MANAGING FOR EFFECTIVE DRYING LOGS TO FINISHED LUMBER

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I am indeed honoured to be invited from Alberta to speak to a group of drying specialists gathered in the area where I grew up and began my work in the forest industry.

I will not attempt to add my comparatively limited drying expertise to that held by this knowledgable audience. I will, however, be pleased to share with you the focus and strategies employed at Grande Prairie division for improving drying results through efforts to control the conditions which impact drying; from the control of log supply, to the control of manufacturing, the lumber yard, and efforts to optimize kiln performance.

Grande Prairie consumes 700,000 m^3 with production of 175 MMBM per year, or 350 Mfbm per shift on a two-shift basis. The species mix for the mill is approximately 48% lodgepole pine, 46% white spruce, and 6% balsam fir. Prior to 1992 all wood volumes were delivered in a winter haul. Since 1992, approximately 100,000 m^3 are delivered in a summer haul. The importance of the summer haul was to prevent grub and sap stain damage to wood manufactured in late summer and fall. The affect on kiln drying, however, is that the wood delivered in the summer **must not be consumed when delivered, or kiln drying control will be lost.**

At Grande Prairie we have four kilns: three 1988 Salton double track (200 Mfbm capacity) computer controlled kilns with single pass air flow; and a vintage Moore double track (145 Mfbm capacity) manual controlled kiln with single pass air flow. For six months in any year our average drying schedules will exceed twenty-four hours per charge. With total kiln capacity only slightly greater than our average daily production, our kilns must run seven days a week during that period. As such, good preventative maintenance is essential.

The key benefits of effectively managing drying performance are improved grade and "specialty" recovery, improvement of the products we present to customers, and improved planer productivity due to reduced warp and breakage. In addition, improved drying efficiency reduces drying costs, reduces overtime costs, and improves productivity. With improved product quality, and reduced degrade, a significant improvement in lumber recovery (LRF) also results.

At Grande Prairie division we have increased #2 & Better grade recovery from an average of 68% in 1989 to 86% in 1993. In addition, Specialty grade extraction (J Grade and Square Edge) increased from a modest beginning in 1991 to 28% of our total volume in 1993.

When we contemplated the elements of performance that most significantly impact grade recovery, we subjectively estimated that:

- The move from two full-time planer graders to three has been responsible for 10% of the grade recovery improvement.
- Grader training and increased grade surveys contributed approximately 15% of the grade recovery improvement.
- The most significant aspect of our grade recovery improvement is attributable to the improvement of product quality; at 75%. Such things as reduced "wets," reduced warp, reduced skips, and overall improved product quality.

With the product quality improvement at 75% of the grade recovery improvement, we estimated that this performance improvement resulted from:

- Stock rotation 7%
- Maintenance 8%
- Manufacturing 10%
- Stacking, stripping, and piling 20%
- Kiln operation 25%
- Log management 30%.

Today, I want to speak to the four most significant contributors to product quality improvement for Grande Prairie; namely: (1) log management; (2) kiln operation; (3) stacking, stripping, and piling; and (4) manufacturing.

Concerning log management, we realized for some time that until we were able to control the balsam content in our rough sawn lumber, we would be unable to optimize our drying performance.

Our first effort was to reinstate a weight-sorting system which had been installed when the mill was constructed, but had never been used. This system sorted lumber based on parameters specified for various board weights, correlated to the board's dimensions, as determined by the trimmer scanner. This system worked quite effectively, however, with only 60 bins we found we had to double-up lengths in the bins. This created other drying problems since we were unable to "box" both ends of the load. Aside from the associated reduction in kiln capacity, the increase in splitting and warping occurring at the ends of boards negated any benefits.

Our second effort was to sort the balsam logs at the merchandiser. This approach worked well in some respects — we were able to sort out 100% of the balsam. The problem, however, resulted from the fact that the balsam did not evenly occur at a rate of 6% throughout our log diet. It could, in fact, occur in pockets of up to 40%. This led to periods where the mill would run out of sawlogs since the merchandiser was attempting to sort out all the balsam, and hence could not keep up to the sawmill requirements.

Ultimately, we learned that to control the mix of balsam in our wood supply, we had to begin in the woods. This was a difficult task — convince our woodlands operators to believe that **their efforts** were key to our **drying performance**. In addition, we had to convince them that their efforts to sort in the bush would be supported with unique sorts being maintained in the log yard.

In our first year we had reasonable success sorting out the balsam, but this year (our third year in the program) we have truly achieved a 100% balsam sort. And while we were very concerned about the cost of sorting in this way, extra costs have not been significant.

In addition to the 100% sorting of Balsam, we keep logged areas of predominately spruce or predominately pine separate in the mill log yard so they to can be run separately through the mill. While this effort does not completely sort the species, it has helped our drying performance.

Concerning sawmill manufacturing, our objectives are to have no "skipped lumber." With lumber target thicknesses predominately at 1.670" (up to 1.700" for side board lumber) there is no room for over-drying. Managing the conditions which influence drying is the only way our quality standards can be met.

Having a sawmill stacking system which produces eight foot wide loads is clearly an asset. It certainly promotes uniform drying as a result of uniform tier heights across the load. It does not, however, reduce the need for as near to "perfect stripping" as possible, proper piling of loads, and effectively loading the "top tier" of each load. Without the top tier adequately loaded the loads cannot be properly piled.

We also learned that with all the energy we were placing on managing drying quality, and all the other components of manufacturing quality, one quality control supervisor was not enough. In February, 1994, we added a second QC supervisor to our management team; whose responsibilities range from the log yard to the rough-green lumber yard. His key priorities are log quality management, lumber size control, and lumber stacking and piling control.

The sawmill QC supervisor conducts daily lumber size control using the SICAM computer program. Every week he conducts yard tours with a checklist of some twenty key elements of load stacking, stripping, and piling. He assesses the condition of pile bottoms and the adequacy of green stock rotation through the kilns. Wherever possible, he tracks performance measures by shift, and each week produces a "yard stock performance" chart for each crew.

Managing kiln performance is obviously another key component of our drying performance improvement. Our preventative maintenance schedule of shutting one kiln down every Friday for maintenance has helped dramatically. When maintenance was left for the weekend maintenance crew, typically mill priorities took over and kiln maintenance was unavoidably deferred.

Collecting statistical moisture content data has been fundamental to our continuous improvement in drying performance. This effort must begin with periodic measurement of the average moisture content of the rough green loads in-bound to the kiln. This is particularly important in the Spring and Fall when drying schedule hours are falling and rising, respectively. Further, moisture samples must be taken for every kiln charge before it is pushed out of the kiln— we sample one hundred boards before any charge is changed. We track this information for average MC and standard deviation, and compare it to the average MC and standard deviation information produced by our moisture detector system in the planer mill. All information for each charge, and each product run, is charted and shared with the kiln and planer crews. Our target for each item is to maintain an average of 15% MC with a standard deviation of 2.5%.

Relatively new to our kiln performance program is a "top tier" weighting initiative we began in early 1993. Essentially, our goal is to weight every load on the top of a kiln charge with one inch thick steel plates, to control the development of warp in the top few rows. This program has been a resounding success for controlling warp, and in fact, we have observed warp which occurred in the rough-green yard actually be reduced during drying as a result of the top tier weighting.

Our results from the weighting program are entirely empirical, however, they are conclusive. Tests with loads left in the rough-green yard with and without weights demonstrated a significant reduction of warp even before the product entered the kilns. Our improved recovery of "Specialty" product is clearly testimony to the reduction of warp which has occurred.

So what have all of these drying, and product quality efforts really done for the key performance factors at Grande Prairie division?

Firstly, our customers advised us that rarely does any "cull" develop when a package of our lumber has been placed on their sales racks. Their customers are looking for well manufactured, "warp free" lumber. Our product is satisfying their customers, and as a result, we are meeting or exceeding the expectations of our customers.

Lastly, and perhaps most significant, is the progression Grande Prairie division has made from being the worst performing profit centre in Canfor's ten northern divisions, to being the best in the last two years.

Clearly issues such as the change from the Canadian export tax of 15% for Alberta's lumber sold to U.S., to a U.S. countervail duty of 6.51% for all of Canada in 1991 levelled the playing field. Log costs are also a disparity between Alberta and B.C.

All this considered, however, no factor has improved the profit performance of Grande Prairie division more than the improvement in lumber manufacturing quality, and hence product sales value. Furthermore, no single initiative has had more impact on our product quality than our efforts to improve the conditions for drying lumber. The efforts in this area of quality management are **clearly worth it!**

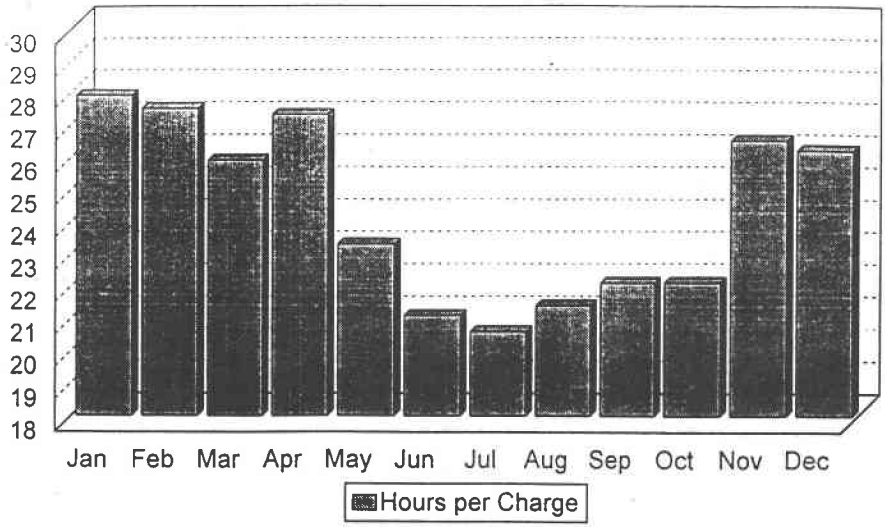

Figure 1. **Kiln schedule hours, 1993.**

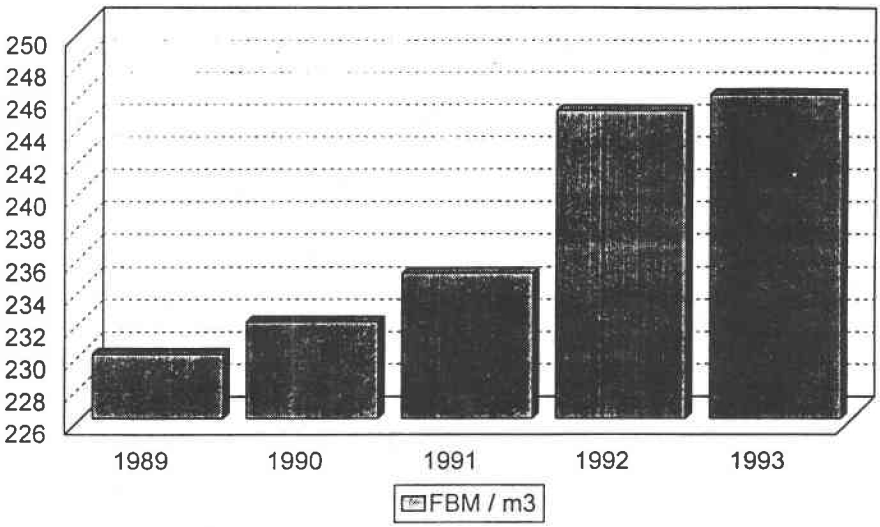

Figure 2. **Lumber recovery, FBM/m^2.**

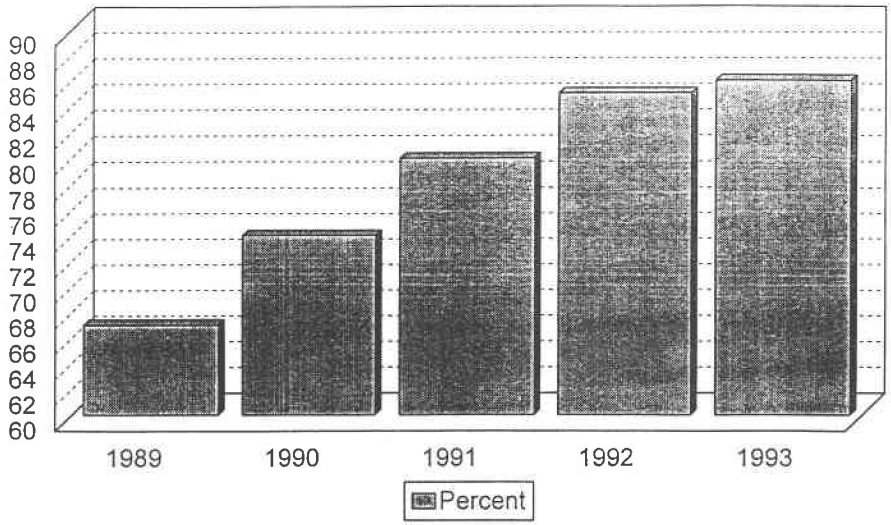

Figure 3. Grade recovery for #2 and better.

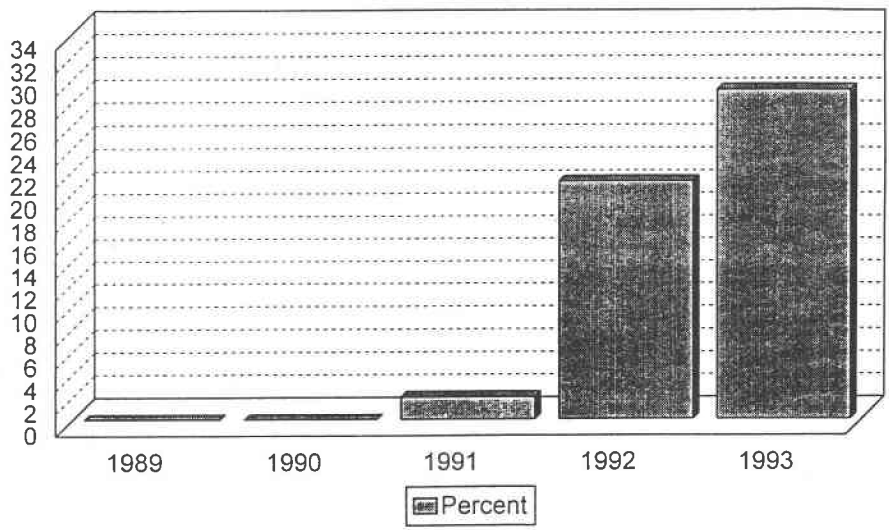

Figure 4. Specialty recovery, J Grade/Square edge.

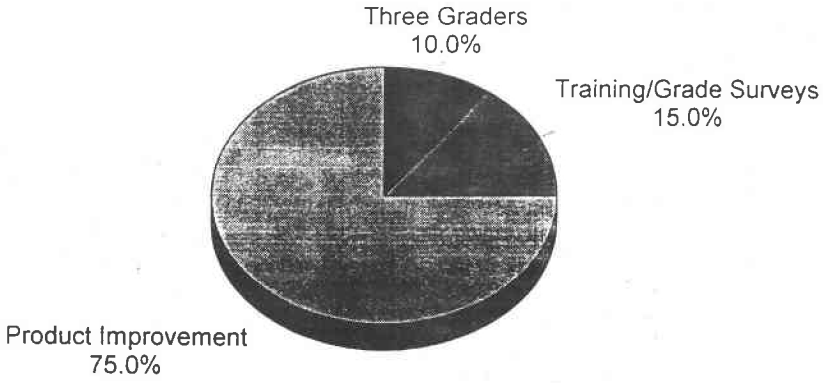

Figure 5. **Grade improvement.**

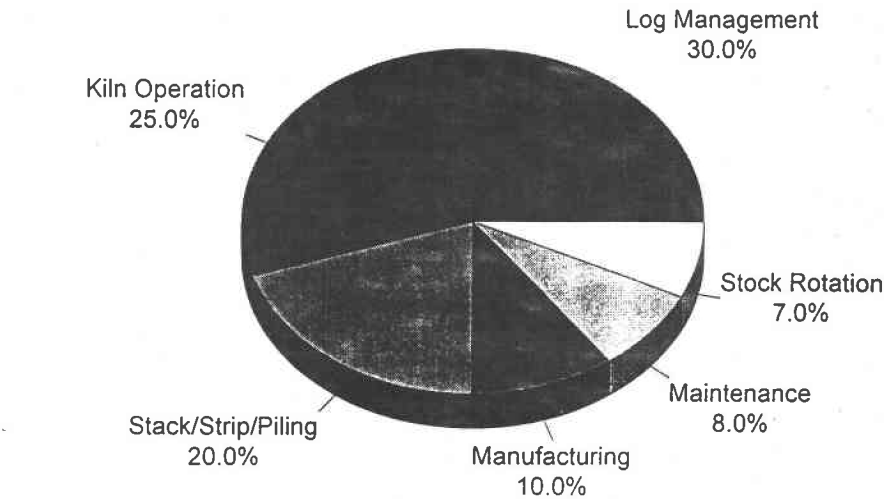

Figure 6. **Product improvement.**

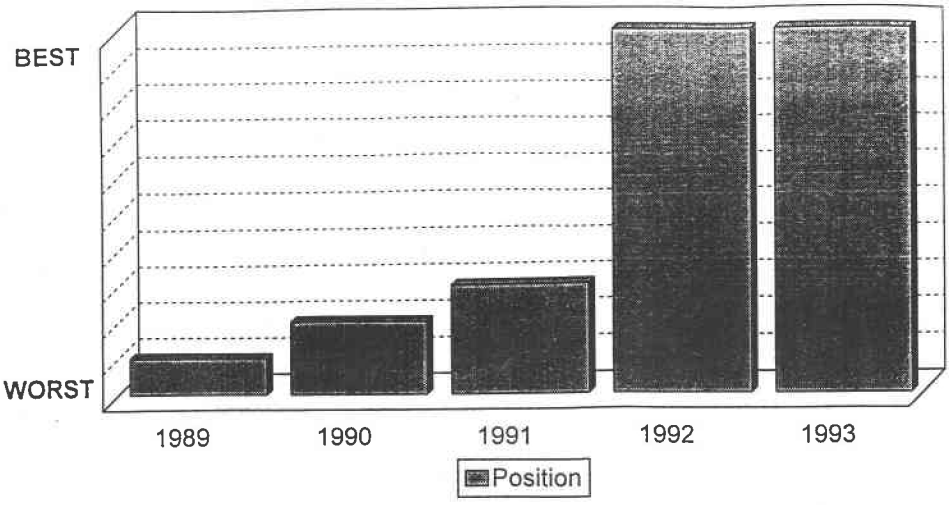

Figure 7. Profit performance in Canfor group.

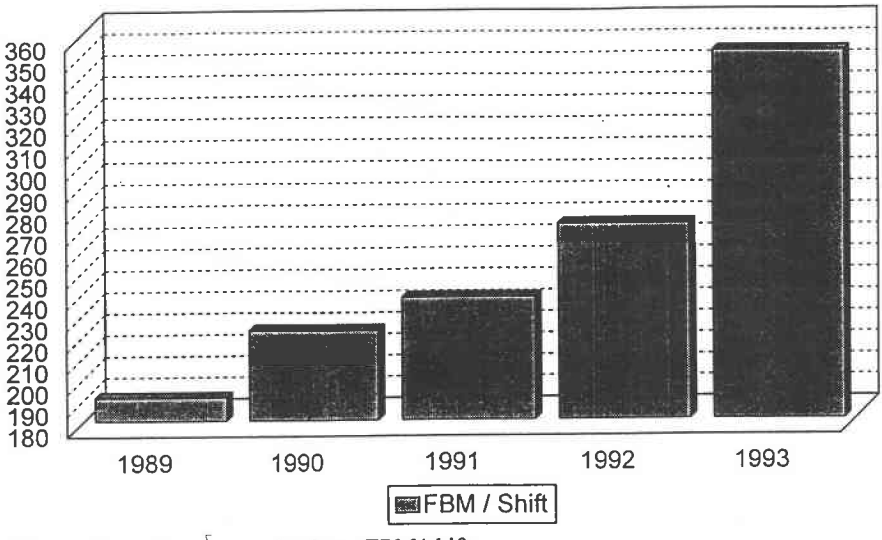

Figure 8. Planer production, FBM/shift.