MAXIMIZING DRY KILN UTILIZATION THROUGH TRACK MANAGEMENT AND SCHEDULING

Larry Lindberg
Simpson Timber Company
Shelton, WA

How many times have you heard, "We need more kiln capacity, but our boiler is at maximum capacity now. We simply don't have the boiler capacity to operate any more kilns." Or a similar complaint, "We don't have room to build any more kilns." And I'm sure we've all heard, "We've got to reduce our cycle times and dry faster to get the needed volumes through the kilns."

As sawmills have become more efficient and productive, kiln capacity has become a premium. In order to keep up with these increased demands we need to take a look at how we manage and schedule our tracks. Are we really maximizing the utilization of our kilns, or are we missing some areas of opportunity?

One area to focus on is uptime. Simply put, uptime is the time when the kiln is on-line and drying lumber. Anytime the kiln is not drying lumber such as, pulling and recharging, preventive maintenance or repairs, waiting to be pulled, or lack of lumber to load, etc. is downtime. If your average uptime is less than 96% per week, you are missing an area of opportunity. In talking with various people in the industry, one common comment is, "That's not our problem, our kilns are always full."

Let's look at an example of an operation where the "kilns are always full". For the sake of argument, let's say they are drying dimension lumber in 22 to 24 hour cycle times, including recharge time. They don't have a kiln operator on duty after 1:30 a.m. or before 7:00 a.m. A kiln shuts down at 2:00 a.m. The day operator comes in, pulls and recharges the kiln. It is back on line at 8:00 a.m. This kiln just had six hours of downtime !! Six hours represents 25% of the drying cycle for another charge. If this scenario happens several times over the course of the week, this operation could very well be losing the ability to dry one or more charges per week, depending on how many kilns they are operating. If you are operating a 200M bd. ft. capacity double track kiln, drying dimension lumber, and you are forced to process 200M bd. ft. green versus dry at a premium loss of $50 per M, you've just lost $10,000 !! Based on 50 weeks of operation, that downtime can cost your operation $500,000 annually !! This operation doesn't need another $800,000 dry kiln, it needs to add another kiln operator. Uptime is important. Controllable downtime is expensive.

Let's move on to an operation that processes multiple species and product lines. All kiln dried, 4/4 boards through 3" clears. Uptime is still critical. But, now we are dealing with drying schedules as low as 24 hours and as long as 21 or more days. Scheduling becomes a critical issue. Communication with the sawmill manager is the key here. The person scheduling the kilns should know the projected cut for the month. This should include the assumed volumes by species and current product assumptions of those species. With this knowledge, the person scheduling the flow through the kilns has an idea of how many tracks he needs to turn daily or weekly to match the mill production. With proper scheduling and looking ahead it is possible to get into a rotation by utilizing fast and slow drying stock to obtain the proper turnover rate. You cannot load up all your kilns with slow drying stock or you will end up in a hole that you will never be able to dig your way out of. In order to

maintain maximum uptime, you must be adaptable to mixing species and thicknesses when lack of volumes requires. Although, this is not always recommended, some species are quite compatible with schedule modifications. At times progressive loading is in order, pulling partial charges and reloading with faster drying, or partially air dried, or re-dry stock. You must become very creative and make use of track hours wisely. Once you've lost or wasted them, you can't get them back.

At times you may find that it is prudent to leave a kiln down for several hours because of incompatibility of stock, or perhaps coming off a weekend or holiday period where you've caught up with sawmill production. If you are managing your green yard and kilns effectively, you will see this coming in advance. Take advantage of these windows of opportunity to schedule your preventative maintenance and repairs.

An area that seems to get overlooked is the equipment itself. Many operations have upgraded or added more dry kilns. When operating a large bank of kilns there is generally a variation in performance between the different kilns, usually by design, heating capacity, velocity, etc. Whenever possible, one should take advantage of this and try to schedule the product into the kilns that they perform best on. By studying drying records and histories the various personalities of the kilns will surface. Knowing and understanding the limitations of your equipment can increase the productivity through the kilns by 10% to 25%.

If you happen to be at an operation that sorts ahead of the kilns by moisture content, be it by weight, infra-red, visual, or some other concept, you are already aware of the advantages of presorting. Generally these include a reduction in track hours, more uniform moisture content, and higher grade recoveries at the planer.

But, is there anything that can be done for an operation that doesn't have the ability or capacity to presort? Why not use the dry kilns themselves to create the sort. A lot of operations are not set up for this type of procedure. Some that are might find it quite controversial. It tends to go against past practice and ideas of how we operate our kilns.

Two and a half years ago while working at a large operation in northern California, I did a study while using this procedure. This particular operation processed Douglas-fir, white fir, ponderosa pine and sugar pine. The primary species being ponderosa pine and sugar pine. The sawmill had weight bars ahead of the trim saws and sorted for moisture content by weight.

When processing ponderosa pine, this method of sorting was quite successful. Sugar pine, however, was another story. I don't know how many of you have, or are processing sugar pine, but this species contains a large portion of sinker or wet wood. The ideal sort on this species would call for three moisture segregations, corky heart, sap and sinker heart. The weightometer did a good job sorting the corky heart or "light" boards. But, unfortunately heavy sap wood and sinker heart boards initial green weight is quite close, although the sap wood dries in much less time than does the sinker. So here was the dilemma. We were drying 6/4 sp "heavy" shop in an average of 340 hours. In this time frame we were averaging 18% 0 - 6% moisture content (over dry) and 18% 15%+ moisture content or re-dry. We were drying this stock in single track kilns with average capacity of 60M bd. ft. per charge. In a normal sugar pine cut, we generally accumulated approximately 720M bd. ft. or 12 charges. At 340 hours per charge, we used 4,080 track hours to process this lumber through the kilns. The net footage was approximately 590M bd. ft. This left two charges to be re-dried. Drying time on 6/4 sp re-dry was 150 track hours per charge. So add 300 hours to 4,080 hours for a total of 4,380 track hours to dry 720M bd. ft. of 6/4 sp "heavy" for shipment.

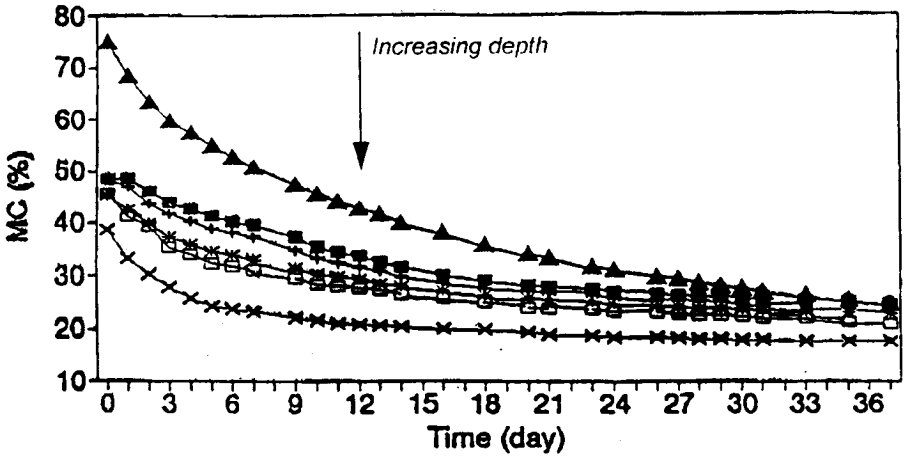

Figure 4. **Moisture content changes with depth as wood dries.**

METHODS OF MEASURING THE MOISTURE CONTENT IN WOOD

Before final use

Ovendry test

MC = (Weight$_{wet}$ - Weight$_{dry}$) / Weight$_{dry}$

Very accurate MC readings

Available in short time

Resistance-type moisture meters

Based on microprocessor

Compensated for species

Compensated for temperature

Memory

Statistical evaluation

Accurate readings at specific points, i.e. at various depths in wood

EMF-type meters

Based on microprocessor

Compensated for species

Compensated for temperature

Memory

Statistical evaluation

Provides a quick check of average moisture content

Inside the kiln

Resistance-type probes

Advantages

Moisture content information from individual boards such as heartwood, sapwood, differing initial moisture contents, quarter sawn, flat sawn

Proven in many installations throughout the world