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**Musculoskeletal Disorders in the New Zealand
Sawmilling Industry – Prevalence, Risk factors and
Intervention Strategies**

A thesis in partial fulfillment of the requirements for the degree of
Master of Ergonomics at Massey University

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ABSTRACT

Government injury data indicated that New Zealand's sawmilling industry had a high number of musculoskeletal disorder (MSD) claims of high cost. New Zealand's forestry and wood processing sector is also a growth industry, with 100 new mills likely to be developed by 2010. Required to address the high rate of MSDs is a systematic review of manual handling risk factors and the development of related intervention strategies.

Detailed information on the prevalence and nature of MSDs in NZ sawmilling was sought. Available Accident Compensation Corporation injury records provided limited detail on the work tasks causing MSDs in sawmill workers. An industry survey of reported accidents for a 12 month period (September 2000-August 2001) was completed to determine MSD prevalence, and to identify sawmilling operations with high manual handling risks. 56% of MSD reports were from millhands and tablehands, who complete the majority of timber handling tasks. Back injuries accounted for 37% of MSD reports, and upper extremity complaints a further 35%. Tasks creating the largest proportion of MSDs in sawmills were pulling, sorting and stacking of timber from green or dry tables/chains (conveyors moving freshly sawn or kiln-dried timber, from which boards are taken and stacked), filleting tasks (stacking timber with spacer sticks before drying), and grading/sorting on the green table/chain.

In case studies of two South Island sawmills, timber handling tasks at green and dry tables were investigated to determine manual handling risk factors. Karsh et al (2001) suggest that multiple intervention applications are the most successful in reducing MSDs. A range of assessment methods was therefore used to identify a range of manual handling risk factors and potential interventions. Assessments included worker interviews, archival data review, environmental assessment, lifting strength testing, force measurement, anthropometry, dimensional assessment, discomfort reporting, exertion scales, Rapid Entire Body Assessment, and application of a manual handling risk assessment.

The manual handling risks identified were related to a wide range of aspects of the task (frequency, workplace design), worker (experience, training), load (timber size, chain/table design), environment (temperature, lighting) and management (task rotations, maintenance schedules). The intervention strategies developed to reduce the manual handling risks included workspace geometry (such as the relationship of timber on the table to the packet, and packet spacing), workflow management (such as task rotations, and managing peaks and troughs in production), task technique training (such as board throwing methods, induction training, and the use of protective aprons), table design (such as height, type of

chain or conveyor), and glove design. Mill-specific recommendations based on these strategies were presented to the mills.

Further work is indicated to evaluate the effectiveness of recommended intervention strategies.

GLOSSARY

<i>Green timber</i>	Recently sawn or fresh lumber that has not yet been through any drying process.
<i>Dry timber</i>	Timber that has been dried, usually in a kiln but may be air-dried in the yard.
<i>Long chain or long table</i>	A straight conveyor system moving sawn timber from the mill. Boards are pulled from the conveyor and stacked into packets. Conveyors may be a link chain, plain steel belts, rollers, shaped nylon lugs or cleat design.
<i>Round table</i>	A large, rotating, circular platform onto which green sawn timber from the mill falls, and boards are pulled and stacked into packets.
<i>Packet</i>	A stack of timber of set dimension and board numbers that is strapped and/or wrapped in plastic. Each workplace has unique packet dimension requirements usually related to size for export containers and other transporting and storage issues.
<i>Filleting or stripping</i>	The stacking of packets of timber with small spacing sticks (called 'fillets' or 'strips') across the packet between each timber layer, to allow drying. Two or three layers of fillets/strips are also placed across all packets for stability in transportation.
<i>Defilleting</i>	The removal of fillets/strips from stacks of timber.
<i>Sorting</i>	Selecting same dimension and grade boards from the mixed boards and grades on the table/chain, and stacking into a packet.
<i>Grading</i>	Marking of boards on the table (usually with chalk) to denote their quality and thereby the packet to be stacked to. The timber grader has completed additional training for this revenue-related task. Automated grading (machine stress grading or MSG) may also occur.
<i>Re-sawing</i>	The return of once-sawn lumber to the mill for sawing to a smaller size.

**REPORTS WRITTEN FROM THIS WORK
(Copies in Appendix 11)**

1. Edwin, M., Tappin, D. & Bentley, T. 2002. *Musculoskeletal Disorders in the New Zealand Log Sawmilling Industry*. Proceedings of the 11th Conference of the New Zealand Ergonomics Society, 14 and 15 November 2002. Wellington. (pp 112-117)
2. Tappin, D., Edwin, M. & Moore, D. 2003. *Sawmill Accident Register Records – Main Findings of a Survey from 37 Mills*. COHFE Report, 4(5)
3. Tappin, D., Edwin, M. & Bentley, T. 2003. *Musculoskeletal Disorders in Sawmilling: ergonomics work systems assessments and suggested interventions*. COHFE Report, 4(6)
4. Tappin, D., Edwin, M., Bentley, T. & Ashby, L. 2004. *Addressing Musculoskeletal Disorders in the New Zealand Log Sawmilling Industry*. Contemporary Ergonomics. McCabe, P. (ed.). (pp 212-216)

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