

# **J. W. Gottstein Memorial Trust Fund**

The National Educational Trust of the Australian Forest Products Industries



## **TIMBER INDUSTRY TRAINING AND PORTABLE SAWMILLING EQUIPMENT IN NEW ZEALAND AND CANADA**

**IAN SCHULZ**

2004 GOTTSTEIN FELLOWSHIP REPORT

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## Joseph William Gottstein Memorial Trust Fund

The Joseph William Gottstein Memorial Trust Fund was established in 1971 as a national educational Trust for the benefit of Australia's forest products industries. The purpose of the fund is *"to create opportunities for selected persons to acquire knowledge which will promote the interests of Australian industries which use forest products for the production of sawn timber, plywood, composite wood, pulp and paper and similar derived products."*

Bill Gottstein was an outstanding forest products research scientist working with the Division of Forest Products of the Commonwealth Scientific Industrial Research Organization (CSIRO) when tragically he was killed in 1971 photographing a tree-felling operation in New Guinea. He was held in such high esteem by the industry that he had assisted for many years that substantial financial support to establish an Educational Trust Fund to perpetuate his name was promptly forthcoming.

The Trust's major forms of activity are:

1. Fellowships and Awards - each year applications are invited from eligible candidates to submit a study programme in an area considered of benefit to the Australian forestry and forest industries. Study tours undertaken by Fellows have usually been to overseas countries but several have been within Australia. Fellows are obliged to submit reports on completion of their programme. These are then distributed to industry through the Trust's website [www.gottsteintrust.org](http://www.gottsteintrust.org). Skill Advancement Awards recognise the potential of persons working in the industry to improve their work skills and so advance their career prospects. It takes the form of a monetary grant.
2. Seminars - the information gained by Fellows can be disseminated by seminars as well as through the written reports.
3. Wood Science Courses - at approximately two yearly intervals the Trust organises a week-long intensive course in wood science for executives and consultants in the Australian forest industries.

Further information may be obtained by writing to:

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**Ian Schulz**

Ian Schulz has been a Sawmill Instructor with Timber Training Creswick, Creswick, Victoria, since 1997. Prior to that time, he worked at Whitlands Sawmill, a hardwood sawmill in the North-East of Victoria.

Training courses he delivers include:

- Occupation Health and Safety for Forest Operators and Sawmill Workers
- Portable and Production Sawmill Training
- Timber Grading – Structural & Appearance
- Chainsaw Training

During his time in the industry, he completed the following courses:

- Australian Vocational Certificate in Sawmilling and Further Processing (Certificate III)
- Assessment and Workplace Training (Certificate IV)
- Occupational Health and Safety for Sawmill Supervisors and OH&S Representatives
- Accident Investigation
- First Aid (Level 1 & 2)
- Occupational Health and Safety for Forest Workers
- Environmental Care Regulations for Forest Workers
- Advanced Timber Drying
- One Man Resaw Bench Operation
- Circular Saw Maintenance
- Chainsaw Operations Cross Cut and Harvest Trees Manually (Basic and Intermediate)

## **Executive Summary**

This report details findings of a study of New Zealand and Canadian timber industry training providers and portable sawmilling equipment suppliers in September 2004.

The points of interest addressed in this study were as follows

- Forest industry training curriculum and accreditation procedures
- Assessment techniques
- Training delivery/materials
- Occupation health and safety
- Distance learning methods
- Workforce recruitment and retention techniques
- Portable sawmilling equipment

The Canadian timber industry has identified a need for training at a higher level of responsibility than certificate 2 and 3 and has developed diploma and degree courses within the timber industry which offer the participant a career in middle management. The Australian training package has the ability to provide the basis for a Diploma in Sawmilling and Further Processing, and implementation of a similar program should be considered.

Training materials and/or publications that are used to assist in the delivery of training are often discarded at the course completion. The passport size learner guides developed by Ontario Forestry Safe Workplace Association, although small, contain all the key learning outcomes and are not intimidating compared to the larger book types. The development and trial of learner guides similar to these in Australia has the potential for more frequent use as reference material after training has completed.

There are currently many requests from portable sawmill operators Australia-wide who are seeking training in timber production to make their business venture more viable. However most can ill-afford the time involved let alone all the other associated costs. On-line and/or CD-ROM training programs offer a lower-cost alternative for training, and there are many training programs including portable sawmilling within the timber industry that would be suitable for this method of delivery. Although it is difficult to deliver the practical components of some training programs online or by CD-ROM, with proper development this technology has the potential to be a useful training tool for distance learning.

The timber industry in general is requesting more Occupational Health & Safety training and advice than ever before, and requests are currently outweighing the ability of Registered Training Organisations to provide the service. The industry in Canada and New Zealand has developed an enormous amount of material, and it may be possible for the Australian industry to tap into these resources and adapt the material to suit their own conditions.

A range of portable sawmill plants manufactured in New Zealand and Canada was evaluated, and several were deemed to be suitable for use in Australia.



# Contents





	Page
<b>Executive Summary</b> .....	<b>4</b>
<b>Introduction</b> .....	<b>9</b>
<b>Scope of Study</b> .....	<b>10</b>

## **Training Institutes**

• <b>School of Forestry and Wood Processing, Rotorua, NZ</b> .....	<b>12</b>
• <b>Logging Forestry Industry Training Board, Rotorua, NZ</b> .....	<b>15</b>
• <b>Ontario Forestry Safe Workplace Association, Nth Bay, Ont. Canada</b>	<b>16</b>
• <b>Forintek Canada Corp, Vancouver, BC, Canada</b> .....	<b>18</b>
• <b>British Columbia Institute of Technology, Vancouver, BC, Canada</b>	<b>20</b>
• <b>Open Learning Agency, Vancouver, BC, Canada</b> .....	<b>22</b>
• <b>University of British Columbia Centre of Advanced Wood Processing</b>	<b>23</b>
• <b>Comparison with Australian training facilities</b> .....	<b>26</b>
• <b>Recommendations</b> .....	<b>28</b>

## **Portable Sawmilling Equipment**

• <b>Introduction</b> .....	<b>31</b>
• <b>Mahoe Sawmills, Kerikeri, NZ</b> .....	<b>32</b>
• <b>Wood Works Limited, Hamilton, NZ</b> .....	<b>34</b>
• <b>Baker Products, Barrie, Ontario, Canada</b> .....	<b>36</b>
• <b>Wood-Mizer, Manilla, Ontario, Canada</b> .....	<b>38</b>
• <b>Select Sawmill Company, Plantagenet, Ontario, Canada</b> .....	<b>40</b>
• <b>Anderson Machinery, Chesterville, Quebec</b> .....	<b>44</b>
• <b>Demo 2004, Quebec City, Quebec, Canada</b> .....	<b>46</b>
➤ <b>Kesla Trailers</b> .....	<b>46</b>
➤ <b>Portable Winch Co</b> .....	<b>47</b>
• <b>Comparison of Portable Sawmilling Equipment</b>	<b>49</b>

## Appendices

	Page
<b>1. Itinerary .....</b>	<b>52</b>
<b>2. The School of Forestry and Wood Processing Certificate 2 in Solid Wood Processing – modules and learning outcomes .....</b>	<b>53</b>
<b>3. The School of Forestry and Wood Processing Occupational Health &amp; Safety – modules and learning outcomes .....</b>	<b>54</b>
<b>4. The School of Forestry and Wood Processing Certificate 2 in Saw Doctoring – modules and learning outcomes .....</b>	<b>56</b>
<b>5. The School of Forestry and Wood Processing Certificate 2 in Timber Machining – modules and learning outcomes .....</b>	<b>58</b>
<b>6. The training packages developed by Ontario Safe Workplace Association specifically for the timber industry .....</b>	<b>60</b>
<b>7. Forintek Timber Drying – module descriptors, contents and costs</b>	<b>63</b>
<b>8. British Columbia Institute of Technology – Diploma in Wood Products Manufacturing Technology .....</b>	<b>66</b>
<b>9. The University of British Columbia Wood Products Degree – modules and elective .....</b>	<b>68</b>



# Introduction

Training within the Australian timber industry faces many challenges. The training market is decentralised and generally spread over remote areas. Many of the hardwood companies are small businesses with limited staff resources and thus have difficulty in releasing people for training. Increasing OH&S compliance issues are forcing the industry to look further at training as a way of developing their staff.

Decreasing access to native forest resource has caused recent cutbacks to the hardwood sector resulting in rapid change within the industry. Those companies remaining in the industry are viewing training as a means of maximising their efficiency.

Training within the timber industry is used to:

- Develop skills required for the workplace
- Develop a skilled work force
- Develop an awareness of, and control methods for workplace hazards

Training has the ability to:

- Increase production, recovery and product yield
- Reduce work related accidents and diseases
- Increase employee confidence
- Increase workplace morale

An industry that is committed to training tends to:

- Be more successful at attracting people into that industry
- Attract greater public and political support
- Be more successful in securing government tenders

In the future as the market and the supply of raw product changes training will also play an important role in assisting the timber industry to adapt.

Training is either delivered:

- On site with company employed trainers
- On site with contract trainers
- Off site using training institute with the ability to simulate the work environment

All of these methods have their advantages and disadvantages. Currently, on site training tends to be the desired method.

The author toured New Zealand and Canada during August and September 2004 with the objective of studying extensively training-related issues and equipment pertaining to the portable sawmilling industry.

## Scope of Study

- **Forest Industry Training Curriculum and Accreditation Procedures**

Of particular interest was the training offered to the timber industry in the countries visited, and in which specific areas the timber industry was requesting assistance.

- **Assessment Techniques**

There was an ideal opportunity to “assess the assessment” and compare methods of assessment with those currently being used in the Australian timber industry.

- **Training Delivery / Materials**

Because training materials, and/or publications, that are used to assist in the delivery of training are often discarded at the course completion, the interest in this particular area is how other training institutions structure and use these materials as on-going learning aids.

- **Occupation Health and Safety**

The timber industry in general is requesting more O.H & S training than ever before and it appears the demand currently outweighs the ability of providers to provide a service. A study of the training being offered internationally and the mode of delivery would be beneficial in assisting with Timber Training Creswick’s O.H&S training commitments.

- **Distance Learning Methods**

There are currently many requests from portable sawmill operators Australia-wide who are seeking training in timber production to make their business venture more viable. However most can ill-afford the time involved, up to two weeks, let alone all the other associated costs such as travel, accommodation, course costs etc. Due to this inability to attend formal training, a viable alternative is being sought. The use of CD-ROM, or other cost effective methods currently being employed, would warrant investigation as a means of delivering remote training for this particular need.

- **Workforce Recruitment and Retention Techniques**

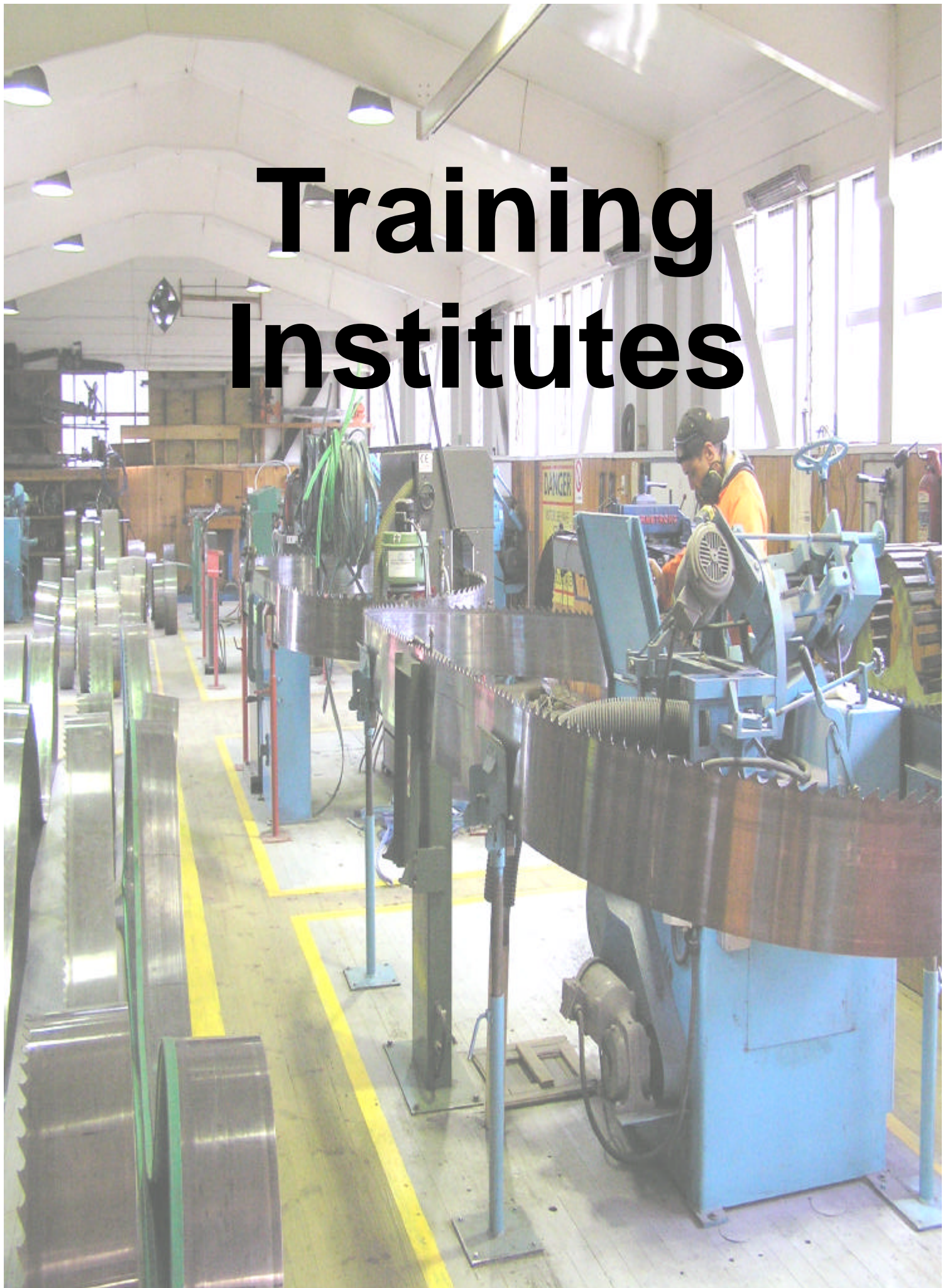
The timber industry today, in particular the hardwood sector, is viewed by prospective employees as being very unstable due to forestry cutbacks and environmental issues highlighted by an active conservation (green) movement. As a result the younger generation, which the industry needs to attract, does not in many cases view the timber industry as a viable career opportunity.

A study and comparison of recruitment methods and career path structures may assist in the formation of a model for the timber industry in Australia.

- **The Latest Technical Advances in Portable Sawmilling Equipment**

Currently there are many portable sawmilling manufacturers producing equipment that would be suitable for Australian conditions. A question often asked by prospective buyers is the suitability to a particular operation. This study tour provided an ideal opportunity to not only become conversant with the equipment, but to also gain an invaluable insight to the producer/designer and the manufacturing process.

# Training Institutes



## **School of Forestry and Wood Processing, Wairariki Institute of Technology, Rotorua, NZ**

The School of Forestry and Wood Processing, Wairariki Institute of Technology, Rotorua, New Zealand was originally established in 1965 as the Timber Industry Training Centre. The capital for the establishment of this training centre was provided by the New Zealand Government from the Timber Workers Housing Fund and the New Zealand Forest Service. The first courses were delivered in 1966 using workshop facilities for saw doctoring and a Wadkin moulder to teach the aspects of timber machining. Shortly after the initial building phase saw the completion of a fully operational sawmill for delivering specific sawmill training in key operator areas. In December 1994 part of the training sawmill was destroyed by fire and in late 1996 with financial assistance from the wood processing industry, equipment suppliers and the Forest Research Institute, a new sawmill was reopened. In April 1998 the Timber Industry Training Centre become part of Wairariki Polytechnic, now Wairariki Institute of Technology, and is one of New Zealand's largest educational institutions outside the formal education system.

Because the School of Forestry and Wood Processing is very similar to Timber Training Creswick, this visit was seen as an opportunity to discuss course content and training methods as well as industry recruitment and retention techniques.

### **Wednesday September 1<sup>st</sup> 2004 - Discussions with**

- **Steve Hensley, Program Leader/Lecturer, Solid Wood Processing**
- **Ollie Kemp, Lecturer, Solid Wood Processing.**

### **Thursday September 2<sup>nd</sup> 2004 - Discussions with**

- **Chris Talbot, Program Leader/Lecturer, Saw Doctoring**
- **John Kelly, Program Leader/Lecturer, Timber Machining**

As a result of these discussions it was established that there was a similarity in training trends between the School of Forestry and Wood Processing and Timber Training Creswick, with a decline in the numbers of sawmill operators receiving training. The difference between these institutes is in their approach to this situation. Timber Training Creswick has adapted to this change and is now delivering training on sites across Australia., whereas the School of Forestry and Wood Processing approach has been to virtually stop operator training with the training mill now operating as a production sawmill.

Although the sawmill is not being fully utilised for industry training purposes, they still offer one training program entitled National Certificate 2 in Solid Wood Processing. This program is designed as an entry-level course for unemployed and/or school leavers and consists of 18 weeks full-time study.

The National Certificate 2 in Solid Wood Processing modules and learning outcomes are listed in: Appendix 2





**The School of Forestry and Wood Processing Training Sawmill**

Other training / courses conducted at the School of Forestry and Wood Processing are listed below.

### **Occupational Health & Safety**

Occupational Health and Safety training, a short course conducted by the sawmill trainers, is similar to that conducted by Timber Training Creswick and covers all the legislative requirements and obligations necessary for effective O.H.&S transfer. O.H.&S modules and learning outcomes are listed in Appendix 3.

### **Saw Doctoring and Wood Machining**

The School of Forestry and Wood Processing still enjoys good enrolments for certificate 3 and 4 in both Saw Doctoring and Wood Machining. They also offer Certificate 2 courses entitled National Certificate 2 in Saw Doctoring and Certificate 2 in Timber Machining. These programs are designed as entry-level courses for unemployed and/or school leavers and consist of 12 months full-time study.

The Certificate 2 in Saw Doctoring modules and learning outcomes are listed in Appendix 4.

The Certificate 2 in Timber Machining modules and learning outcomes are listed in Appendix 5.





**Trainees levelling a bandsaw in the saw shop**

As the students are not sponsored by employers, students are required to pay the enrolment fees for the Certificate 2 course they choose to attend. The cost for the full-time 18-week course is NZ\$1600 and the cost for one of the full time 12 month courses is \$3700. The student can apply for a student loan which is to be repaid on commencement of full-time employment.

Recruitment for the Certificate 2 courses is accomplished using the following methods.

- Visiting secondary schools to make students aware of the opportunities available to them in the timber industry.
- Placing advertisements in local papers in areas where the timber industry is a major contributor to the community, socially and economically.
- Holding open days (several throughout the year.)

## **Logging Forestry Industry Training Board, Rotorua**

The Logging Forestry Industry Training Board (LFITB), Rotorua, was originally part of the New Zealand Logging Forestry Industry Training and Advisory Board and was delivering training to the forest industry as well as being a member of the advisory body to the New Zealand Education Board. As there appeared to be a conflict of interest and questions of ethics, the training operation was sold and is now a privately-owned company that continues to offer training to the forest industry. The LFITB was selected as a visit point to assess and compare forest operator training and assessment methods.

### **Friday September 3<sup>rd</sup> 2004 – Discussions with**

- **Rob Prebble - Managing Director of Logging Forest Industry Training Board.**

As a result of discussions it was established that there was a similarity in training delivery between LFITB and Timber Training Creswick (TTC). Training at both institutions had seen a marked increase in on-site training delivery and a decrease in class sizes resulting, in many cases, in the delivery of one-on-one training. This was noted as being highly effective for the participant and employer provided the training was not compromised due to the cost ineffectiveness of this type of training. Assessment methods employed at both organisations are also very similar in that they both rely heavily on observation and oral questioning. There does, however, appear to be a major difference in documentation. The assessment instrument used by LFITB is very lengthy in comparison to that used by TTC – in most cases about double the size.

## Ontario Forestry Safe Workplace Association, North Bay, Ontario, Canada

In 1915 the Ontario government established the Workers Compensation Scheme, whose present day Australian equivalent would be WorkCover. The Workers Compensation Scheme is funded by a compulsory payroll levy based on the risk associated with that particular sector of the industry.

The Canadian timber industry is divided into three major risk sectors.

- Logging, at the premium rate of 11% due to the notorious high risk factor
- Sawmilling, attracting a lesser rate of 9%
- Veneer and Plywood, deemed as the lowest risk sector, affording the lowest rate of 7% of payroll.

When the scheme was established, a requirement was made that 2% of all levies collected were paid back to the industry from which they were taken to establish a training and advisory board for their specific Occupational Health and Safety requirements. This heralded the establishment of the Ontario Lumberman's Safety Association in 1915, which over the years has evolved to become known as the Ontario Forestry Safe Workplace Association.

### **Tuesday 7<sup>th</sup>, Wednesday 8<sup>th</sup> September 2004– Discussions with**

- **Tom Welton, Manager of Field/Administrative Services for the Ontario Forestry Safe Workplace Association.**

For the company to service the State of Ontario, due to its vast expanses and to make training cost-effective, the state has been divided into ten separate districts with one trainer/consultant based in each. Currently the Ontario Forestry Safe Workplace Association employs 23 full-time staff

- **Nine trainer/consultants** who deliver all training and consultancy on site across Ontario. Course delivery times can vary from two hours up to a full five-day program. Courses of longer duration may be broken up into smaller modules and delivered over five separate site visits, which allow the trainees time to absorb the information before the next module.

Course costs per trainee are as follows:

- Four hour duration, C\$30 plus materials
- Eight hour duration, (full day) \$60 plus materials

When considering the costs associated with the conduct of training state-wide, and the fact that the trainer/consultant assists with and conducts OH&S systems audits and policy implementation free of charge, these fees are considered as token amounts.

- **Four program developers** whose duties range from the development of complete training packages to the development and production of learner guides. Recent research by this organisation has concluded that small pocket-sized learner guides are more likely to be retained by the trainee after initial training and form a future reference, rather than a book-sized guide which is comparatively large and intimidating. One of the program developers is an audio technician who is responsible for developing media training, such as videos and CD ROMs.
- **Six administration staff** who are responsible for the day-to-day running of the organisation and administration of course accreditation.
- **Four management staff** who as well as general management duties, also perform training and training needs analysis of the timber industry.

The Ontario Safe Workplace Association has developed training packages specific to the timber industry, given in Appendix 6. As well as delivering the courses referred to in Appendix 5, The Ontario Safe Workplace Association has developed instructor packages, suitable for in-house training, that have all the course information, overhead projections, training videos and learner guides required to deliver these courses.

# Forintek Canada Corporation, Vancouver, BC

**For, Forestry; in, industry; tek, technology.**

Forintek Canada Corp is Canada's national Wood Product Research Institute. The role of the Institute is to support the forest products industry in optimising the manufacturing processes, extracting high value products from the available resource and meeting customer expectations of performance, durability and affordability. The organisation was established by the Canadian government in 1913 and privatised in 1979. Forintek, operating as a non-profit corporation, has an annual operating budget of \$28 million and employs a staff of over 200 people.

**Monday 20<sup>th</sup> & Tuesday 21<sup>st</sup> September 2004 – Discussions with**

- **Luiz Oliveira, PhD, Group Leader, Wood Drying for the Lumber Manufacturing Department**
- **Dal Wright, Wood Drying Technologist.**
- **John Taylor PhD, P.Eng, Group Leader-Wood Machining and Optimisation for the Lumber Manufacturing Department.**
- **John Wallace, Research Scientist, Lumber Manufacturing Department - Drying Group.**



**Forintek Vancouver research laboratories**

Over a period of time Forintek has trialled various methods of training delivery. Presently three of these methods are being employed for timber drying, summarised below:



#### Method I.

- By correspondence, 12 modules in total in written format.
- Offered in 2 module blocks with written assignments.
- Self-paced course over 24 month period.
- Certification upon course completion.
- Successful for remote learning situations.

#### Method II

- By correspondence
- Delivery via CD package, same 12 modules as per method I
- Offered as complete package with no assessments during course
- No certification upon course completion.
- Not as successful as previous method due to computer literacy requirements

#### Method III

- Two day workshop
- Delivered at company's own site
- Excellent interaction
- No certification
- Most expensive method

For example of module descriptors, contents and costs, refer to Appendix 7.

Summarised below are other products involving Forintek's research and development and training departments.

- Training package for Saw Design and Manufacture.  
The package is presently in draft form and will be available on CD in a similar format to Lumber Drying.
- A softwood sawmill simulator.  
Currently in use is a commercial version of a "virtual softwood sawmill". It is installed at the Duchesnay forestry/sawmilling college where it has become a training tool.
- Mountain Pine Beetle project.  
The mountain pine beetle is killing vast areas of forest due to what is believed to be a climatic change. For natural control of the beetle, five consecutive days of -20°C in October are required to freeze the beetle larvae before they have the opportunity to bore into the centre of the tree.
- Computerised Tomography (CT)  
A computerised scanner with the ability to build a 3-D picture of internal defects to allow for true sawing optimisation.

## **British Columbia Institute of Technology, Vancouver**

The British Columbia Institute of Technology is a Polytechnic Institute which is equivalent to our TAFE Institutes. It has a Wood Products Manufacturing Department offering a Diploma in Wood Products Manufacturing Technology. This visit was seen as an opportunity to discuss course content and training methods.

### **Tuesday 22nd September 2004 – Discussions with**

- **Eric Worthy, Program Head of Wood Products Manufacturing, British Columbia Institute of Technology.**

British Columbia Institute of Technology has been focusing on delivering the Diploma for Wood Products Manufacturing for several years. The Diploma is a two-year full-time course that is designed for the person who wishes to make a career in the timber industry in areas such as Timber Sales Representatives, Plant Supervisors, Occupation Health and Safety Representatives and Management. The entire Diploma is theory-based with regular field trips to increase the understanding and knowledge of the industry. The two-year program consists of four semesters, and the students are encouraged to complete work experience during the semester breaks.

The first year studies include:

- Wood science.
- Log utilization.
- Computer skills.
- Timber tallying.
- Timber grading.

The second year studies include:

- Manufacturing techniques.
- Process controls.
- Mechanical and electrical equipment.
- Economics.
- Management skills such as problem-solving, supervision, cost controls, product sales and business communications.

A complete list of the diploma modules is given in Appendix 8

The British Columbia Institute of Technology has stopped taking enrolments for this course and presently only has a second year group of students. They are currently redesigning the program, and are going to start taking enrolments for next year. The new program is also intended for the person who wishes to make a career within the timber industry. However the delivery time for this is reduced to one year full time. The final decision on the modules

has not been made, but it has been suggested that they will resemble the last two semesters of the previous course. See Appendix 8

The reasons given for this restructure were:

- In recent years there has been declining student numbers. The suggested reason for the decline was the cost associated with the course. In the past most students have had previous employment, and if you include lost income, accommodation and course fees, the cost to the student would be estimated at \$120,000.
- Employers have indicated that they would sponsor selected employees to complete this course, but only over a reduced time.

The restructure is an attempt to increase student participation to get the program back on track. The intention is to make up for the reduced time and modules by recruiting students from within the timber industry. When questioned about competency-based training, it was stated that the only certificate of competency issued in the timber industry is for timber grading.

## **Open Learning Agency, Vancouver, BC, Canada**

The Open Learning Institute was established in 1978 by the government of British Columbia in response to the Winegard report which called for greater access to college and university education for British Columbia's rural areas. In 1980 the BC government established the Knowledge Network as BC's public education television service. In 1988 the Open Learning Institute and the Knowledge Network merged to form the Open Learning Agency. Today the Open Learning Agency delivers training at college and university level as well as operating British Columbia's education television station. The Open Learning Agency has been delivering training to remote areas of Canada since 1978 and this visit was seen as an opportunity to discuss delivery methods.

### **Thursday 23rd September 2004 – Discussions with**

- **Werner Schulz, Executive Director of the Open Learning Agency.**

Since computers and internet access have become readily available, the Open Learning Agency's preferred method of delivery has been on-line with internet access. The reasons the Open Learning Agency prefers these methods of delivery are:

- Students can schedule their schooling around other commitments e.g. work
- As long as there is access to a computer and the internet, learning can be done from anywhere in the country/world
- No travel and accommodation costs
- Students can work through the course at their own pace
- The Open Learning Agency can monitor students' progress.
- Students have the ability to confirm any part of the training package with an instructor through the use of e-mail.

It was suggested when developing training for distance learning that:

- Learning guides in paper form or CD-ROM are both good methods for delivering distance training. However they will only be successful if the trainees have the ability to confirm any part of the training package with an instructor through the use of either e-mail or telephone.
- When training is all theory based, learner guides are the cheapest alternative.
- When training involves technical and/or practical skills, a CD-ROM with a combination of video and text was preferred.
- CD-ROM with a combination of video and voice is useful when literacy is a concern.
- The cost of producing training packages using CD-ROM can be expensive; and as a result the market needs to be large enough to justify the production costs.

## **Centre for Advanced Wood Processing, University of British Columbia, Vancouver, BC**

The Centre for Advanced Wood Processing was established as a result of the British Columbia timber industry recognising they had an ageing workforce, particularly in the areas of Timber Sales Representatives, Plant Supervisors, Occupation Health and Safety Representatives and Management. Trade Schools and Universities from across British Columbia were then asked to develop a training and recruitment program and as a result the University of British Columbia was selected to host the Centre for Advanced Wood Processing. In October 1994, the University of British Columbia was awarded C\$22 million in funding to establish and run the Centre. The acquisition of the infrastructure. (Buildings, machinery, etc) accounted for \$10 million, and the remaining \$12 million was invested and the annual return from this investment provides operational funds for the Centre.



**Inside the Centre for Advanced Wood Processing**

The Centre offers a Wood Products Processing Degree, and this visit was seen as an opportunity to discuss course content and training methods as well as industry recruitment and retention techniques.



**Monday 27<sup>th</sup> September 2004 – Discussions with**

- **Philip Evans, Professor and Director of the Centre for Advanced Wood Processing.**
- **Tom Wray, Facility Manager of the Centre for Advanced Wood Processing.**
- **Robert Furst, Instructor of the Centre for Advanced Wood Processing.**
- **Dr Stavros Avramidis, Professor of the Department of Wood Science.**

The Wood Products Processing Degree is delivered over five years of full-time study, and with the cooperation of the timber industry includes five work terms of cooperative education. The cooperative work term enables students to integrate their academic studies with valuable employment experience and is structured so the students are engaged in productive work relevant to their level of study and experience. Prior to commencing their first term the students complete the first two years of their academic studies, they also complete a series of employable skills workshops in order to prepare them for work placement.

Cooperative education gives the students the opportunity to:

- Develop valuable career planning and job search skills.
- Receive extensive free pre-employment training.
- Explore various career options and gain experience to include on their resumes.
- Enrich academic learning with workplace experience.
- Finance their degree with relevant, paid work.
- Have a higher employment rate after graduation.
- Travel, and experience different cultures.

A complete list of the Degree modules are listed in Appendix 9

At the same time as the Centre for Advanced Wood Processing was being built they also embarked on recruiting students from across Canada to participate in the Wood Products Processing Degree. To achieve this, the Centre for Advanced Wood Processing employs two full-time recruitment officers. In 1997 they started their first year with 36 students since then the recruiters have had continuing success and the 2003 intake was the highest so far with 43 enrolments. They have also established a program call Recruit the Recruiter where volunteer graduates from the Wood Products Processing Degree are trained to be recruiters and assist with recruitment of future trainees.

Recruitment activities include:

- High school presentations.
- College presentations.
- Career fairs.
- Teacher and counsellor-focused events.
- Public and industry events.
- Recruit the recruiter activities.
- Brochure distribution.

To date all successful graduates from this program have secure positions within the timber industry, it was suggested that the employers are lining up at the front door. Students in Canada are paying for this course and can only afford to do the training program with assistance from government loans, similar to that of university HECS fees in Australia, and wages earned during co-op work placement. This appears to be a very successful program and one that should be considered in Australia. When questioned about competency-based training it was again stated that the only certificate of competency issued in the timber industry is for timber grading.



**The Centre for Advanced Wood Processing, wood machinist workshop**

## **Comparison with Australian training facilities**

- **Forest Industry Training Curriculum and Accreditation Procedures**

New Zealand and Canada continue to deliver trade level qualifications for Saw Doctoring and Wood Machining. There is also training available for Timber Drying and Timber Grading. The area where training has virtually ceased for training providers, similar to that of Timber Training Creswick, is timber production. Sawyer training for production sawmill operators is now conducted on site by company-employed trainers and assessors to suit the company's individual needs. This is a trend that already exists in our softwood industry and the hardwood industry is seemingly headed in the same direction.

Apart from a few Canadian institutes using the Wood-Mizer training package there is little to no portable mill training available. This could be due to the fact that a large percentage of the timber sawn is softwood, which does not exhibit the same sawing difficulties as does hardwood, however in New Zealand the portable mill industry is cutting a considerable volume of eucalypts with only a partial understanding of the technology. There is currently no portable mill training available to assist.

Canadian training providers consult on a regular basis with employers to assist them in developing and adapting training packages to suit their needs. Timber Training Creswick is already working with employers and delivering training to suit their needs on an on-site basis, however not all of the timber industry is aware that this is available to them.

New Zealand's timber industry, like Australia's, has in recent years been directing training toward Certificate 2 and 3 levels for new employees.

The Canadian timber industry has identified a need for training at a higher level of responsibility, and has devolved degree and diploma courses. In particular, the degree course delivered by the Centre for Advanced Wood Processing has been quite successful, and with the timber industry cooperation toward relevant work experience, a similar program would be worthy of consideration in Australia.

The New Zealand Training and Assessment package, like Australia's, is competency based. The Canadian Training and Assessment package is curriculum based, where the only certificates of competency issued are for timber grading and chainsaw and skidder operations. There is a lot of interest in competency-based training and assessment as this is the direction they will most likely follow in the future.

- **Assessment Techniques**

New Zealand's assessment techniques are similar to those used by TTC; the preferred methods of assessment are questioning, oral or written and practical demonstration. Third party interviewing is not the preferred method used in this instance.

The Canadian cutter-skidder operator competency assessment techniques are also similar to those used by TTC. However there is a strong reliance on third party interviewing. This method of collecting evidence of competency has in the past shown it can be unreliable.

- **Training Delivery/Materials**

New Zealand and Canada, like Australia, rely on training materials/publications in the delivery of training which are often discarded upon course completion. The passport-size learner guides developed by the Ontario Forestry Safe Workplace Association, although small, contain all the key learning outcomes and are not as intimidating as the larger book types.

- **Distance Learning Methods**

The Open Learning Agency preferred method of training delivery is on-line with internet access. Although it would be difficult to deliver the practical components of some training programs on-line, there are many training programs in the timber industry that could be delivered using this method. This should be considered as an affordable alternative. With any development of on-line or CD training packages, the issue of computer literacy needs to be considered otherwise there is a real risk the package will be intimidating. To minimise this, an oral format should be considered wherever possible.

The recommendation that trainees have the ability to successfully communicate with the trainer on matters relating to the training program is sound advice and needs to be built into any delivery method chosen for distance learning.

- **Occupational Health and Safety**

The Ontario Forestry Safe Workplace Association has developed large volumes of Occupational Health and Safety training programs specifically for the timber industry. Through discussions with Ontario Forestry Safe Workplace Association it was suggested that if Timber Training Creswick was interested in any of their training materials they could purchase the package, make any changes necessary to comply with regulations, and use it to deliver training to the Australian timber industry. The Ontario Forestry Safe Workplace Association requests, in return, acknowledgement as being the developer of the training package.

- **Workforce Recruitment and Retention Techniques**

The New Zealand and Canadian timber industries have both embarked on a recruitment program. To achieve this they have made a commitment to educating secondary school students about the careers available to them in the timber industry. As a result of this program they are successfully attracting school leavers into careers in the timber industry. They have also inadvertently gained greater support from the community as a result. The Australian timber industry would benefit from the adoption of a similar program.

## Recommendations

As a result of this study it is recommended that Timber Training Creswick considers the implementation of the following:

- The development of a Diploma in Sawmill and Further Processing similar to the degree offered by the Centre for Advanced Wood Processing. This course would consist of a combination of training at Timber Training Creswick, and work experience from employers within the timber industry. It would give participants the background knowledge and the business management skills required to achieve a career in the timber industry.

For this to be successful it would

- require the support of the timber industry in the form of work experience.
- necessitate the availability of student loans to assist with accommodation and enrolment fees.

- The development of training programs to be delivered on-line similar to the Open Learning Agency. Although it is difficult to deliver the practical components of the course on-line, there are many courses including some of the core modules of Certificate 2 and 3 that could be delivered through on-line training.

The development and implementation of on-line training by Timber Training Creswick has the potential to

- allow trainees to schedule training around other work commitments.
  - allow trainer and trainees to monitor progress.
  - reduce the costs associated with on-site training.
  - allow Timber Training Creswick to concentrate more on the practical components of training.
- The development of CD-ROM training packages, although expensive, has the potential to be a useful training tool for many courses including portable sawmilling, timber grading and timber drying.

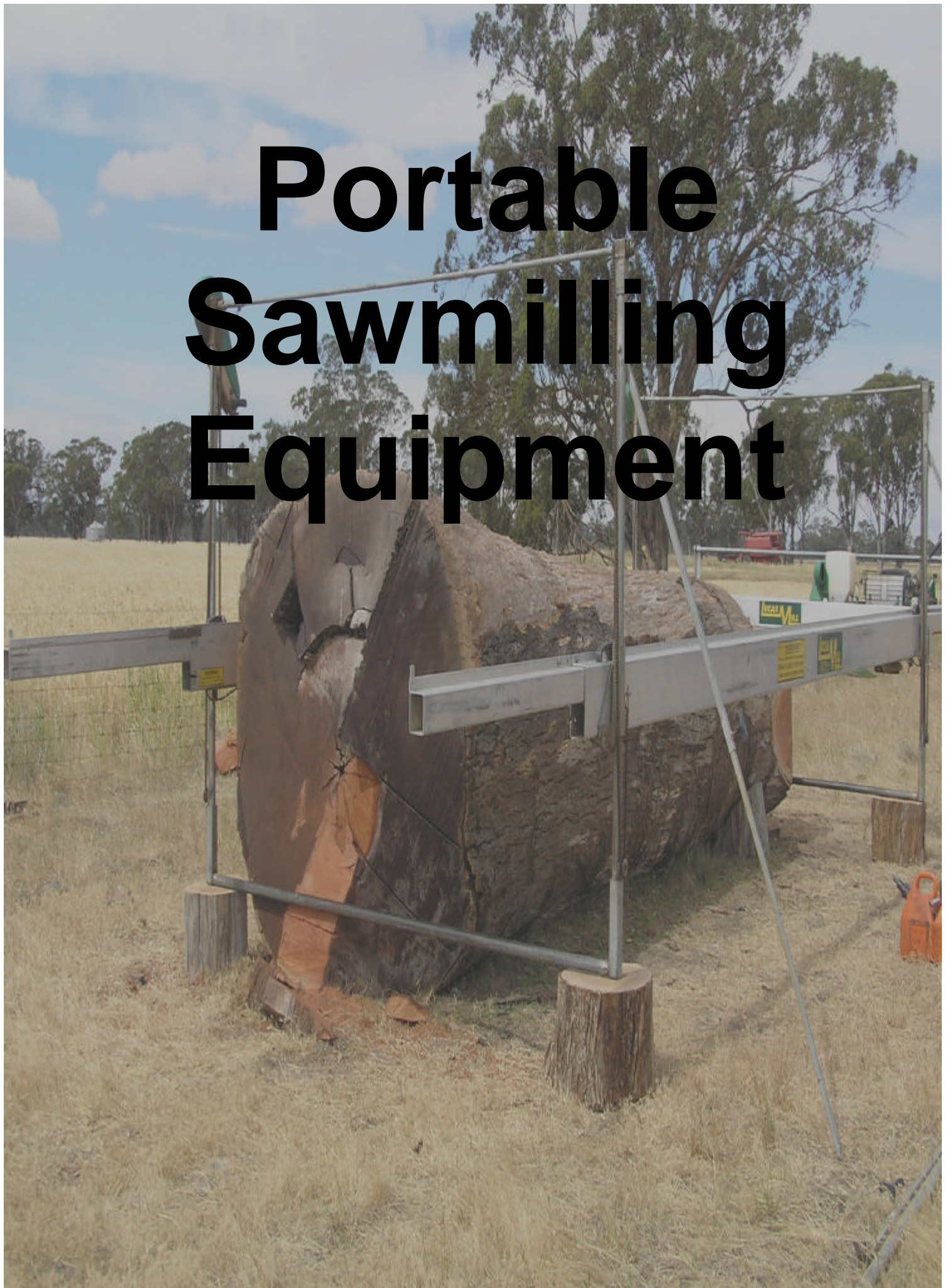
For this to be successful Timber Training Creswick would need to ensure that the development of any training package takes into consideration

- the need for the trainees to have the ability to communicate well with the trainer on matters relating to the training program.
- the need for a combination of video and text – too much text on its own has the potential to be intimidating.
- the computer literacy skills of the trainee.



- The development of passport-size learner guides similar to those developed by Ontario Forestry Safe Workplace Association. The development of these learner guides in areas such as timber grading has the potential for more frequent use as reference material after the training has been completed
- Ontario Forestry Safe Workplace Association has suggested that if Timber Training Creswick was interested they could purchase any of their training materials, make any changes necessary to reference of regulations, and then use it to deliver training in Australia. This is an offer Timber Training Creswick should consider as the cost of developing a training package to the same quality that satisfies the Occupation Health and Safety requirements of the timber industry would be enormous.
- The timber industry has recently developed a committee for attracting workers into the forest products industry. Timber Training Creswick should consider aligning with this committee, in order to make people considering a career in the timber industry aware of the training opportunities available to them.

# Portable Sawmilling Equipment



## Introduction

A second part of the study involved visits to manufacturers of portable sawmilling equipment. The purpose of these visits was not only to become familiar with the equipment production, design and manufacturing processes, but also to assess their suitability for Australian conditions.

There are currently many portable sawmill manufacturers producing equipment that may be suitable for Australian conditions. Although portable bandsaws are quite popular in many countries, circular saws are the more common in Australia. Use of bandsaws increases sawing inaccuracy due to a combination of the narrow width ribbon used for the saw and/or a lack of horsepower. The high density of many Australian timber species in comparison to the rest of the world also contributes to this problem.

Although the sawmills are portable, to move them for every new log is not cost effective. In most situations the sawmill is positioned on the site and the logs are brought to the mill. There are many methods used to achieve this, although most are labour intensive and carry a high OH&S risk.

## **Mahoe Sawmills, Kerikeri, New Zealand**

John and Don Bergman began their sawmilling operations with salvaged kauri logs and eucalypts, mostly shelter trees, and some plantation species from the Bay of Islands, Northland, New Zealand. In the early 1980s, they sought a new sawmill which would allow their growing business to expand. This sawmill had to be robust but light, portable and powerful enough to produce timber with dimensions up to 300 x 150 mm. After unsuccessfully searching the market for a suitable sawmill, they decided to design and build their own. In 1990 a delegation from Russia, who were visiting the Bergman family's successful dairy and cheese factory, saw the portable sawmill in operation and enquired as to whether two of these sawmills could be made for them. After placing another two of these sawmills into Vietnam and a further two into Samoa, the potential of the sawmill was realised and marketing began in earnest in New Zealand. The next ten years saw the Mahoe Company sell approximately 200 sawmills. The Minimax mill was launched in 2002 and has since sold 80 sawmills with the company struggling to keep up with demand.

### **Monday August 30<sup>th</sup> 2004 - Demonstration/operation day with**

- **John and Don Bergman the designers and manufacturers of the Mahoe and Minimax Sawmills**

A large Sydney blue gum was placed onto the Mahoe Minimax sawmill and was cut into 200 x 50 mm boards. The sawmill displayed little to no problem in deep-ripping 200 mm with the vertical saw. The mill has an option of two different power plants, a 33 hp three-cylinder petrol motor or a diesel engine with comparable power. The latter is apparently the preferred option when sold into Australia. This sawmill would cost approximately A\$37,000 with the expected purchaser to be an operator who already owns and operates a sawmill such as a Lucas or Peterson plant and is looking to expand an already-developed viable business.

#### **Advantages:**

- The power feed removes the need for the operator to push and pull the power head/saw through the log.
- With the horizontal and vertical saws cutting simultaneously the saw has the ability to return the sawn timber back past the operator, which then increases production and reduces the amount of bending, twisting and lifting required by the operator.
- The ability to produce a 300mm deep cut with the vertical saw.

#### **Disadvantages**

- The inability to resaw highly stressed quartersawn slab. Without removing the horizontal saw it is not possible to place the slab on top of the log and resaw; even when the saw has been removed the widest width cut would be 150mm due to the saw spindle.



- A combination of the mechanical feed and two saws being pulled through the log will affect the log's stability, particularly when cutting small diameter logs.
- The maximum horizontal cut is 150mm.



**John Bergman and the MAHOE sawmill**

When questioned regarding training for prospective purchasers, the manufacturers indicated that past efforts had been very scant. However currently they are developing a training video for this machine and are also building living quarters on their property to accommodate the prospective purchaser. This will enable the new operator to stay on-site for a couple of days to receive training in the sawmill operation prior to taking delivery.

## Wood Works Limited, Hamilton, New Zealand

Wood Works Limited has been the sole agent for Lucas Mills since their introduction into New Zealand 1995, during which time 250 units have sold. Arnold Koppens, the proprietor of Wood Works Limited, has developed a log rotator to be used in combination with a Lucas mill for producing large section sizes from relatively small diameter logs with minimal effort, to boxed in the heart and large posts cut to shape to suit customer demand. The potential to develop a successful market for large treated pine posts suitable for architectural and structural uses in Australia should see the log rotator reach its market potential.

### **Tuesday August 31<sup>st</sup> 2004 – Discussions with**

- **Arnold Koppens re development of log rotator.**

The initial intention was for the manufacturers to patent and market the log rotator themselves. However, since then, due to unspecified reasons, the manufacturer has suggested that if anyone was interested they could purchase the equipment from him, or alternatively design and develop something similar, to suit their own needs. Arnold also explained that he uses the slabbing bar in preference to the circular saw to reduce the risk to the user of turning the saw too early and having it come in contact with the steel components of the log rotator.



**Rotating log 180 degrees to remove second round back**





**Finished post**

**Advantages:**

- The ability to accurately size large posts.
- The ability to cut unusual shaped posts e.g. hexagon and octagon.

**Disadvantages:**

- Time involved in setting up the rotator.
- Time involved in preparing the log and attaching to the rotator.
- The inability to recover sawn boards from the round backs when using the slabbing bar.

Wood Works Limited, in conjunction with Lucas Mills, has donated a portable sawmill to The Waiariki Institute of Technology in Rotorua to be used to deliver portable sawmill training. Arnold Koppens is of the opinion that there is a well-recognised need for portable sawmill training in New Zealand, and is currently in discussion with The Waikato Institute of Technology in Hamilton to come to a similar arrangement to that of The Waiariki Institute in Rotorua to deliver portable sawmill training.

## **Baker Products, Barrie, Ontario, Canada**

Baker Products started in 1979 when Ed Baker, a sawmill owner, built his first thin-kerf horizontal band resaw to recover boards from round backs off the scragg mill. During the next few years, local pallet manufacturers developed a keen interest in Baker Products, manufacturing a similar saw to assist with pallet production. After producing and selling two resaw units, the company began to realise the sales potential for this type of equipment. Consequently in 1988 they began manufacturing stationary band resaws and some portable units. In 2000, Baker Products purchased Enercraft, a Canadian company, specialising in portable band sawmills and edgers, and has continued to grow in strength with their equipment now world renown.

Because some portable sawmill owner/operators in Australia are quarter sawing to produce high value appearance products from our hardwoods, slab resawing is desirable to produce a straight product. Some portable sawmills have the ability to resaw, however most if not all would increase productivity significantly with the use of a board edger. For this reason Baker Products was chosen as a visit point.

### **Thursday September 9<sup>th</sup> 2004 – Discussion/operation day with**

- **Peter Beacock - General Manager for Baker Products' Canadian operation.**

Baker Products' heavy-duty portable board edger has the ability to resaw slabs up to 700mm wide and 57mm thick. The edger is powered by a 20 hp petrol engine which drives two 250mm diameter circular split saws as well all the hydraulically-driven feed rollers. An optional diesel or electric motor is available. This edger would cost approximately C\$13,800 or US\$10,500, not including freight.

#### **Advantages**

- The ability to cut 57mm thick boards. This is important when cutting oversized timber.
- Split circular saws. This makes saw replacement quick and easy.

#### **Disadvantages**

- The infeed and outfeed rollcase is long.
- The gauge/ruler is approximately 1.5m away from operator position.
- The inability to lock the saw into position – the saw has the potential to float during the cut as the machine ages.
- No agent in Australia.
- Must buy direct from the United States.



**Baker Products heavy-duty portable board edger**

Training, if conducted at all, consists of simple half day mechanical familiarisation session with the mill.

## Wood-Mizer, Manilla, Ontario, Canada

Wood-Mizer was first established in 1978 by Don Laskowski, with the introduction of the Wood-Mizer Dupli-Carver. The first portable band sawmill was released by the company in 1982, and since then Wood-Mizer has grown to be the United States and Canada's largest manufacturer of portable band sawmills. The reason to visit this company is similar to that of Baker Products. Wood Mizer manufactures a portable board edger that could be utilised by the Australian small-scale sawmilling industry.

### **Friday September 10<sup>th</sup> 2004 - Discussions with**

- **Ian Campbell – Founder of Wood-Mizers Canadian branch**
- **Dave Cheel - Sales and service representatives for Wood-Mizers Canadian branch.**

Wood-Mizer's twin blade edger has the ability to resaw slabs up to 690mm wide and 50mm thick. The edger is powered by a 28 hp petrol engine which drives two 350mm diameter circular saws as well as all the hydraulically-driven feed rollers. An optional diesel or electric motor is available. This edger would cost approximately C\$14,700, exclusive of freight. Wood-Mizer has two agents in Australia, Millwood Forest Products, Bunbury, WA, and Vermont Hill Pty Ltd, Brisbane, QLD.



**Wood-Mizer's twin blade edger**

Advantages:

- The infeed and outfeed rollcase is a convenient length.
- 28 hp motor.
- Two Australia agents.
- The ability to lock the saw into position.

Disadvantages:

- The ability to cut only 50mm thick boards.

Wood Mizer, having identified the need for structured training in the timber industry, approached the formal education system and research institutes for assistance in developing a curriculum based training package. The aim of the package was to arm the participant with the knowledge to become successful small business operators in portable sawmilling. The training package cost Wood-Mizer US\$100,000 to develop, and is given free of charge to any secondary school or university across the United States and Canada. The entire CD package contains 650 pages of teaching materials which include session plans, course information, handouts and assignments. The disk also has 230 coloured PowerPoint slides and a black-and-white version for creating transparencies for overhead projection.

This training package consists of five modules.

Module One:	Wood Technology
Module Two:	Sawmilling Concepts and Techniques
Module Three:	Calculating the Logged and Lumber Volumes
Module Four:	Lumber Drying
Module Five:	Sawmilling as a Business

It was suggested this has been a successful way of educating the younger generation on the timber industry and the potential career that could be made. It was unclear how many educational institutes across the United States and Canada now using this package. Unfortunately the only mention of circular saws was on one page which covered the advantages and disadvantages of a circular, and the sawing techniques were specific to band saws, in particular Wood-Mizer.



## ***SELECT* Sawmill Company, Plantagenet, Ontario**

*SELECT* Sawmill Company was established in February 1997. The company manufactures portable bandsaw mills, board edgers and debarkers as well as infeed and outfeed systems to suit the portable and stationary sawmill industry.

The Select Sawmill Company has produced a portable bandsaw unlike almost all others. This saw does not lack horsepower or blade width like most of its competitors, thus making it more suitable to Australian hardwood sawing conditions.

### **Monday September 13<sup>th</sup> 2004 – Discussions with**

- **Luc Carriere - Sales Representative for Select Sawmill Company.**

The Select Sawmill Company produces two portable bandsaw model numbers 3620 and 4421.

Model 3620 comes standard with

- computerised set works.
- 100 mm wide double-cut blade.
- the ability to produce a 900mm deep cut 6 metres long.
- 50 hp diesel engine or 30 hp electric motor.



**Model 3620**



Model 4221 comes standard with

- computerised set works.
- 150 mm wide double-cut blade.
- the ability to produce a 1050mm deep cut 6.6 metres long.
- 115 hp diesel engine or 75 hp electric motor.



**This partly completed model 4221 still has to have the correct axles fitted.**



**The double cut blade gives these machines the ability to cut in both directions.**



**The control panel and computerised set works.**

#### Advantages

- 100 and 150 mm wide blade increases stability and reduces sawing deflection. Most portable bandsaws run a 32 or 38mm wide blade.
- Double cut blade enables the operator to cut timber on the return.
- The ability to produce a 900 or 1050mm deep cut. Most bandsaws are limited to 650mm.
- The power available with both these models particularly model 4221 allows the operator to maintain saw and feed speed which increases saw stability and reduces sawing deflection. Most bandsaws are limited to 40hp.

#### Disadvantages

- Cost associated with saw sharpening. A complete sharpening package is available , however depending on location these saws would be best sent to a saw doctor for sharpening.
- No agent in Australia.
- Must buy direct form the Canada.
- The cost.

The band saw model number 3620 is priced at US\$75,595.

The band saw model number 4221 is priced at US\$91,195.

This is a large investment for most portable saw millers, however if provided with an ample supply of logs this sawmill has the ability to be highly productive and profitable.



The Select Sawmill Company also produces heavy duty board edgers but probably due to the high price, about US\$44,000, only two have been commissioned.

To complete the equipment package, the company also has available all the necessary saw doctoring equipment to professionally maintain the saws. This entire package is priced at approximately US\$19,000.

Training is offered to the clients who are prepared to travel to the Select Sawmill Company site.

**Tuesday September 14<sup>th</sup> 2004 – Operational sawmill using Select Sawmill Company equipment.**

The company visited was using a band saw, coupled with an edger, to cut white pine. With a team of only eight people, half of whom were stackers, the mill was capable of producing an incredible forty cubic metres of sawn product per day, due to the robust construction of these bandsaw units and the operational speed. The adaptability to most sawing conditions including Australian hardwood would be unquestionable.



**4221 in production.**

The expected purchaser is an operator who already owns and operates sawmills such as a Wood-Mizer, Lucas or Peterson plant and is looking to expand an already-developed viable business.

## **Anderson Machinery, Chesterville, Quebec**

Anderson Machinery is a large engineering company specialising in agricultural equipment who recently acquired the Majaco Engineering Company specialising in log trailers for forestry use. Anderson Machinery is situated approximately 130 kilometres south east of Montréal in a small country town called Chesterville.

### **Wednesday September 15<sup>th</sup> 2004 – Discussions with**

- **John Roberts – Sales representative for Majaco Engineering Company.**

Due to the difficulty faced by the portable sawmill industry in log handling, the trailers produced by this company could be highly beneficial. Other forms of log handling, front end loaders/forklifts for example, can be quite cost prohibitive where salvage volumes are small and the more traditional method of manual handling has an inherent safety factor to consider. Majaco trailers could be the sought after cost-effective option for log handling for this particular industry sector.

Majaco log loaders trailers range from the M-90 for four wheel drive motorbike up to the M-160 for tractors and four-wheel-drive vehicles.

The M-160 key specifications are as follows

- outreach 4.8 metres.
- a lifting capacity of 522 kg at 4.8 metres.
- towing capacity of 7500 kg.

The M-160 model costs approximately US\$17,000, exclusive of freight.

#### **Advantages**

- The ability to inspect and retrieve logs, thus reducing travel time and associated costs. Although portable sawmills are portable it is often more cost effective to return the log to the mill.
- Reduces strains associated with more traditional method of manual handling.
- This trailer could be used to load logs into the sawmill.
- Minimum environmental damage.

#### **Disadvantages**

- The ability to only lift 522 kg at 4.8 metres. However the closer it is to the trailer the more it can lift, and it can also lift one end then the other.
- The price is too high for most portable sawmillers.



**M-160 log loaders and trailers**



**This is the first of a new design. It has the same capacities as M-160 with the built-in ability to tip.**

For the portable millers who struggle with log cartage and positioning, the trailer's robust design makes it an alternative to more expensive log cartage and handling equipment.

# DEMO 2004, Quebec City, Quebec

## Thursday September 16<sup>th</sup> 2004 – Demo 2004

DEMO is similar to AUSTIMBER in Australia in that it is a Forest Industries field day held every four years. The exhibits were directed mainly at the harvesting sector of the industry rather than sawmilling. However log handling is an area applicable to both sectors. DEMO 2004 was held at Montmorency Forest, the training grounds for Laval University approximately 60 kilometres north of Quebec City.

There were two manufacturers of interest present at DEMO 2004 with equipment suitable and affordable to the portable sawmill industry.

## Kesla

Kesla have been in the business of manufacturing forestry equipment such as loaders, trailers, chippers and harvester heads since 1960. Kesla manufactures log loaders and trailers similar to those made by Majaco, although they are larger.

A Patu 8T trailer fitted with a Patu 202T loader is similar in capacity to that of the Majaco.

Key specifications of the Patu 8T trailer fitted with a Patu 202T loader are as follows:

- outreach 5.3 metres.
- lifting capacity of 597 kg at 5 metres.
- towing capacity of 8000 kg.

The Patu 8T trailer fitted with a Patu 202T loader costs approximately US\$24,500, exclusive of freight.

### Advantages

- The ability to inspect and retrieve logs reducing travel time and associated costs. Although portable sawmills are portable it is often more cost effective to return logs to the mill.
- Reduce strains associated with more traditional method of manual handling.
- This trailer could be used to load log into the sawmill.
- Minimum environmental damage.

### Disadvantages

- The ability to only lift 597 kg at 5 metres. However the closer it is to the trailer the more it can lift, and it can also lift one end then the other.
- The price is too high for most portable sawmillers.





**Patu 8T trailer fitted with a Patu 202T loader**

For the portable miller who struggles with log cartage and positioning the trailer's robust design makes it an alternative to more expensive log cartage and handling equipment.

## **Portable Winch Co**

The Portable Winch Co manufactures and specialises in portable winches and accessories. This company has only been in business for 24 months, although it seems very established. It manufactures one model and its key specifications are as follows;

- Pulling capacity of 1136 kg on a single line (pulley) and 2272 kg on a double line.
- 2.5 hp Honda engine.
- Unit weight 14.5 kg.

### Advantages

- This winch would minimise the effort involved in retrieving logs from what would normally be difficult situations.
- It would also minimise the effort involved in rolling logs into sawmills or trailers.
- Reduce strains associated with more traditional method of manual handling.
- Minimum environmental damage.

### Disadvantages

- No agents in Australia.
- Must buy direct from Canada.



**A 3.6 metre x 35 cm white pine log being pulled by portable winch.  
Also included in the photograph is a portable winch.**

The cost of this winch including skidding cone, rope and pulley would be approximately C\$1,700. This is an affordable piece of equipment that would be of immense benefit to any portable sawmiller.

# Comparison of Portable Sawmilling Equipment

- **Mahoe Portable Sawmill**

The Mahoe Minimax is restricted in its ability to resaw quartersawn hardwood slabs, however in conjunction with an edger, or when back sawing softwood/hardwood, this sawmill has the potential to be productive and reliable, thus making it worthy of consideration.

- **Wood Works Limited**

The log rotator has the potential for a portable sawmiller to develop a successful market for large treated pine posts suitable for architectural and structural uses in Australia. This equipment required long set-up times. However with further development this equipment could become faster and more versatile.

- **Baker Products and Wood-Mizer**

Both companies manufacture portable board edgers, and although there are subtle manufacturing differences between them, the function of each is similar. These machines have the ability to increase production, particularly when resawing quartersawn hardwood slabs, and would therefore be worthwhile investments.

- **The Select Sawmill Company**

The Select portable bandsaw is unlike most other portable bandsaws in that it does not lack horsepower or blade width like most of its competitors, thus making it more suitable to Australian hardwood sawing conditions. The disadvantage of this sawmill is the purchase price, which would be a huge investment for any sawmiller. However with an adequate supply of logs, this sawmill has the potential to be highly productive and reliable thus making it most worthy of consideration.

- **Anderson Machinery and Kesla**

Both these companies manufacture trailers that are designed for handling logs, and although there are subtle manufacturing differences between them, the function of each is similar. These trailers, although expensive, would be an affordable alternative to the more expensive trucks as well as reducing the amount of environmental damage caused by heavy haulage. Physical strains and sprains associated with alternative methods of log handling would also be reduced.

- **The Portable Winch Co**

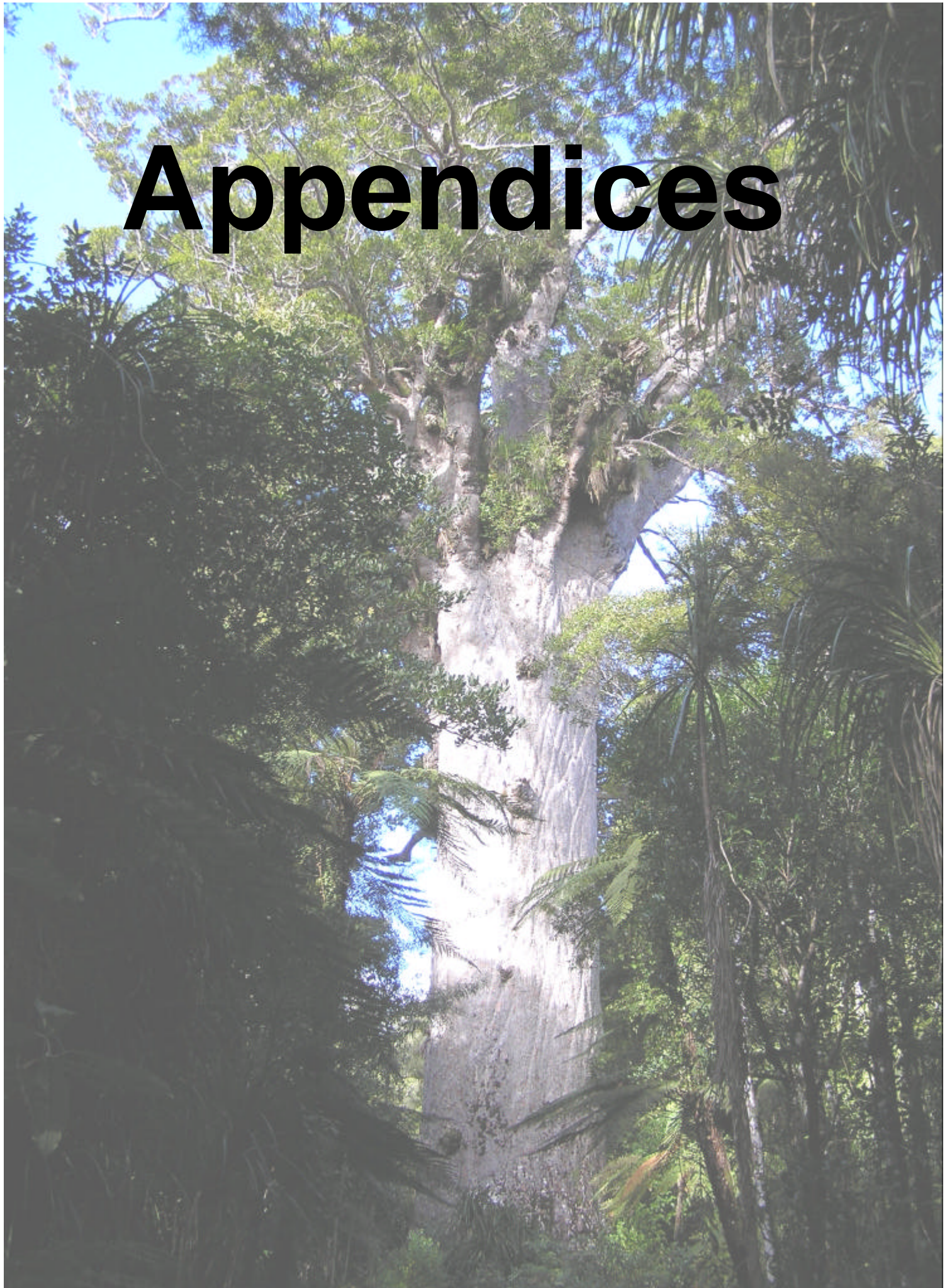
This is an affordable winch that would be of benefit to any portable miller for retrieving logs from hard to access places and rolling logs into sawmills or onto trailers. This equipment also has the potential to reduce the amount of strains and sprains associated with manually handling logs.

- **Equipment training**

Wood-Mizer has developed a training program to educate secondary school students across United States and Canada about wood properties and the potential career a portable bandsaw has to offer. All the sawmill manufacturers offer some training on machine setup and operation, however this is generally only available if the purchaser is prepared to travel to the manufacturer's site.



# Appendices



# Appendix 1

## New Zealand Itinerary

<b>Portable Sawmilling</b>	- Mahoe Sawmills - <b>John Bergman</b> - Wood Works Limited - <b>Arnold Koppen</b>
<b>Training Provider</b>	- Waiariki Institute of Technology - <b>Steve Hensley</b> - Logging Forestry Industry Training Board - <b>Rob Prebble</b>

## Canada Itinerary

<b>Portable Sawmilling</b>	- Baker Products - <b>Peter Beacock</b> - Wood-Mizer - <b>Ian Campbell</b> - Select Sawmill Company - <b>Luc Carriere</b>
<b>Training Provider</b>	- British Columbia Institute of Technology - <b>Eric Worthy</b> - The Open Learning Agency - <b>Werner Schulz</b> - Ontario Forestry Safe Workplace Association – <b>Tom Walton</b> - University of British Columbia - <b>Phil Evans</b>
<b>Majaco</b>	- Manufacturer of forestry equipment - <b>John Robert</b>
<b>Forestry Field Day</b>	- Demo 2004
<b>Forintek</b>	- Forest Research Institute - <b>Luiz Oliveira</b>



## **Appendix 2**

### **The School of Forestry and Wood Processing Certificate 2 in Solid Wood Processing – modules and learning outcomes**

#### **Module one: Communicating in Groups**

- Learn about workplace communication.
- Practise listening techniques.
- Participate in teams to complete tasks.

#### **Module two: Health and Safety**

- Gain an understanding of the health and safety requirements of the timber industry.
- Obtain a first aid certificate.
- Shut down and isolate machinery and equipment.

#### **Module three: Timber Grading**

- Learn about timber grading.
- Study the principles of New Zealand timber grading.
- Study the principles of grading lumber for United States market.

#### **Module four: Environmental Issues**

- Gain an understanding of the industry's environmental issues.

#### **Module five: Sawmilling Operations**

- Study sawmilling.
- Tally timber.
- Handle sort and stack timber.

#### **Module six: Wood Properties**

- Tree growth and the physical characteristics and wood.

## **Appendix 3**

### **The School of Forestry and Wood Processing Occupational Health & Safety – modules and learning outcomes**

#### **Module one: Overview of the Health and Safety Employment Act 1992**

- Principal objectives of the Act.
- Strategies for achieving the principal objectives.

#### **Module two: Recognise Statutory Rights and Responsibilities/Duties**

##### **Topic one: Employee's Rights under the provision of the Occupation Health and Safety act**

- General working conditions.
- Information.
- Training.
- Safety equipment.
- Safety management involvement.

##### **Topic two: Employee's Obligations and duties under the provision of the Occupation Health and Safety act**

#### **Module Three: Protect Health and Safety (Employee /Employee's Involvement)**

##### **Topic one: Hazard Management**

- Identification and assessment.

##### **Topic two: Significant Hazards**

- Eliminate.
- Isolate.
- Minimize.

#### **Module Four: Emergency Procedures**

**Module Five: Workplace Health and Safety in Action (Employee Involvement)**  
**Safety Committees/Advisory Groups**

- Budget.
- Policy.
- Safety officer appointments.
- Zero accident objectives.
- Safety training.
- Recognition for safety achievements.
- Records.

**Module six: Administration**

- Administration and powers.
- Accident recording/investigation requirements.
- Codes of practice.
- Compliance and prosecution.

## **Appendix 4**

### **The School of Forestry and Wood Processing Certificate 2 in Saw Doctoring – modules and learning outcomes**

#### **Module one: Band Saws**

- Sharpen band saws.

#### **Module two: Chainsaws**

- Understand the code of practice relating to chainsaw use.
- Operate a chainsaw.
- Maintain a chainsaw chain and bar.

#### **Module three: Circular Saw Maintenance**

- Set circular saws.
- Re-tooth inserted tooth saws.
- Tooth circular saws.
- Sharpen circular saws.

#### **Module four: Communication**

- Write a technical report.

#### **Module five: Engineering**

- Select, use and care of engineering hand tools.
- Select, use and maintain portable hand-held engineering tools.
- Select; care four engineering dimensional measuring equipment.
- Carry out heat treatment of metal parts.

#### **Module six: Environmental**

- Gain an understanding of the environmental issues facing the industry.

**Module seven: Health and Safety**

- Gain an understanding of the Health and Safety requirements of the industry.
- Obtain a first aid certificate.
- Shut down and isolate machines and equipment.
- Follow safe working practices on an engineering site.

**Module eight: Mathematics**

- Use standard units of measurement.
- Perform saw doctoring calculations.
- Identify and convert basic unit of measure used in engineering.

**Module nine: Saw Doctoring**

- Study the principles of saw doctoring.
- Maintain knives and anvils for chipping machines.
- Maintain household and handyperson cutting tools.
- Learn about grinding wheels, stones and fluids for saw doctoring.
- Grind and hone straight cutters.

**Module ten: Sawmilling/Forest Industry**

- Study sawmilling.
- Learn about the New Zealand forest industry.

**Module eleven: Wood Structure**

- Study tree growth and the physical characteristics of Wood.



## **Appendix 5**

### **The School of Forestry and Wood Processing Certificate 2 in Timber Machining – modules and learning outcomes**

#### **Module one: Health and Safety**

- Gain an understanding of the Health and Safety requirements of the industry.
- Obtain a first aid certificate.
- Shut down and isolate machines and equipment.

#### **Module two: Mathematics/Calculations**

- Use of standard units of measurement.
- Perform basic calculations for the operations of planners and grinders.

#### **Module three: Operate Key Remanufacturing Machinery**

- Re-saw timber to smaller widths for grade recovery in wood product remanufacturing.
- Re-saw timber for width, thickness and clears recovery in wood product remanufacturing.
- Crosscut timber for grade recovery and length in timber remanufacturing.

#### **Module four: Sawmilling/Timber Handling**

- Study sawmilling.
- Tally timber.
- Handle, sort and stack timber.
- Block stack timber.

#### **Module five: Sharpening Cutters**

- Learn about grinding wheels, stones and fluids for Timber machining.
- Maintain knives and anvils for chipping machines.
- Grind and hone straight cutters.

#### **Module six: Timber Drying**

- Study the principles of wood drying.

**Module seven: Timber Grading**

- Study Timber grading.

**Module eight: Timber Machining**

- Study timber machining.
- Understand timber machining principles.
- Feed and tail out planer.
- Set cutters into heads.
- Dismantle, inspect, assembled and test components under supervision.

**Module nine: Timber Remanufacturing**

- Study the principles of finger jointing
- Learn about timber yard operations.

**Module ten: Wood Structure**

- Study tree growth and the physical characteristics of Wood.
- Learn about the characteristics of Wood.

## Appendix 6

### The training packages developed by Ontario Safe Workplace Association specifically for the timber industry

- **Accident Investigation**  
A one-day training session that examines the process of accident investigation.
- **Basic Certification Training**  
A five-day training program intended for management and worker representatives of the joint health and safety committee.  
Deals with the implementation of the OH&S certification program that Ontario Safe Workplace Association has developed.
- **Workplace-Specific Hazard Training** a two-day course developed for hazard identification specific to the forest/timber industry.
- **Logging Safety Awareness** a training program developed to suit specific needs of the employers in the harvesting sector.
- **Every Reasonable Precautions** a half day course designed for owners, senior management and supervisors as an orientation to the Occupation Health and Safety Act and relates to the expectation of due diligence and the requirements of the development of effective health and safety program.
- **Forest Products Load Security** a one day course targeted primarily at truck operators employed or engaged in the haulage of forest products.
- **Industry Lift Truck Operations** a two-day course intended for both experienced and new operators. This program provides participants with the skills and knowledge required to recognise potential hazards, perform critical checks, monitor vehicle performance and carry out safe operations of vehicle lift trucks. **This course includes a written examination.**
- **Industrial Lift Truck Operations - Train the Trainer** a three-day course intended for in-house instructors who will be delivering the industrial lift truck operation course previously described.
- **Lockout/Tagout Policies and Procedures** an intensive one-day course designed for anyone who performs lockouts as part of their everyday responsibility.

- **Mandatory Cutter/Skidder Certification Training** Ontario Safe Workplace Association in conjunction with the Minister of Training Colleges and Universities have developed and implemented this mandatory Cutter/Skidder Certification Training Program. This training package is the only recognised training program in the state that is authorised to certify the workers meeting the requirements of the legislation for tree falling, crosscutting and skidder operations.
- **Strains and Sprains Injuries Prevention Program (Veneer/Plywood and Other Board Industries)** this half day course is designed to enable managers, supervisors and workers in typical veneer and other board operations to identify and control workplace risk factors and job demands that can lead to strains and sprains injuries.
- **New Employee Safety Training for Sawmills and Veneer/Plywood Industries** this program consists of over 80 lesson plans designed to be delivered in the workplace and a rate of the few minutes to one half hour per day over at least 30 days. The program can be customised for each workplace and for each new employee, depending on the tasks they will be performing.
- **Occupation Health and Safety Act and Industrial Regulations** this course familiarises participants with the organisation and content of the Occupation Health and Safety Act and can be delivered either in a full one-day course or half day overview session.
- **Planned Workplace Inspection** a one-day course designed to familiarise participants with the health and safety related workplace inspection standards and the benefit of a well-planned inspection program.
- **Professional Cables Skidding** This training package is intended for operators of cables skidding machinery in logging operations using typical cut/skid harvesting methods.
- **Professional Chainsaw Operations** is a training course in safe and efficient chainsaw operations.
- **Professional Chainsaw Operations - Train the Trainer** is a two-day course designed exclusively for trainers who will be delivering the Professional Chainsaw Operations course.
- **Sawmill Safety Awareness** is a video based training product that can be delivered by Ontario's Forestry Safe Workplace Association or purchased by companies for their own training applications.
- **Safe Skidding Awareness** is a brief one to two hour course aimed at providing refresher/reminders for certified skidder operators.

- **Working Safely with Propane** is a four-hour course designed to provide the information necessary for Forest workers to safely connect, disconnect and activate propane appliances.
- **Yard Loader Safety Training** this is a one-day course designed to develop competent, and safeguard, loader operators.



## **Appendix 7**

### **Forintek Timber Drying Module – descriptors, contents and costs**

#### **Module One**

##### **Introductory Concepts terms Used in Lumber Drying**

- To discuss how some wood properties are affected by moisture.
- To recognise important anatomical wood features and understand how these affect water movement in the wood and, therefore, the drying process.
- To utilise the most frequent terms associated with drying of wood.

#### **Module Two**

##### **Moisture in Wood**

- To understand the principles, advantages and limitations of measuring moisture content with electrical moisture meters.
- To determine moisture content of a sample of wood.
- To perform calculations involving moisture content.
- To describe the various forms of water that exists in wood.
- To discuss basic mechanisms through which water movement occurs during drying.

#### **Module Three**

##### **Shrinkage in Wood**

- To describe the shrinkage and swelling phenomena in wood.
- To discuss the effects of types and shapes of wood, and drying conditions on shrinkage.
- To perform calculations to determine dimensional changes due to changes in moisture content.

#### **Module Four**

##### **Drying Stresses and Degrade**

- To discuss relationships between shrinkage stress and various forms of degrade.
- To implement results of quality control procedures and propose actions to reduce degrade.

## **Module Five**

### **Heat, Temperature and Humidity**

- To discuss the concept of dry and wet bulb temperatures, relative humidity and equilibrium moisture content and the impact on drying.
- To describe the heat transfer mechanisms involved in drying.
- To describe properties and use of steam in dry.

## **Module Six**

### **The Drying Process.**

- To identify various stages in drying and describe variables that can affect each stage.
- To describe how temperature influences drying and wood properties.
- To propose changes in drying conditions to achieve specific drying results.

## **Module Seven**

### **Air Circulation**

- To understand basic engineering concepts of heat and moisture transfer as they relate to air flow in drying.
- To use the East concepts to minimise quality-control problems associated with unequal air flows.
- To describe piling and loading practices to maximise kiln performance.

## **Module Eight**

### **Kilns.**

- To describe the main components of a kiln and their functions.
- To describe different types of kilns and their use for specific wood types and products.
- To describe basic functions and maintenance of kiln controllers.

## **Module Nine**

### **Kiln Drying Schedules**

- To describe the basic elements of kiln schedules.
- To develop schedules / modifications to achieve specific drying goals.
- To select basic schedules for Western commercial species.

## **Module Ten**

### **Storage and Transit of Dry Timber**

- To describe the effects of storage conditions on wood and moisture content.
- To recommend procedures and maintain quality during storage and transit.

## **Module Eleven**

### **Alternative and Additional Technology for Kiln Drying**

- To describe the benefits of electronic moisture sensors for green moisture sorting, dry moisture sorting and in kiln moisture measurements.
- To describe the application and basic functions of advanced kiln control systems.
- To describe the application of small-scale specialised drying processes.

## **Module Twelve**

### **Statistical Quality Control in Lumber Drying**

- To describe the benefits of an ongoing kiln drying quality-control program.
- To perform basic statistical procedures including evaluations of averages, sample variances, confidence intervals and determination of sample sizes.

### **Correspondence course**

- Forintek members      C\$802.50
- Non-members          C\$1605

### **CD Training Package**

- Forintek members      C\$400
- Non-members          C\$800

## **Appendix 8**

### **British Columbia Institute of Technology – Diploma in Wood Products Manufacturing Technology**

#### **1<sup>st</sup> Semester (15 weeks)**

- Technical communications 1.
- Computer applications.
- Technical mathematics for wood products manufacturing.
- Interpretation of technical wood drawings.
- Physics for wood products 1.
- Timber grading 1.
- Timber tallying.
- Wood science 1.
- Wood products industry issues.

#### **2<sup>nd</sup> Semester (20 weeks)**

- Technical communications 2.
- Linear programming.
- Statistics and quality-control for wood products manufacturing.
- Mechanical equipment.
- Management engineering.
- Physics for wood products 2.
- Introduction to forestry/timber manufacturing.
- Wood science 2.
- Timber grading 2.

#### **3<sup>rd</sup> Semester (15 weeks)**

- Advanced technical communications 3 for wood products manufacturing.
- Electrical equipment.
- Process control for wood products.
- Operations management for wood products.
- Summer technical report.
- Wood science 3
- Plywood manufacturing.
- Lumber manufacturing and finishing.
- Mill safety and cost controls.

#### **4<sup>th</sup> Semester (20 weeks)**

- Advanced technical communications 4 for wood products manufacturing.
- Industry projects for wood products.
- Wood science 4.
- Wood products distribution.
- Mill services.
- Engineered wood products.
- Timber drying.
- Timber quality-control.
- Value added wood manufacturing.
- Supervision.



## **Appendix 9**

### **The University of British Columbia Wood Products Processing Degree – modules and elective**

#### **Year 1 Basic Science**

##### **Term 1**

- General chemistry.
- Maths 1.
- Elementary physics 1.
- Introduction to wood products and forest management.
- General elective. (Student choice)

##### **Term 2**

- General chemistry.
- English.
- Maths 2.
- Elementary physics 2.
- General elective. (Student choice)

#### **Year 2 Wood and Material Science**

##### **Term 1**

- Principles of microeconomics.
- Quantitative methods in the wood industry.
- Intro to business statistics and quality-control.
- Wood anatomy and identification.
- Mechanics of wood products.

## **Term 2**

- Technical communications.
- Wood product chemistry.
- Wood and adhesives and coatings.
- Wood drying and preservation.
- Wood products manufacturing.
- Wood machining skills.
- *Co-op work placement. (Junior)*

## **Year 3 Manufacturing One Basic**

### **Term 1**

- Circuits and electronics.
- Mechanical components.
- Industrial engineering.
- Quality improvement.
- Applied mechanics of material.

### **Term 2**

- *Co-op work placement. (Intermediate)*

## **Year 4 Advanced Manufacturing**

### **Term 1**

- Financial accounting.
- Machine CAD/CAM.
- Job Costing and engineering economics.
- Machine and plant optimisation.
- Principles of cutting and tooling.
- Restricted elective. (Student choice)

### **Term 2**

- Logistics and operation management.
- Computer-controlled machine.
- Plant layout and design.
- Wood finishing.
- Furniture construction.
- Restricted elective. (Student choice)
- *Co-op work placement. (Senior)*

## **Year 5 Specialisation**

### **Term 1**

- *Co-op work placement. (Senior)*

### **Term 2**

- Wood product marketing.
- Glued wood products.
- Environmental and facility design.
- Project in program major. (Wood science)
- Restricted elective. (Student choice)
- Restricted elective. (Student choice)

### **Wood Electives**

- Timber structure and design.
- Wood building design.
- Building science.