

Addressing musculoskeletal disorders in sawmilling
Case Study 1: Optimising working heights at
Waipawa Timber, Hastings



The green table at Waipawa Mill

Summary

Through a participative process involving staff and management, changes were made to make manual handling easier at the mill; most notably, overall packet heights were lowered and friction reduced for timber handlers at the green table. There were unexpected benefits. Not only have the staff have reported less fatigue since the changes were made, but significant gains in productivity were also recorded.

Acknowledgements

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The Problems

Packet heights

Packet stacking practices had been changed and were now designed to suit the dimensions of the export containers. This meant packets were up to 27 boards high - dependent on board dimensions, with some of the layers above shoulder height and some work that required stacking and fillet placing above head height. After 12 months of this new higher-stacking system, staff were reporting extra fatigue, which they felt was a result of this practice.

Staff turnover has historically been low at this family-owned mill, but good staff are always hard to replace - especially in the fruit picking season when the region generally struggles to find enough labour. The kilns run 24/7 and so good, reliable staff are essential for sustained profitability. The low turnover also means however that the average age of staff is creeping up, and to keep the experience at the mill the tasks need to be as physically sustainable for as wide a section of the population as possible.

Resistance when pulling timber from the tables

Comments from green table staff about niggling injuries and various strains/sprains - which they felt were related to pulling timber - prompted the mill to look for ways to improve the task and make it more sustainable.

Common problems

Awkward working heights and high resistances are common MSD risk factors in sawmills around New Zealand. For more discussion on these, (and what can be done about them), see the two COHFE reports referenced on the back page.

Interventions– what was done

Packet heights

Following attendance at a presentation on addressing MSD in sawmills, manager Terence Taylor decided to introduce changes to see if the fatigue could be reduced. The intervention was simply to reduce the packet heights, stacking to only three sections and cutting out the problematic top section of boards. The intervention 'came right through the whole system' from green table and filleting to de-filleting after the kilns, removing work above eye level and greatly reducing working above shoulder level.



A lower 20-layer packet

Resistance when pulling timber from the tables

Following discussion about ways to reduce friction at the table edge at the presentation, the mill fitted a 1.5 inch galvanised pipe around the green table.



Pipe fitted on green table edge to reduce friction

Other changes made as part of this initiative

- Task Rotation was brought in over 3-4 years. It is quite formal now, and the mill wants staff to be versatile enough to be able to move between three jobs within six months'. The motivation is that "if someone is sick, others need to be able to step in without hindering production too much".
- Transfer of skills between filleters - teaching and helping each other. There is a culture of being competitive as a team - not as individuals squeezing out weaker members - as they did when they were younger.
- Working in pairs - swapping from one side of packet to the other to do left and right handed stacking.
- Method of getting new ideas - participation of staff, management 'always asking for input'.
- Building weather shelters for filleters.

Results

Reduced packet heights

Benefits

- Throughput of timber for the mill increased by 35%, attributed mostly to the increased productivity of the filleting team. Head Filleter Craig suggested that there were a number of reasons for this:
 - Under the previous system the last seven or so layers took as long to stack as the first 20, removing this slow work sped up the whole system improving mill productivity significantly
 - Stacking to smaller packets with a faster turnaround time provides more frequent breaks, so that the staff don't need such long smokos. Their experience (which supports the published studies on optimal work-rest patterns) is that shorter, more frequent breaks are better than longer but more widely spaced ones. Craig feels minor injuries have reduced too; staff 'don't get hurt as much - less trapped fingers'. Staff also reported less fatigue.
- The staff doing the stacking were on piecework, and chose to maintain the same hours. They therefore increased their take-home pay.

Costs

- The change in stacking resulted in one cubic metre less being fitted in the kiln per charge due to the extra bearer layer
- The extra bearer layer also reduced somewhat volume per load on domestic (non-container) shipments

Overall results

When the benefits and costs were compared, the productivity gains and reduced fatigue clearly tipped the balance in favour of retaining the changes to the stacking heights.

Resistance when pulling timber from the tables

The staff report being able to feel the difference most at the end of the week. They feel less cumulative fatigue with the reduced-friction pipe edge.

Limited before and after objective measures were taken using a handheld digital force meter to gauge the break-out force at the start of the pull. There remained a lot of difference from one board to another due to shape, sap deposits etc, but the reductions in average measured force needed were considerable. Break-out pull forces for the 300x25mm pieces reduced by a third from 27kg to 19kg.

Nine boards at 200x25 (3.7m length) required an average of 5.5kg. By comparison a pair of 200x25 had been measured pre-intervention at 13kg and 8kg. When multiplied by the thousands of boards handled each day, this adds up to a huge reduction in the total force required, just for this one part of the total timber handling process.

Key points

- Participation of the people who work in the area in identifying and designing changes is a key part of successful interventions
- Many organisations in New Zealand find themselves with an ageing workforce. It makes sense for a number of reasons to therefore redesign operations, wherever possible, so that the physical job demands are within the capabilities of as many people as possible.
- Every plant is unique and no one solution will fit perfectly everywhere. However, the basic principles of good manual handling design can be applied in any plant, and with experimentation can make jobs easier, safer and more productive.

Further reading

Tappin, D., Moore, D., & Ashby, L. (2003). *COHFE Report, 4(3): Filleting - good practice principles to help prevent musculoskeletal disorders.*

Tappin, D., Edwin, M., & Bentley, T. (2003). *COHFE Report, 4(6): Musculoskeletal Disorders in Sawmilling: ergonomics work system assessments and suggested interventions.*

Both of these reports are downloadable from:
<http://www.scionresearch.com/cohfe.aspx>

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