PRACTICAL APPLICATIONS OF COMPUTERIZED CONTROLS FOR WESTERN SPECIES

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INTRODUCTION

Although the development of computerized, multizone kiln controls occurred in the south, Western mills have been quick to recognize its value. The majority of new computerized kilns as well as the conversion of older kilns is happening here, west of the Great Plains. Perhaps the west recognizes that multizone technology addresses the basic problems which affect how well kilns perform. It provides complete control over the factors which affect drying with the added benefit that we see what is happening. It is not a band-aid approach.

Terry Brown of Oregon State tells an amusing story about the dry kilns at a mill he visited. There was a large steam leak in one kiln which the operator had covered with a bucket to keep steam from spraying into the kiln atmosphere. Each time Terry returned to the mill he peeked in to see if the leak had been fixed. He was always disappointed until one day, to his amazement, the bucket was gone, replaced by a new bucket.

Everyone recalls solving a problem by repairing its symptoms rather than its cause. If we were honest with ourselves, we soon realized that the final solution got to the root of the problem. While not always the easiest approach, it is solved for all time. Kiln controls are similar in that adding new controls alone do not solve our drying problems. The same variations in heat, humidity, and airflow remain. Unless we change the way our kilns control the conditions which affect drying, we have made no real change. Only then do we realize the full benefit of our investment.

The following discussion examines the experiences of several Western mills drying a range of different species. They have all converted or built new kilns which have computerized, multizone controls. We will look at the situations which prompted them to adopt this technology and discuss the benefits they received. Finally, each mentioned several points which they felt were important to the success of the project and wanted to share with those considering similar conversions.

PINE, SPRUCE, FIR, LARCH

The majority of timber which the Stoltze Land & Lumber Company of Columbia Falls, Montana cuts is fir and larch with most of the balance in lodgepole pine and spruce. A small amount of ponderosa pine and cedar is also sawn. The product mix is boards, dimension and some shop. In 1988 they remodeled a 68' double track kiln to computerized multizone control. As sawmill production increased, Stoltze felt the pinch to add an additional kiln. Rather than build a new kiln, early this year they converted their three remaining kilns. They reasoned that the most economical approach would optimize existing equipment rather than add new capacity. The increased drying speed experienced with the first conversion promised what they needed.

Stoltze Land & Lumber met their goals. Overall drying time was reduced 30 percent to meet production requirements. Grade recovery increased 2 to 5 percent depending on the item. The change in moisture distributions was dramatic. Before conversion 95 percent of the lumber fell within $\pm$5 to 8 percent of target

moisture content. After conversion this narrowed to ± 1.5 percent. Lumber is brighter, has fewer splits and quality is more consistant.

Added benefits include the ease of control over their entire drying operation, including the boiler. The energy management system distributes steam according to need and reduces surges in demand. In fact, according to the operator, the boiler is unaware that a kiln is coming on line 80 percent of the time. Troubleshooting is easier with the computer giving "visual access to the kilns". The computer allows them to change the schedule without worrying about it. In all, Stoltze describes the kiln conversion project as "the most satisfying major project in the last 5 years" in terms of realization of goals.

PONDEROSA PINE

Duke City Lumber Company in Winslow, Arizona cuts 5/4 & 6/4 shop in addition to dimension. In 1987 they remodeled three double track by 68-foot kilns to computerized, multizone control. Originally, they planned to add another kiln to increase drying capacity. We convinced them that conversion made more sense. By replacing and zoning the center coils, zoning the overhead coils and adding computer controls we expected to reduce drying times by 25 percent. By shortening schedules in the existing kilns, they could avoid the expense of a new kiln and still achieve their drying goals.

Drying time reduced 34 percent. In winter, 144 to 170 hours was the normal drying time for 5/4 and 6/4 shop. It now takes 90 to 96 hours. Summer drying averages 75 hours. March, 1989 saw a record 2.880 MMbf pass through the kilns. The best performance before conversion was 1.70 MMbf per month. In addition, grade realization improved from $10 to $15 per Mbf for payback in less than one year. One aspect of this project was not immediately obvious from the outset. Lumber requires a certain amount of energy per board foot to dry. Drying time has little impact on this except that longer schedules consume a little more energy per board foot. This is due to efficiency losses through walls and by venting. For example, a double track by 68 foot kiln might consume 228,800 pounds of steam to dry a load to 12 percent moisture content. Drying in 157 hours our average steam demand is 1,457 pounds per hour. Shortening schedules to 93 hours raises our average steam demand to 2,460 pounds per hour, a 69% increase. Fortunately, they have plenty of steam. An undersized pressure reducing valve restricts steam flow and is easily replaced.

Eel River Lumber in Redcrest, California built six new double track by 68-foot dry kilns in 1988. These kilns were designed for Douglas-fir and redwood and are fully computerized and multizoned. Since startup, the mill has begun cutting ponderosa pine, sugar pine, white fir, and incense cedar. This requires some adjustment in kilns designed for lumber with lower heat and vent requirements. Although these are the only kilns at this mill, the kiln operator has extensive experience with kilns at other locations.

The operator appreciates the amount of useful information the computer provides and its ease of retrieval. Although there is some minor maintenance on the computer, the security of knowing what is going on with the kilns gives him more time. In fact, he estimates he has fifty percent more time than he would have with a conventional system. More time to manage his drying operation. Time to plan future charges, check moisture contents at the planing mill, and tune drying schedules.

When we spoke, he had just returned from the planing mill checking a run of 1 by 12 ponderosa pine. This was unsorted stock, made up of sap and heart material dressed directly from the kiln, not set out. The lumber dried in 64 hours which he considered very good. The planing mill runs an in-line moisture detector and this charge showed 87.8 percent of the lumber in the 8 to 12 percent moisture

content range. Only 5.6 percent was above 12 and 6.6 percent below 8 percent moisture content.

SUGAR PINE

In 1988 the Rough & Ready Lumber Company of Cave Junction, Oregon remodeled three double track by 68' and three double track by 72' kilns to computerized, multizone control. They also needed additional drying capacity which they expected to achieve by speeding the existing kilns. Reductions in degrade and stain with improvements in drying uniformity were also important. They feel their goals and expectations have been realized.

Drying times for sugar pine have reduced 25 to 33 percent from 12 to 13 days down to 8 or 9 days. Athough they have seen no change in grade for sugar pine, the lumber is more consistent in quality with narrower moisture content distributions. Their product is much softer with less checking and splitting.

SUMMARY

The conversion of kilns to computerized multizone drying technology carries many benefits for Western mills. Western species which have long drying schedules reduce drying time an average 25 to 35 percent once converted. Many mills use this reduction to increase their total drying capacity without adding additional kilns. Often this is the sole justification for adopting the technology.

Many mills report an increase in grade realization of $10.00 to $20.00 per MBF. The added product value often pays for conversion in one year or less. This benefit is hard to estimate before installation since it depends on how well you are now doing with your system as well as the value of your end product.

Mills experience a narrowing of moisture distributions which gives peace of mind. Fewer high moisture content boards means fewer customer complaints. No longer are top layers of bundles overdried while trying to dry the lower units to an acceptable moisture content. Drying is more uniform with more consistent quality.

Other benefits which may be harder to quantify include brighter surface appearance. Although this is little consequence to those mills planing their production, it is important to those who export. Overseas customers place a premium on light color. In addition, lumber is softer, with fewer splits and checks to cause degrade.

On the equipment side, boilers are easier to control with the computerized steam management option. Should boiler pressure drop, steam is apportioned to the kilns based on a priority system. As the boiler recovers, steam is fully restored to each kiln in reverse order of priority. This reduces the size of boiler swings and controls surging. By ramping startups the boiler is better able to pace and respond to demand, smoothing startups. Troubleshooting is easier with the computer allowing you to see inside your kilns. Tracking steam pressure with dry-bulb temperature often explains dips in control temperature which would otherwise be difficult to trace. Failures of traps and control valves become obvious and easy to trace on the screen. The computer monitors and alarms thermocouple, motor, and vent failures.

There is more information available from which to make informed decisions concerning your drying system. More important, it is easily retrieved and displayed in an understandable manner. There is no longer any need to wonder if schedule changes were made at the proper time. The computer assures that each schedule will run the same from one charge to the next.

USER RECOMMENDATIONS

While surveying mills to understand and report their experiences with computerized multizone kilns, I asked each if they had any advice to those considering conversions. The following were listed as important by several mills.

First, evaluate existing steam capacity. The computers' schedule ramping capability dampens fluctuations in boiler demand which occur on startup, easing it to higher firing rates. Its energy management features help the boiler recover during steam loss by reducing steam demand on a priority basis as pressure drops. As pressure rises, demand is allowed to increase. By managing steam usage for the entire drying system, the boiler operates efficiently, increasing its capability to handle higher average steam demands. Still, a marginal boiler now stretched to its limit may have difficulty adjusting to the increased demands of conversion. Careful consideration of steam availabilty lets you anticipate and plan for future needs.

Second, the right kiln operator is important. The equipment is simple enough for almost anyone to operate. However, the right operator must have the interest to develop an understanding of the process. Rather than diminish his importance, the computer expands an operators available control options. He must be capable of accepting the challenge and fully use his new tools. The operator must have the confidence to overcome any fear of new technology and experiment with his kilns. Taking this approach brings the full benefit of this exciting technology to the mill.

One final comment. Computerized multizone kiln control is a serious solution to the problems which have given operators concern for decades. It is major surgery for any kiln. When complete, one control has not simply been replaced by another. Simply replacing controls gives you more information yet you lack the ability to make changes which matter. Multizoning fundamentally alters the way any kiln operates and performs. A multizoned kiln acts like a different kiln because it is a different kiln. You can see drying problems as they develop and take the steps necessary to correct them. No other system gives you this capability. More important, the system pays back in improved drying efficiency and quality for the life of the kiln.

REFERENCES

	Species Dried
Duke City Lumber Company, Inc. Winslow, Arizona (602) 289-4655 Conversion of (3) DT x 68' Kilns	Ponderosa Pine
Eel River Sawmills, Inc. Redcrest, California (707) 764-5636 Six (6) New DT x 68' Kilns	Ponderosa Pine, Sugar Pine, Douglas Fir, Redwood, Incense Cedar, White Fir
F. H. Stoltze Land & Lumber Company Columbia Falls, Montana (406) 892-3252 Conversion of (3) DT x 68' and (1) DT x 104' Kilns	Fir, Larch, Lodgepole Pine, Spruce, Ponderosa Pine, Cedar
Rough & Ready Lumber Company Cave Junction, Oregon (503) 592-3116 Conversion of (3) DT x 68' and (3) DT x 72' Kilns	Sugar Pine, Ponderosa Pine, Douglas Fir