

ERGONOMICS DEMONSTRATION PROJECT

# **Ergonomics Demonstration Project at Columbia Vista Corporation in Camas**

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Columbia Vista Corporation is a typical sawmill where a number of work-related musculoskeletal disorder (WMSD) hazards could have existed among lumber handlers. In 2001, the company participated in an industry-wide ergonomics project together with five other sawmills in Washington State. A number of WMSD hazards were identified at some of the jobs there. Examples of possible solutions were developed from that project. The company management has taken some important steps by involving employees in order to reduce or eliminate the hazards. This report describes these improvements.

In the industry-wide sawmill ergonomics project, jobs of lumber handlers (for example, machine off bearers, edger operators, resaw operators, straighteners/drop sorters, trim saw operators, planer operators, graders, pullers, and banders) at the five sawmills were evaluated based on Washington State Ergonomics Rule and other ergonomics guidelines. Results were presented to the sawmill participants with discussions about causes of these hazards and possible ways of eliminating or reducing them.

WMSD hazards were primarily found in a few jobs: machine off bearer, edger, grader and lumber puller in Columbia Vista's production processes.

### **Machine off bearer**

The machine off bearer job is located between the headrig saw and the edger. This position ensures that cants are straightened, slab wood and slash are disposed of, and that the wane is up. Cants can often weigh up to 300 lb.

Before the improvement, a machine off bearer would frequently have to handle and turn the cants to ensure that the cants were properly aligned on the chain with the wane up. Due to the shape and weight of the cants, the operator had to apply high hand grip force to perform the handling and turning tasks. Detailed analysis showed that the operator had to handle the cants and slabs more than 500 times per hour, and turn the cants more than 100 times per hour. With the high hand force and relatively high frequency, the job is considered hazardous in terms of high hand force risk. Lifting and turning the heavy cants also results in significant risk to the low back. Biomechanical analysis showed that only 32% of typical male workers would have the strength to perform such heavy lifting. Based on Washington State Ergonomics Rule, the machine off bearer's job is a "hazard zone" job due to high hand force in combination with highly repetitive motions and heavy, frequent lifting.



Handling and turning cants to ensure that the cants were properly aligned on the chain with the wane up

The sawmill recognized this hazard and confirmed that it was possible to improve the jobs based on other sawmills' experience. Initially they decided to install a commercial board turner that would involve a significant investment. However, management believed that such an investment was justified because this hazard is a major concern for the company. When management presented the idea to the employees and asked for comments, one of the employees volunteered to try a new and inexpensive solution. He used two pneumatic cylinders and constructed a "home-made" board turner, with a cost of only \$150! This resulted in considerable savings for the company and the system performed very well. The operator does not have to manually flip the cants, but needs only to guide the boards while the "home-made" board turner is doing the work. Both the high hand force and heavy lifting risks have been significantly reduced due to the use of the board turner.



A "home-made" board turner assists the operator to turn the cants and so to eliminate the heavy lifting/turning activities at this job.

### Edger operator

Edging is a secondary breakdown process that makes longitudinal cuts in cants. This process is usually located after the headrig saw. There the cants are broken down to boards, then sorted and straightened. At Columbia Vista, the edger operator manually feeds the edger. Sometimes, the edger operator needs to flip the cants to find the best way to cut them. Similar risks existed in this job as in the machine off bearer's job.



An edger operator manually feeds the edger machine.

As the cost of the “home-made” board turner is so little, the company decided to also install a board turner at the edger’s workstation. This significantly reduced the physical demand of manually turning cants.



A “home-made” board turner is also installed at the edger station to assist turning cants.

## Grader

The main function of the grader’s job is to grade boards of various dimensions and weights according to their quality. Performing the grading required the grader to turn the boards frequently so that all four sides can be examined.



A grader is turning boards to inspect and grade them.

Analysis of a work sample showed that the grader might apply hand exertions for more than 1400 times per hour. Considering the relatively high hand force required to turn the

boards, this job is considered a “hazard job” due to high hand force and highly repetitive motions.

This job became another major targeted job for improvement. The company learned about a board turner system for grading stations from L&I’s Hazard Improvement Project in sawmills, and also did their own research on the product. The company bought the system and installed it in the grading stations. Realizing that there were technical problems associated with the system when boards of different sizes were produced, the company worked to modify the system and made it possible to handle boards of various sizes. With the modified board turner, the boards are automatically turned in front of the graders, so that no manual board turning is required. The company also went one step further in this improvement. Instead of manually marking the boards, an electronic control system was developed. The graders use pre-defined keys to assign the grade marks to the boards passing by. These marks are logged into the computer for sorting at the mechanical sorter. This logged grade mark information is also used for analysis that shows the distribution of each individual grader’s grade marks. This information is used to monitor the grading variation between different graders, so that proper training can be provided if necessary. The investment in this system not only significantly reduces the WMSD hazards, but also increases the product quality.



A board-turning system is installed at the grading stations, and graders do not need to manually turning and marking boards.

## Puller

The puller’s job occurs later in the milling process. Previously at Columbia Vista, boards were manually pulled off the conveyor chain and stacked by dimension for transportation. Boards usually weigh 70 to 80 lbs. It required about 20 to 40 lbs pulling force to pull the boards off the conveyor chain. Depending on the location at the line, some pullers were required to pull more frequently (more than 600 times per hour) than other pullers (as slow as 100 times per hour).



Boards were manually pulled off the conveyor chain and stacked by dimensions for transportation

Based on the Washington State Ergonomics Rule, many of the positions of the pullers could be considered hazardous due to high hand force and highly repetitive motions, as well as heavy and frequently lifting.

This job was therefore also targeted for improvement. The decision to make such improvements was not only because of the high risk of musculoskeletal disorders, but also due to production concerns. The sorting and stacking process was usually the bottleneck in production that limited the productivity of the whole production process.

One ultimate solution to this was to install mechanical sorters and stackers. This has been used in many other sawmills and proved successful. However, the cost is high. Based on a cost-benefit analysis, the company determined that the investment would be worth it because this upgrade would significantly improve productivity. Therefore, they purchased a mechanical sorting and stacking system to replace the manual pulling and stacking process. The manual pullers' jobs were removed and only one operator is required in the sorting and stacking process. The improvement significantly increased productivity. In only about six hours, the mill is now able to process the amount of boards equal to eight hours' production in the old system.



A mechanical sorting and stacking system is installed to replace the manual pulling and stacking process

The company has greatly improved its working conditions in a relatively short period of time. Although the company made a major investment, this investment is not only for ergonomic improvements but also mainly for productivity improvements, according to

the company's President, Bob Lewis. He is very happy and satisfied with what they have done, and commented that he would do the same again in similar situations. He is very happy with the involvement of workers so that inexpensive and effective solutions could be developed. And he is also happy that many other benefits (such as productivity and quality) could also be achieved while working conditions are improved.