting tools owing to presence of silica. Seasons without difficulty. A general utility timber where high strength and durability are not required. Suitable for interior joinery, shelves, plywood.

FURNITURE DESIGN COMPETITION

In Newsletter No. 198 (July-September 1954) details were given of a Furniture Design Competition sponsored by the Forestry Commission of New South Wales.

Designs for articles of furniture made from New South Wales timbers were required, and the Commission recently announced the results of the competition.

The prototypes of designs selected for final judging were displayed at the N.S.W. Guild of Furniture Manufacturers' Annual Mart at the Sydney Showground.

The first prize was awarded to Mr. W. E. Lucas, of Sydney, for a chair design, and second prize to Mr. D. S. Bertrand, of Ripponlea, Melbourne, for a bed design.

Details of the next competition, entries for which close in December, will be published in a later issue of the Newsletter.

ROUND FENCE POSTS

Preservative Oil Treatment

For many years the Division of Forest Products has advocated the preservative treatment of round fence posts cut from non-durable species as a means of offsetting the increasing scarcity and price of split durable posts.

In many districts the problem has become more acute in recent years, and the Division has spent a considerable amount of time investigating the various factors involved in economically treating round posts.

Tests of treated non-durable posts were commenced by the Division 25 years ago in Western Australia and nearly 21 years ago in Victoria. Round posts of a number of non-durable species, including radiata pine, were treated with a variety of preservatives and set in fence lines in localities of severe decay or termite hazard. The great majority of these posts are still in very good condition, and will last many more years.

On the basis of this experimental work, supported by extensive field tests, the Division has issued a publication dealing with all aspects of the treatment of round fence posts with preservative oils.

C.S.I.R.O. Leaflet No. 12, "Round Fence Posts: Preservative Oil Treatment", may be obtained on request to the Chief, Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne.

STAFF NOTES

Mr. Stanley A. Clarke, Chief of the Division, is expected to return to Melbourne on November 7. Mr. Clarke has been acting as adviser to N.Z. Forest Products Ltd. for the past four months and has visited New Zealand, England, Europe, the United States of America, and Canada, in company with Sir David Henry, Chairman of Directors of N.Z. Forest Products Ltd.

Mr. D. S. Jones, of the Utilization Section, returned to the Division early in October after 12 months abroad, during which time he studied the sawing, sawmilling, and woodworking research being conducted in overseas forest products laboratories.

Mr. Jones spent nine months at the Swedish Forest Products Research Laboratory in Stockholm, where he worked under the direction of Dr. Bertil Thunell, head of the Wood Technology Department. Mr. Jones also visited Norway, Finland, Germany, Belgium, and France, and spent four weeks at the Forest Products Research Laboratory, Princes Risborough, England. He returned to Australia via Canada and the United States of America, spending some time at the Canadian Forest Products Laboratory, Ottawa, and the U.S. Forest Products Laboratory, Madison, Wis.

It is with great regret that we announce the death of Mr. I. H. Boas, former Chief of the Division of Forest Products. Mr. Boas passed away on October 16 after a short illness.

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Finishing of Wooden Floors

By W. G. KEATING and M. A. WILLIAMS, Utilization Section

THE DIVISION of Forest Products is frequently consulted regarding the sanding, staining, and polishing of wooden floors, and although these topics are outside the scope of the Division's programme of research, general advice is usually given to the enquirer, as there is no research being conducted into problems associated with floor finishing in Australia, except by some paint manufacturers.

Instructions relative to proprietary lines are generally printed on the containers and may be supplemented with advice obtainable from reputable paint merchants. Such directions should always be carefully followed.

Treatments with materials generally available could be expected to produce good finishes on wooden floors if the following procedures are observed:

Preparation

Punch all nails below the floor surface and fill the holes with a suitable putty stained to match the surrounding wood. After 48 hr sand the floor smooth either by machine or by hand. When sanding by hand use M2 sandpaper on a cork block, and if necessary follow this with a finer grade paper, say No. 1. All sanding must be in the direction of the grain of the timber. Remove all dust after sanding, preferably by means of a vacuum cleaner.

Staining or Oiling

If the floor is to be left in natural wood colour, this step is omitted. However, if the floor is to be coloured, select a suitable stain, either one with an oil base or a water-soluble type. For softwood floors the oil-type stain is usually advisable, while for hardwoods either type may be used. Oil stains are easily applied and do not raise the grain. Although water stains cause slight roughening of the timber surface, they are more permanent in colour than oil stains and give good penetration. Grain raised after water stains are applied can be removed by light sanding with No. 0 sandpaper. Brush the stain in the direction of the grain with a 2- or 3-in. soft bristle brush and allow it to dry for 24 hr.

Another type of treatment consists of oiling with raw linseed oil or a combination of raw linseed oil and turpentine in the proportion of 3 parts to 1 part. Brush or mop the oil over the floor and allow to soak into the wood. Apply a second coat 24 hr later. If 30 min after this application there are any glossy patches where excess oil remains on the surface, wipe it off before it has time to harden. A further single application can be given as the surface begins to wear.

There are also a number of proprietary brands of oil-type floor finishes which can be used in place of those described.

Sealing

If an oil-type finish is not required, the natural or stained timber should be sealed. Sealing involves the use of shellac or a proprietary sealer consisting generally of nitrocellulose and shellac. If shellac is used, prepare a solution by dissolving 3-4 lb of bleached shellac in a gallon of methylated spirits or alcohol. Make sure that the shellac is freshly manufactured as old shellac may discolour the timber. Brush the solution on in the direction of the grain using a 3-in. soft bristle brush. Allow to harden for 24 hr and then rub down lightly with fine sandpaper or steel wool. Apply a second coat and lightly rub down again. All dust must be removed after each operation. The procedure is similar with proprietary sealers, but it is advisable to follow closely the manufacturer's directions.

Finishing

The floor surface having been sealed, finishing materials can be applied. If a final high gloss is desired, a clear floor varnish is generally used. Brush on in the direction of the grain, and when dry, usually after 48 hr, rub lightly with fine sandpaper or steel wool and apply a second coat. When hard, the varnished floor is ready for use. Later coatings of varnish can be applied as the old surface begins to wear.

As an alternative finish, the floor may be waxed either with a paste-wax polish or with a liquid-type floor wax. Make sure that the liquid wax is not water-based, as in some instances water will turn shellac white. Liquid waxes are now widely sold and have slip-resistant properties combined with a moderate gloss. The liquid-type wax is best applied with a lambs' wool applicator, obtainable from hardware stores, or a mop. Two applications of wax are necessary before any traffic passes over the boards. Wax cannot be satisfactorily applied over an oily surface.

The advantages and disadvantages of the various types of finishes are as follows:

Oil.—Easily applied and renewed. Chief disadvantages are that oily surfaces tend to collect dust and "build up" to cause darkening of the wood. Not slippery if excess oil is wiped completely from surface.

Varnish.—More difficult to apply and repair. Glossy surface is suitable where foot traffic is light. Does not retain grime.

Waxes.—Paste types although easily applied and maintained with glossy surface are often slippery. They tend to "build up" layer upon layer with subsequent darkening of surface. Slip-resistant waxes are readily applied and renewed, and are particularly suitable for domestic use. No great disadvantages.

Furniture Design Competition

ENTRIES for this year's Furniture Design Competition conducted by the Forestry Commission of New South Wales will close at 5 p.m. on January 27, 1956. Prizes of £75, £30, and £20 respectively will be awarded.

The use of one or more of the following timbers is specified: New England oak (*Eucalyptus obliqua*), tulip oak (*Tarrietia* sp.), negrohead beech (*Nothofagus moorei*).

Drawings may be in either ink or pencil, and each sheet of drawings should measure 29 by 15 in. Sufficient details to enable construction to proceed without further reference to the designer are required, and any special fittings should be drawn in detail. The name of the designer must not appear on the face of the drawings, and an entrance fee of 5*s*. must accompany each entry.

Entry forms and further information may be obtained from the Division of Wood Technology, Forestry Commission of New South Wales, 96 Harrington Street, Sydney.

DONATIONS

THE following donations were received by the Division during October:

Furness Ltd., Edwardstown, S.A.	£50 0 0
A. W. Pryor, South Brisbane	£1 5 0
Orient Line, Melbourne	£10 10 0
Town and Country Joinery Works Pty. Ltd., Brisbane	£20 0 0
Victorian Sawmillers' Association, Heyfield Branch	£10 0 0
South Australian Timber Merchants' Association, Adelaide	£50 0 0
Timbrol Ltd., Melbourne	£15 0 0

Timber Seasoning Course at Tumut, N.S.W.

AN INTENSIVE 5-day course in timber seasoning and utilization, held at Tumut, N.S.W., October 10-14, was conducted as a joint activity by officers of the New South Wales Forestry Commission and the Division of Forest Products, C.S.I.R.O. Some 50 representatives of the timber and allied industries and forestry personnel attended.

In an opening address, Mr. E. L. S. Hudson, New South Wales Forestry Commissioner, said that Tumut had been selected as the venue because of its growing importance as a timber producing centre. He indicated that the planning programme for the Tumut area envisages a pine plantation establishment of some 70,000 acres with a log output approximating 200 million super feet.

The Course consisted of a series of 18 lectures and discussions on plant layout and timber handling; air seasoning; stacking techniques and equipment; timber grading; the cause and prevention of warp in wood; modern drying kilns for sawn timber and veneer; shrinkage, collapse, and reconditioning; the cause and alleviation of checking and drying stresses; testing for moisture content; anti-sapstain dip treatments; kiln operation and maintenance; factors affecting boiler performance; steam and its use for heating; the use of flue gases for kiln heating; superheated steam drying; kiln control and instrumentation; and kiln installation and drying costs.

Several sessions were devoted to practical work on measuring moisture content, the preparation and use of sample boards, and methods of testing for stresses in wood. Talks on radiata pine logging and demonstrations and talks on the care and use of chain saws were also given during field visits to pine plantations.

Timber Seasoning Course 1955, Tumut, N.S.W.

Well-known New South Wales companies represented at the class included Messrs. Hansen Consolidated Industries Ltd.; Smith Bros. Pty. Ltd., Rosebery; Slazengers (Aust.) Pty. Ltd., Alexandria; Vanderfield & Reid Ltd., Sydney; Hardy's Joinery Pty. Ltd., Wagga; Donoghue & Hopkins Ltd., Queanbeyan; Monga Sawmills Pty. Ltd., Monga; T. S. Carson, Tumut; Oakley & Co. Pty.

Ltd., Rozelle; Wallace & McGee, Dubbo; Manilla Sawmills Ltd., Manilla; Riverina Sawmills Ltd., Wagga; Oakley & Ball, Wauchope; Rosebery Veneer Pty. Ltd.; Neville Cush & Co., Kogarah; National Box Co. Pty. Ltd., Rozelle; and Furniture Industries Pty. Ltd., Sydney. Representatives of the New South Wales Forestry Commission, Country Timber Merchants' Association, Timber Development Association, and timber companies at Devonport and Glen Avon, Tasmania, also attended.

Mr. E. B. Huddleston, Chief, Division of Wood Technology of the New South Wales Forestry Commission, and his staff, and Mr. R. Forster, District Forester, and his staff, were responsible for local arrangements and spared no effort to ensure first-class facilities.

Class lecturers were Messrs. G. W. Wright (Officer-in-Charge, Seasoning Section), R. F. Turnbull (Officer-in-Charge, Utilization Section), W. McKenzie, and G. S. Campbell of the Division of Forest Products, C.S.I.R.O., and Messrs. Peter Marshall, R. Forster, and R. Hammond of the New South Wales Forestry Commission.

This class followed an earlier one held in Adelaide during March this year. Both have proved so successful and have been so well attended by representatives of the timber producing and using organizations, that a further class is to be given jointly with the Associated Sawmillers and Timber Merchants of Western Australia in Perth during May next year. It is hoped to follow this up with classes in other States.

OBITUARY: I. H. Boas

By the death on October 16, 1955, of Isaac Herbert Boas, Australia lost one whose unquenchable conviction that an Australian paper making industry could be based on the pulping of light-weight eucalypt timbers was a big factor in the ultimate establishment of that industry.

Born in Adelaide, S.A., in 1878, a son of the Rev. A. T. Boas, Rabbi of the Adelaide Hebrew Congregation, I. H. Boas was educated at Prince Alfred College and Adelaide University. He graduated B.Sc. in 1899 and did a post-graduate course in mining engineering and metallurgy.

Twenty years of lecturing in physics and chemistry followed, first at Adelaide University, then at Charters Towers Technical College, and finally at Perth Technical College, where he carried out research on the coal of the Collie fields; for this he was awarded an M.Sc. degree by the University of Western Australia. In Perth he had a practice as a consulting chemist, and in 1918 began his work on the pulping of Australian hardwoods for paper making. The following year he went abroad on behalf of the Bureau of Science and Industry to study forest products investigations in U.S.A., Canada, England, and on the Continent.

On his return Mr. Boas began, in association with the Western Australian Government, to establish a forest products laboratory. In 1921 he resigned to join Michaelis Hallenstein & Co., of Melbourne, as chief chemist. In 1928 he was invited to become the first Chief of the newly formed Division of Forest Products, C.S.I.R.

When he retired in 1944 Mr. Boas had the satisfaction of knowing that under his direction the new Division had made a big contribution to the increased efficiency of the Australian timber industry, and had earned a place amongst the leading forest products laboratories of the world. This was due in no small measure to his keen perception of the problems of prime importance and his gift of encouraging and maintaining the enthusiasm of his staff. In the work of the Division he maintained a happy balance between the pure scientific approach and the applied approach to practical problems, which won him the esteem of both scientific workers and timber men.

He took an active part in the life of the Jewish community and was an untiring worker on behalf of those Jews who sought refuge in Australia.

Mr. Boas is survived by his widow, three sons, and two daughters.

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