

BRANCH NEWS



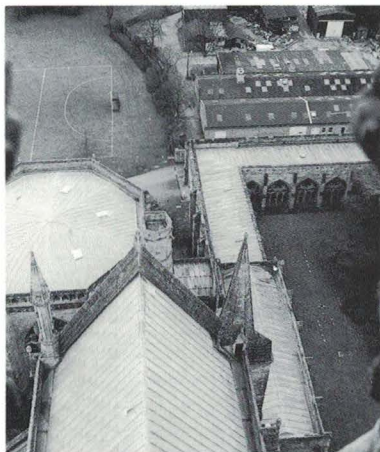
Tim Tatton-Brown explains the additional bracing in the tower

Photographs by David Woodbridge.

Joint visit to Salisbury Cathedral by the London and Southern Branches



Part of the group in the nave roof



View of Cathedral roof from the tower

On Friday March the 5th the London and Southern Branches' trip to Salisbury Cathedral took place.

This quite outstanding event was attended by over 40 members and friends (somewhat to the surprise of the Cathedral Staff).

The tour of the roofs and tower was led by Tim Tatton-Brown (above ground Archeologist to the Cathedral). The combination of the brilliance of the ancient timber work and Mr. Tatton-Brown's immense knowledge and enthusiasm held everyone's attention to such an extent that no one (apparently) gave a thought to such trivial matters as vertigo!

A fuller, illustrated, report will be printed in the next Newsletter.

CORPORATE MEMBERS

The Council of Management wish to record its thanks to those listed below for their support as Corporate Members:

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25th Anniversary of the formation of the Australian Branch

On Thursday, 12th November 1998, the Australian Branch of the Institute of Wood Science celebrated the 25th Anniversary of its formation with a Dinner in Melbourne, at which the Branch Chairman, Dr. Harry Greaves took the chair. Members from all parts of Australia attended, including Bill Keating and three other former Branch Chairmen. Research Institutes, University Departments and Industrial Companies working on aspects of Wood were well represented.

Having represented the Australian Branch on the Council of the Institute for some twenty years, I was delighted to be invited to attend and accompanied by my Wife, departed for Melbourne on 9th November.

The Dinner took place on Thursday, 12th November with some eighty people attending, including many well known Australian scientists who have

developed many aspects of wood science and formed the basis of some excellent research groups across Australia today. It was great to meet so many old friends and make new ones. Harry Greaves gave the address, welcoming all those present and giving a brief review of the development of the Branch in the last 25 years. He was followed by a presentation entitled "Wood for Furniture — A Challenge for the Timber Industry" given by Graeme Gooding and Lee Kidman.

I spent nine very happy days in Australia and met up with other old friends who had not been able to attend the dinner. I was also given the opportunity to spend two days visiting CSIRO Forestry and Forest Products at Clayton and seeing and discussing some of the aspects of research that were being undertaken there. I spent one more day with the School of Forestry of the University of Melbourne at Creswick, having similar discussions on the research projects being undertaken there. These three days were interesting and very stimulating and I was thrilled

to see how much basic fundamental research was being undertaken in these two Institutions and hear of other equally interesting research being carried out in other Australian laboratories. There should be series of very interesting papers coming from Australia in the next five years or so which are likely to be of first class importance to both research scientists and the Timber and Forest Products Industries worldwide.

I was also given the opportunity to attend and give an address to a meeting of the Timber Preservers Association of Australia.

It was a great nine days in Australia, which we thoroughly enjoyed and the date of our return flight came all too soon. It was a good flight, however and as we approached Heathrow before dawn on 20th November, we were informed that "---- the weather in London is fine, --- BUT, the temperature is 1°C." Nevertheless the brilliant colourful sunrise which followed was a very nice "Welcome Home".

J. F. Levy.

INFORMATION

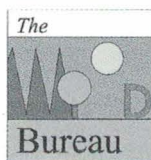
The WOOD Bureau - www.woodbureau.co.uk

WOOD - so much more than just wood!

WOOD - the stuff that trees and books and charcoal and fire doors and violins are made of.

WOOD - without which life, and many companies, would be all the poorer.

WOOD - has a remarkable history - the future has a remarkable material - **WOOD!**



A new approach that will benefit you and wood.

Instigated with the aim of developing a non-partisan organisation; to obtain significant funding without vested trade interest; to provide a wide audience with comprehensive, reasoned and balanced information; to create an atmosphere in which wood is naturally accepted, recognised for its adaptability and used with alacrity, diligence and confidence to the limit of its capabilities; to promote the true value of wood for the benefit of all who rely on it for their commercial activities and success.

Every wood-reliant company can afford the low subscription levels; whether they choose to become sponsors is a different matter. They are happy to use wood but that is as far as it goes. With more than 30,000 wood-reliant companies in the UK alone, the effect of such a potentially major funding annually would be profound and long lasting.

UNITED KINGDOM FOREST PRODUCTS ASSOCIATION

The British grown timber industry has witnessed a significant increase in its share of the UK market in recent years. It is estimated that over the past two decades, market share for British grown timber in the overall market for wood in the UK has increased from about 8% to at least 22%.

The United Kingdom Forest Products Association (UKFPA) represents the technical and commercial interests of the British grown timber industry. UKFPA Members account for at least 85% of the production of sawn British grown softwood and more than 90% of the production of sawn British grown hardwood.

Members of UKFPA include harvesting companies, sawmillers, sawmill co-product processors, merchants, paper and board manufacturers and manufacturers of wood based panel products, all derived from British grown timber. In addition to these mainstream activities, other services include specialist joinery manufacture and the manufacture of fencing, gates, pallets and packaging.

UKFPA is governed by an Executive Council, whose membership represents a cross section of Members' interests and activities. In addition, there are a number of specialist sub-committees which address specific topics, including education, training, health and safety, wood supply, technical and development issues, harvesting and contracting matters and environmental issues.

UKFPA has a regional group structure, which provides a forum for Members to meet at a regional level. The Regional Groups cover North Scotland, South Scotland, Northern England, Wales and the Midlands, Southern and Western England and Northern Ireland.

Although timber is one of the oldest construction materials used by man,



research and development plays a major part in ensuring that new opportunities are presented for British grown timber, most notably for its use in construction. UKFPA is an active sponsor of research and development.

In addition to significant investment in plant and machinery and involvement in developing British and European Standards, continued investment in research and development has increased the competitiveness of the industry, primarily through improved product quality. This has enabled British grown timber to compete effectively in the international market for construction timber. With increasing volumes of British softwood becoming available, research continues to have an important role in maximising further opportunities for the product.

Research has contributed to the continuing success of British grown timber in construction. A wide range of research projects have been undertaken in conjunction with UK research establishments, most notably with the Centre for timber Technology & Construction at the Building Research Establishment and TRADA/TRADA Technology Limited, with whom there are strong and effective links. In recent times, increased involvement in research programmes has been facilitated by Government initiatives such as the DETR Partners In Technology and Partners In Innovation programmes.

Further information: David Sulman, Executive Director, UKFPA, tel: 01786 449029, fax: 01786 473112.

PROMOTING SAFETY IN THE WOODWORKING INDUSTRY

In Journal issue Volume 13, No.4, Winter 1994, a review of the HSE Video series 'The Cutting Edge' was printed.

Now that the Provision and Use of Work Equipment Regulations 1998 (PUWER) are fully operational, the three videos have been revised to take full account of the legal changes that are now in force, as from December 5th.

This very excellent video series, a must for all concerned with the management and use of woodworking machinery, is available for hire or purchase from HSE Videos, PO Box 35, Wetherby W. Yorks LS23 7EX.

An approved code of practice (ACoP) will be available from HSE on the use of woodworking machinery and currently four (free) woodworking information sheets relating to PUWER 98 are available from the HSE publications (01787 881165)

The following description of the videos is reprinted from the HSE leaflet:

Part 1: MANAGING FOR SAFETY **Running time 15 minutes UK 4411**

The programme highlights the need for introducing, developing and maintaining a health and safety strategy. It follows the progress of a management meeting devising a strategy and implementing it. The message is reinforced by using the presenter and re-enacted interviews, confirming a business-like approach to health and safety is essential to any successful and efficient company.

Part 2: A SAFE MACHINE **Running time 11 minutes UK4412**

'A Safe Machine' concentrates on achieving good standards of machinery safety in various sectors of the woodworking industry by well managed training and supervision. The programme emphasises that the majority of woodworking machinery accidents could have been prevented, if the people involved had received proper training and supervision. Training is vital for everyone in the management chain, to ensure that each person knows their responsibilities and capabilities. Safe working practices, properly guarded machines and the use of safety devices are also shown.

Part 3: A HEALTHY BUSINESS **Running time 12 minutes UK 4413**

There are many hazards to the health of people in the woodworking industry, the two most obvious being noise and dust. Exposure to noise from woodworking machines can cause noise induced hearing loss. Wood dust can cause respiratory illness and even in some cases a rare form of nasal cancer. Companies can and should introduce a strategy where they are in control of the health of their workforce, just as they are in control of other aspects of their business.

These videos were filmed at a number of locations and show the diversity of the woodworking industry.

IN PRAISE OF SYCAMORE (*Acer pseudoplatanus*)

by Michael Tinsley

(Forestry Consultant: Tinsley and MacMullen, New House, Julian Road, Pulham Market, Norfolk, IP21 4TH)

One of the most encouraging aspects of broadleaved forestry, although it seems to have escaped the notice of a high proportion of woodland owners, is the increasing marketability of sycamore.

Maligned by many for years as a weed, a killer of ground flora, economically unimportant, not indigenous and of little use to the native fauna the sycamore really needs pulling out from behind its bush.

It is true that it has weed-like aspects: it grows and flourishes with a proliferation that no other timber tree can match. Despite this admirable enthusiasm for reproducing itself it should not be regarded as a tree that will grow well under most circumstances - and by well, I mean in quality and form. To produce the best timber, sycamore has its own particular site requirements although it is less exacting than many of its peers; sycamore prefers a reasonably fertile soil, it likes lime when it can get it and a sheltered situation, although it is windfirm and makes a good shelterbelt tree, especially in coastal areas as it tolerates salt spray. Nonetheless, to grow at its best it prefers a relatively sheltered environment.

That it kills ground vegetation by dense shading is no more true of sycamore than any other forest tree and it certainly isn't as bad as beech - what is?

When treated like a crop rather than a weed; and therefore carefully thinned to allow the development of good crowns, the forest floor below will produce the same amount of vegetation as would a properly nurtured oak wood.

Re-seeding will occur but the young trees will only develop where there are open areas and therefore light. In this modern day it is not difficult or costly to spray off unwanted growth anyway. No, it is not truly a native tree although it is rather pedantic to make too much of this. It has certainly been around for close to five hundred years, so it is for better or worse now "naturalised" and but for the English Channel it would have been here as long as the oak.

Ecologically it is not the sterile habitat that is so often portrayed - far from it, although it does not possess the rich diversity of dependant life forms associated with oak. It is nonetheless a tree of considerable merit in this respect. It hosts a huge variety of aphids, in fact the overall insect biomass on sycamore is superior to many native broadleaves. The presence of aphids makes it attractive to birds, and bees like it too for the flowers are rich in nectar - your car will bear testament to this when you park beneath a sycamore in the summer.

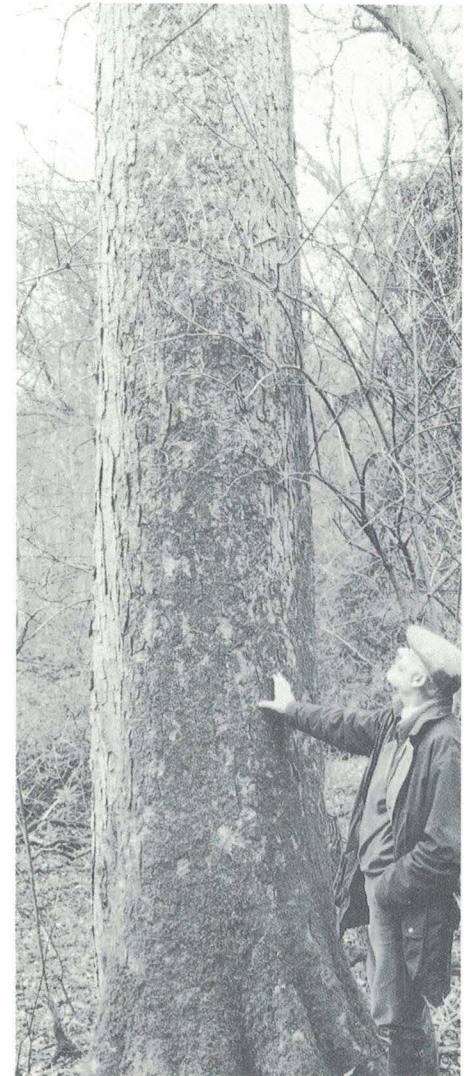
Economically, good sycamore is an extremely attractive proposition: It comes cheaply: no costly guards, no fencing and no initial purchase unless it really is an introduction. It will require singling but luckily it can compete well with its own kind. Although it self-prunes reasonably well when growing competitively, to produce trees of the best potential quality and therefore marketability, the high pruning of selected logs is important.

Fast, even growth, based on a 5-year thinning cycle towards a likely rotation of 50-60 years, is the aim - but rotation length is geared to the tree and not the crop, for sycamore provides one of the best candidates for sustained broadleaved woodland through continuous cover forestry.

An important part of the thinning regime is to permit and encourage the development of select young seedlings within the crop: ideally seeking a representation of all age classes throughout. Better still, thin to permit the introduction of other species for longer-term development and diversity.

Sycamore timber is much sought after, especially in continental Europe. Prices are good for winter-felled timber of most size ranges above say ten inches diameter; early thinnings are no less saleable than any other hardwood. Value throughout the range is good - comparable with ash and often better; certainly today sycamore is more sought after than ash. Always of course there is the prospect of the elusive 'ripple' - the tree with that unusual figure, prized for musical instruments and in furniture as a veneer. You can expect perhaps one in every acre or so - then, the sky is the limit!

Surely, you say this tree must have some drawbacks? Well, it has one nasty ailment - Sooty Bark Disease (*Cryptostroma corticale*), associated almost entirely with sycamore, but occasionally with other maples, and saprophytically with horse chestnut. The fungus lies in a latent state in the wood of healthy trees for many years, causing no symptoms. However if high temperatures and prolonged dry weather prevail it can spread rapidly in the wood and cause the disease. The external - visible - signs of the tree being affected do not appear until the fungus is well established in the outermost sapwood, at which time wilting sets in, the bark dies and the fungus spreads through it to form its very extensive fruiting structures. The thin blistered bark of the tree flakes and breaks open allowing spores to drift away. Prevention is not possible, but good husbandry and the growing of sycamore in mixture with other species will lessen its effects.



A high quality sycamore veneer butt

Then there is the grey squirrel - sycamore is one of the species very susceptible to attack. This provides no excuse whatsoever for not growing the tree - eradication of the grey squirrel is the answer and Woodland Heritage has been promoting the importance of this for a long time. One last thing: the proper weeding of young trees is almost more important than the proper planting of them in the first place and young sycamore must be especially kept clear of grass. Nurture them, tend them, protect them and the old ugly duckling makes a graceful and most valuable swan.

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PROGRESS NOW BEING MADE WITH BRITISH HARDWOOD IMPROVEMENT PROGRAMME

John Davis

The Trustees of Woodland Heritage have had the vision to support and apply their funds to the concepts and the detailed work programmes of the British Hardwoods Improvement Programme and we who are carrying out this work are indeed most grateful.

Over-cutting in two World Wars has left the English countryside with far fewer good trees than it deserves. The British cabinet makers, in Queen Anne's time and throughout the 18th and 19th centuries, led the world in style, quality and imaginative workmanship. The cabinet makers of today who make up many of Woodland Heritage's Members generally look to imported logs for quality and continuity of supply; while the British landowner is now often told that trees can only deliver environmental and landscape benefits, but forget the log. We can get that elsewhere! Any self-respecting 18th century landowner would have been utterly bewildered by such a thought as he sat down reading with sensitive enjoyment Gilbert White's *Natural History* and John Evelyn's *Silva*!

How do you improve trees, make them grow quicker, straighter, of better quality and higher value? The question of 'nature' versus 'nurture' must be debated. Foresters are taught that the height of a tree depends upon the soil it stands on, while its girth depends upon the forester and the work and the attention that he gives to the tree. This is broadly true and disposes of most of the 'nurture' side of the argument. The tree's 'nature' leads us to look at its inherent genetic characteristics. A tree with bad form is very likely to produce an offspring with equally bad form or worse. And vice versa. How do you pre-determine this so that the British tree nursery can concentrate on producing the best available material?

Here there are two very clear and quite distinct schools of thought. The first says - let's find the perfect tree and then reproduce it exactly - in other words 'clone it'. This is perfectly possible and the techniques for doing this do currently exist. As with "Dolly the sheep", so it can and has been achieved with forest trees - notably with the 'clonal monoculture' systems of poplar and eucalyptus.

However, the British Hardwood Improvement Programme prefers another route. It may be called "**natural improvement and selection**" and we

are now perfecting and building on scientific techniques which have been developed at Oxford University - the Oxford Forestry Institute - and a method already proved practical and tested in trials within the tropical rainforest. These trials have delivered genetic gains of between 30% and 50% improvement, acknowledging that the first leap in genetic improvement is usually the biggest. We are now applying this same technique to the deciduous broadleaved hardwoods that grow best in the British lowlands - oak, ash, cherry and walnut, with future programmes in sweet chestnut and some of the *Acer* family, like sycamore.

Different species display characteristics with varying degrees of genetic control. For example, vigour and branching are highly heritable in ash, with forking and form having much lower heritable characteristics. In oak, on the other hand, vigour is not particularly heritable while leading shoots (apical dominance) and form are. Cherry has highly heritable characteristics for branch thickness and for disease resistance. All these matters take some sorting out and we are doing this fast in our different species working groups. The aim is to identify and secure a potential 30% genetic gain within ten years. This will transform the economics of lowland tree production in the UK and bring it alongside those other agricultural land uses where varying crop returns accrue on an annual basis.

A really significant discovery in this programme is that the use of modern analytical techniques when applied to our unique breeding layout can prioritise the parent trees in order of excellence. With ash we have been astonished to find consistency at quite an early stage and that family ranking does not change a great deal. We are seeking those families whose progeny will do well on **all sites**; equally, we need to eliminate quickly those trees which are doing badly on all sites; in the middle there will be families which do well on some sites, but not on others.

Prioritising in order of excellence is not only essential in breeding better future progeny; it also gives the nurseryman really valuable data which he can use now.

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Miss Jean Marion Taylor FIWSc, Past President IWSc.

Jean Taylor died of cancer in February following an illness of several months. She was within a few days of her 75th birthday.

Jean served in the WRAF during WW2 working on air-frame maintenance and becoming a skilled fitter. After taking a degree in Zoology at her local university, U.C. Cardiff, she joined the Entomology Section of the Forest Products Research Laboratory in 1949 to work with Dr.R.C.Fisher. She was part of the immediately post-war intake to FPRL which included John Bletchly, John Brazier, Joe Carruthers, Bill Curry, Roy Laidlaw, John Savory, John Sunley, Michael White; colleagues who spent much of their careers at the Laboratory and made major contributions to many branches of wood science.

Jean's work at FPRL was on the prevention and control of wood-boring insect infestation. She led the evaluation of the newer generation of insecticides and was particularly concerned with the development of laboratory testing technology and the ever-thorny problems of using laboratory results to predict real-life performance. Her great practical skill and meticulous experimental work were invaluable in this field and she played a major part in collaborative programmes within the European Standards Organisation, CEN, and in the International Research Group on Wood Preservation.

After more than twenty years at FPRL, which by then had become the Princes Risborough Laboratory, Jean wanted to widen her professional horizons and she accepted a research post in the technical department of Protim. The qualities which had proved so valuable at PRL were put to good use in Industry and Jean was promoted to Technical Director - a post she held until her retirement in the mid 1980's.

The Institute of Wood Science played a large part in her life - she was elected a Fellow in 1962 and served on various committees before becoming President in 1986. Her presidency covered a period of considerable change in the Institute and her clear analytical approach and gift for enthusing people was put to full use.

Jean participated widely in social activities outside her career. In earlier years she was a keen golfer and was Ladies Captain of the Whiteleaf Golf Club. Later she became an enthusiastic gardener and a voluntary worker for the National Trust. For more than 30 years she was a committed and very active member of the Aylesbury Soroptimists serving as Secretary and twice as President of the group.

A forthright and straightforward person who expected to find these qualities in others, Jean hated pomposity and had the knack of rendering complex issues into their essentials. It was no surprise to those of us who knew her that, although she well knew its implications, she met her last illness with characteristic breeziness - almost with disdain - and was cheerful to the last. She will be sadly missed.

Michael Baker FIWSc

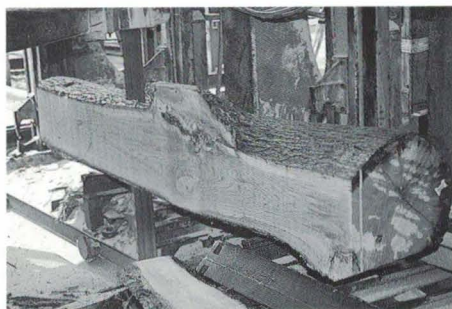
THE VISUAL STRENGTH GRADING OF OAK

David Woodbridge BA(Hons), FIWSc, HonFICW

For centuries oak has been associated with buildings, especially the structural components. In the 1950s BSI published Code of Practice CP112 covering the Structural Use of Timber. In this Standard design stresses for oak, ash and beech were represented along with a method of visual stress grading. In 1986 CP112 was withdrawn to make way for the current structural code, BS5268.

Over the last decade there has been a notable increase in the demand for structural oak for renovations, repairs and indeed new buildings. To assess strength the deleted grading rules in BS CP112 could be used as a yardstick but this was hardly an approach that did justice to oak or provided the necessary predictability and accountability for the specifier or commissioning authority.

With the publication of the enlarged BS5756 1997, Specification for Visual Strength Grading of Hardwood oak can now take its place alongside other established structural hardwoods.



Conversion of an oak log. Even though small the log has the potential to yield serviceable structurally graded timber, in this case a 200 x 200mm oak column (probably to the THB grade).

Strength Grades for Oak

The standard specifies two main strength grade categories. Firstly, for timber with a thickness of less than 100mm, or a cross sectional area less than 20,000mm², the grades are General Structural Temperate hardwood; TH1 and TH2.

Secondly, for timber with a minimum cross section of 20,000mm² and a minimum thickness of 100mm the grades are Heavy Structural Temperate Hardwoods; THA and THB.

Grade Limitations

The standard provides details of strength reducing characteristics together with guidance on the way that they can be measured and assessed. The limitations are given for each grade. For example, knots, whether contained within clusters or single, are measured across their face at right angles to the longitudinal axis of the timber. Depending on their longitudinal separation and their position within the piece, the limitations for knots appearing on the face of a timber section are:

TH1	up to 1/4
THA	up to 1/5
TH2 and THB	up to 3/4

The general rule for slope of grain, when occurring over a significant part of a face of the timber is:

max 1 in 12 for THA
max 1 in 10 for TH1
max 1 in 4 for the lower two grades THB and TH2

The interpretation of the grade rules, especially the traditional oak burr, requires a sound knowledge of wood structure and tree growth together with an intimate understanding of the grade rules. These skills can be acquired through training and, as with other established structural grading methods, a rigid system of examination and certification is already operational.

Oak is usually cut from the log in its green state, that is unseasoned and with moisture content that often far exceeds 20%.

Grade Marking

The standard states that timber with a thickness of 100mm or more, will be regarded as having been graded WET and the grade mark (or certificate, see below) will state this. The reason for this stipulation is on account of the extended drying time required for the larger dimensions. The grade description for smaller dimensions in respect of the WET or DRY rating will depend on the condition (moisture content) of the parcel at the TIME OF GRADING.



THA Oak beams for repair work at Westminster Abbey

Often the use of oak in building will be both structural and visual. Rather than having the faces of the wood grade stamped, when appearance is a feature, the Standard allows for a certificate of grading to be issued. In either case the essential details are:

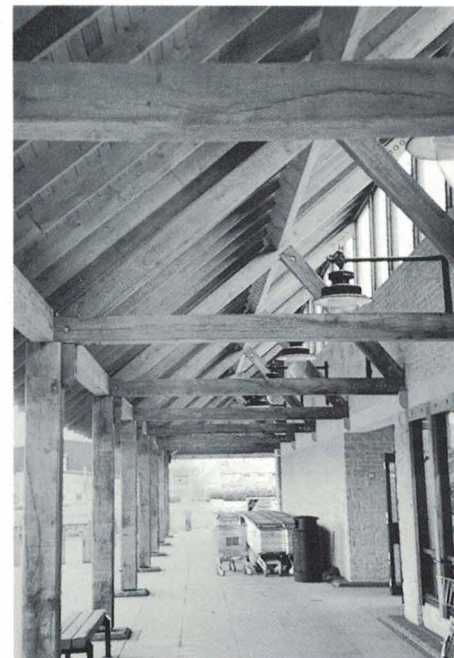
- Identification of the company responsible for the grading
- The grader (registered number)
- The certification body
- The BS Number (BS5756)
- The species (OAK)
- The strength grade
- The designation of wet or dry (see above)

BS5268 provides the individual stresses for the oak grades (see Table 1).

Table 1.

Grade stresses/F values (N/mm²) for each of the Oak Grades

	TH1	TH2	THA	THB
Bending Parallel to grain	9.6	7.8	12.6	9.1
Tension Parallel to grain	5.8	4.7	7.6	5.5
Compression Parallel to grain	9.3	8.4	10.5	9.0
Compression Perpendicular to grain (no wane at bearing area)	4.0	4.0	4.0	4.0
Shear Parallel to grain	2.0	2.0	2.0	2.0
Mean E	12500	10500	13500	12000
Min. E	8500	7000	10500	7500



Structural oak columns and roof timbers in a recent superstore development in Witney, Oxfordshire.

Also contained in BS5268 Part 2 are the strength classes for both softwoods (prefix C) and hardwoods (prefix D). THA is allocated to strength class D40, THB and TH1 are allocated to strength class D30 (see Table 2).

Table 2.

Extract from BS5268 Strength Classes for Hardwood

Comparison by Strength Class (BS5268 : Part 2 : 1996 N/mm²)

	D50	D40	D30
Bending Parallel to grain	16.0	12.5	9.0
Tension Parallel to grain	9.6	7.5	5.4
Compression Parallel to grain	15.2	12.6	8.1
Compression Perpendicular to grain (no wane at bearing area)	4.5	3.9	2.8
Shear Parallel to grain	2.2	2.0	1.4
Mean E	15000	10800	9500
Min. E	12600	7500	6000

TH2 is not included within the strength class system, however this grade can be specified, graded and marked in its own right.

By way of a comparison the combination of timber species and strength grade for some of the established tropical hardwoods are shown below (see Table 3).

Table 3.

Examples of timber species/Grade combinations relative to Strength Class

D50	Keruing, Karri, Opepe all to 115 Grade
D40	Iroko, Jarrah both to 115 Grade Oak to THA Grade 5
D30	Oak to THB/TH1 Grades

Please note that the above information from BS5268 and BS5756 is only intended to provide a comparison between the various grades, method of grading, strength classes and timber species. For detailed application of the information relating to visual strength grading and structural timber design one should refer to the British Standards.

WOOD SCIENCE – IT'S PAST, PRESENT AND FUTURE (Extracts)

by F.W. JANE

The inaugural lecture to the Institute of Wood Science — January 21, 1957

Professor Jane's book 'The Structure of Wood' was for many years the standard text book. I well remember working from it in the 1960s and it still provides a valuable reference source. It is also both interesting and revealing to re-visit Professor Jane's lecture of January 1957 printed in full in the first issue of the Institute's Journal.

The extracts below are remarkable in that they foretell several advances in timber technology and utilization that, 42 years on, we have come to accept as the norm.

David Woodbridge

In modern wood science some of the most exciting discoveries have been in the realms of chemistry and physics. Research has given us a picture of the walls of the wood cells as extraordinarily complex layered structures. We now know that each of these layers consists of a framework of a cellulose, which makes up about half the wall substance, and modern research has enabled us to discover how the cellulose molecules of this framework are arranged. This is of course, far too small to be seen with the ordinary microscope, but it has been discovered by indirect chemical and physical methods. Other substances, like lignin and water, lie in the spaces between the long bundles of cellulose molecules.

Cellulose itself is an immensely important substance and demands for it are increasing. Pulp, rayons and other textile materials, some plastics, wrappings like cellophane, and adhesives, are some of the things of which cellulose forms the raw material. Other plants, besides trees, produce cellulose and it does not follow that the cellulose of wood will necessarily be the source of the raw material. Nevertheless, in wood there is an enormous potential source of the raw cellulose.

As to the future of wood science, I can only make what I hope are intelligent guesses. I suggest that we may see much progress in the controlled production of our raw material for, as more and more of the world's forests disappear so, I believe, will the science of forestry develop. Growing trees is not a simple matter. It is not just a case of taking an area of available land and planting the sort of tree you want to grow, even if you are prepared to limit your requirements to trees which you know grow well in your district. A forest is not merely a collection of trees, but an integrated whole, a complex organism, which we cannot disturb without risk. As knowledge of forest ecology advances, I believe the forester will become more and more a forest warden, not a tree planter, and that he will regulate the development of his forest and its subsequent cropping, with a fuller

knowledge of the consequences of what he does. He may succeed in afforesting land at present regarded as unsuitable for trees, but of course, the agriculturist may learn to utilise land at present regarded as suitable only for forestry, so that it does not follow that the area available for forests will be increased. I am sure there will be more and more planting of selected strains of trees, as the science of tree genetics advances; strains which will give a quick return, or a high yield, or which have timber of some desirable quality. I do not, even, exclude the possibility that trees of a shape less wasteful in conversion may be produced – the forester's dream, the square tree. If that seems too fanciful, I may say that there is a lime tree growing in Cambridge in which a section across the trunk would show three straight sides and a fourth one slightly convex – not far off a square section. The tree looks healthy enough. I cannot discover anything definite about the history of this tree, but I have heard that it was produced experimentally; if so it means that the process can be repeated. Many tree species produce wood which at present is not valued highly. There are very heavy woods which are difficult to work; there are very light woods, incapable of standing up to work where any degree of strength is required. It does not seem too much to expect that future research on machine tools will help us to work some of these difficult woods. It would not be the first time that a tool had been produced to handle a recalcitrant wood. Or again, some way might be discovered of processing the logs of these awkward woods before conversion. It seems reasonably certain that we shall see improvements in cutters and saw teeth, made of material able to stand up to longer and harder wear, and I should like to think that some way will be discovered of sawing, or parting timber with a much smaller wastage than the present kerf involves.

Stronger and better wood preservatives will no doubt be devised, to the discomfiture of insect and fungus pests, not only those of temperate regions, but, as well, those like pin-hole borer and sap stains which disfigure so much tropical timber.

I would hazard a guess that particular attention will be paid to penetration and that in time it may be possible to preserve all timber which needs it, adequately and economically, without the use of costly and bulky pressure plants. The fibre board type of construction will be developed and much more of the tree used than at present.

I believe that in time some of these boards will have their fibres orientated and running in one direction, just as they do in wood. In other words, wood will be taken to pieces and rebuilt as required, blending the fibres of different trees and introducing those qualities which are wanted in the reconstituted wood. Perhaps we shall see rapid and reliable tests devised to determine the overall strength of wooden members in engineering.

As knowledge grows of the ultra fine structure of wood, we may be able to use this, together with our knowledge of microscopic and gross structure, to make much more accurate forecasts as to purposes for which woods are suited. An enormous field awaits exploration on extraneous materials, on the gums, resins, tannins and other substances which occur in wood. It is highly probable that many trees will be needed for their cellulose and lignin, to produce the numerous things that these two substances seem capable of yielding. It may even prove possible to introduce figure as well. Research on wood will continue and expand. Inevitably, emphasis must be given to the economic possibilities of research, but I hope that some money will be found for fundamental research, without regard for its economic possibilities. I am convinced that research of this type, purely for the sake of knowledge, is worth while and that, in the long run, it pays handsome dividends.

The Institute's Journal *Suggestions needed*

The latest issue concludes Volume 14. With the last two Volumes the front cover photograph has followed a particular theme.

Volume 13 was tree bark

Volume 14 was wood grain and figure

This now poses the question as to the theme for Volume 15

**YOUR SUGGESTIONS ARE
WELCOME PLEASE.**

The Editor