DRY KILN EFFICIENCY: BACK TO THE BASICS

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I would like to ask a question. Are we operating our kilns in the most efficient manner? In terms of utilization, production, and grade recovery? If I were to poll the audience I would probably receive answers ranging from, "yes we are," "I think we are," "no, but I can't get any support from management to help the situation," or, an honest "I don't know."

There have been millions of dollars invested in sawmills over the last several years focusing on fiber recovery and production. All are geared to lowering operating costs. Utilizing new technology and methods in most instances has been very successful. Sawmills have increased their production levels 30 to 50%, and even 100%. A lot of them have changed or added species and product lines. Unfortunately, a substantial number of these installations have failed to add capacity to their dry kilns. This is the situation a lot of us find ourselves in. Operating under stress and pressure to keep the kilns cycling trying to stay up with increased sawmill production. The light at the end of the tunnel grows dimmer.

Operating dry kilns with higher demands on production eventually shows up in the form of lost efficiency. With production ahead of the kilns constantly growing, the first thing to go by the wayside is a good preventative maintenance program. Following that, is maintenance in general. The only time the kiln gets taken offline for maintenance or repairs is when it has finally gotten to the point that it just won't dry lumber anymore. If this sounds familiar to anyone in the audience, don't be embarrassed, you are not alone.

So, how do we address this issue of lost efficiency? A good place to start is to evaluate your equipment from top to bottom. Back to the basics.

Let's start with the roof. Is the roof in good repair? No sagging panels or leaks You don't want more water running into the kilns than you are trying to take out. Are the vent motors, levers, and linkage in good repair and functioning properly? Are any of the vent rods broken or bent? Do the vent lids open and close properly? Are they in adjustment, all opening equally? In the case of a power vent system, is it operating to manufacturers specifications? Is the internal duct work in satisfactory condition? No leaking connections, or collapsed tubing?

Let's move down to the fan decks. If this is a cross shaft installation is the fan wall in good condition? No sheet metal problems? Do cross over doors open and close securely? Are fan housings and rings in good repair, fans centered, pitched correctly, uniform tip clearance? Are all fan motors operating? Are they all turning in the right direction? Are motor bases solid, no vibration? Bring a torque wrench, this is an excellent time to be sure all fan hub bolts are air tight and properly torqued.

If this were a line shaft is the serpentine housing solid and in good condition? No sheet metal problems? Do cross over doors open and close securely? Are the line shaft couplings all tight and secure? Are the bearing stands all solid, keeping the shaft running true. Are the bearings being lubricated properly? Are the fans secure on the shaft? Are all fans centered in the fan rings? This is extremely important in a line shaft air delivery system. If you are running steel disc, fixed pitch fans, are the tips of the blades all attached to the outer ring? No broken welds, bent or cracked tips? In the case of propeller type fans, are they pitched correctly? Are all fan hub bolts tight and properly torqued? Regardless of which type of fan you are running, are they in the proper sequence? Are all fan hub bolt tight and properly torqued? Regardless of which type of fan you are running, are they in the proper sequence? Alternating right hand pitch and left hand pitch? If during maintenance or a fan change you should get two fans in sequence that are pitched in the same direction, you will have created a gigantic wet spot in your next charge of lumber.

Let's take a look at the condition of the floor of the fan deck. Is the sheet metal in good condition? No holes or soft spots? Do you feel safe and secure walking around up here? Is the width of the fan deck adequate? Does the edge of the fan deck extend to the edge of the cribs of lumber?

Steam supply lines, everything is solid, no leaks? Fittings where supply attaches to feed header of heating coils, all secure, no leaks? What condition are the heating coils in? No leaks, no damaged or missing fins? Are there sufficient runs of fin pipe to fill the top of the plenum chamber? No large gaps at the wall or edge of the fan deck where the air has a chance to short circuit or by-pass the heating coils?

Let's move down to the floor. What condition are the rails in? No collapsed rails, or rusted and about to collapse rails? Floor baffles, if so equipped, are all in place, and in good working order? Take a look at the floor itself. Are there any water stains or wet spots that are obvious? These would indicate a steam leak. Investigate these areas to see if a leak truly exists. We didn't detect any leaks in the coils while up on the fan deck, but there are areas of the heating coils and plumbing that are not totally visible while on the fan deck.

If this is a double track kiln, what condition are the center coils in? No leaks, no sagging runs of pipe? Are the fins clean? Center coils have been known to clog up with sawdust and other debris. Vertical runs generally seem to experience this more than horizontal run. When the coils start to accumulate sawdust this sets off some very undesirable effects. It speeds and enhances the corrosion of the fins, it acts as an insulator, the coil's heat release is non-uniform, and air flow is non-uniform. These all contribute to EXTENDED DRYING TIMES and NON-UNIFORMITY OF FINAL MOISTURE CONTENT. Floor drains, are they clean and open? Early in the schedule in high moisture content wood, the free water literally pours out of the wood, thousands of gallons of it. If the water is allowed to stand on the floor again, bad things develop. The standing water speeds corrosion of the rails, floor baffles, and any plumbing that runs at floor level. The kiln vents excessively, creating a higher demand on the boiler, EXTENDED DRYING TIMES and NON-UNIFORMITY OF FINAL MOISTURE CONTENT.

Are the walls in good condition? No holes, coating is in good condition, not only on

the walls but all other metal structures in the kiln? Heat sensors are mounted solidly and excess leads or capillary tubing are coiled up and out of harms way. Water box and wet bulb are mounted securely. The drain in the water box is unclogged and is piped to the outside of the kiln. If these drains are allowed to plug up, water runs on the floor of the kiln, and all plumbing connected to the water box corrodes and rusts out prematurely.

Overhead baffles, are they all in place and in good repair, and functioning? End baffles, are they in good repair? Is there a positive method to secure these baffles to the corner of the packages? Let's face it. The only thing that truly works in a dry kiln is the air. It carries the heat to the lumber and it carries the moisture away from the lumber. A major contribution to EXTENDED DRYING TIMES and NON-UNIFORMITY OF FINAL MOISTURE CONTENT is non-uniform air delivery. The air velocity the more this becomes apparent.

Steam traps, are they equipped with strainers, blow downs, and test lines? Are they conveniently located so service and maintenance can be performed easily? Or, are they buried in a hole somewhere where they will surely fail over time due to purposeful neglect?

As we exit the kiln, take a look at the doors. Are they in good condition? No holes, door seals are doing their job? The door carriers move easily so you don't have to struggle to open and close the doors.

Let's head to the control room. Whether you are running electronic or manual controllers, are they operating properly? Are dry bulb and wet bulb sensors recording accurately? How long has it been since calibration has been confirmed? Control valves, do they open fully? And of equal importance, do they fully close A leaking control valve will generally cause temperatures to constantly override the set point in the area of the kiln valve controls. Again, a major cause of NON-UNIFORM FINAL MOISTURE CONTENT AND INCONSISTENT CYCLE TIMES. Shut off and isolation valves: you can never have too many isolation valves. Isolation valves make "on the fly" repairs more convenient. You can change out a faulty control valve in a matter of minutes with very little interruption in your drying cycle. Always use high quality valves that seat securely when shut off to avoid serious injury.

Let us assume that we have completed our evaluations. Time has passed, all of the repairs have been made. The kilns are now operating within their original design specification. Now we should see more consistency in our cycle times. And better uniformity of final moisture content. At this point proceed with caution. Before you try to run "the hot rod schedule" your buddy down the road has given you, step back into the real world for moment. Know and realize the limitations of your equipment. During our evaluation and repairs all we did was repair or replace components to bring the kiln back to its original operating condition. We didn't increase boiler capacity, heat capacity, or air velocity.

When designing or upgrading a drying schedule stay within the limits of your equipment. If you cannot reach and maintain set points, you are out of control. Your control valves are staying wide open. The boiler is struggling trying to keep up with the demand. You are not maintaining the correct dry bulb wet bulb depression.

Therefore you are no longer in control of the drying rate of your lumber. This can result in serious degrade. And again, it contributes to INCONSISTENT DRYING TIMES AND NON-UNIFORM MOISTURE CONTENT.

Let's take a look at how we set up our charges to load the kiln. As we are walking down the track looking at the charge, ready to push into the kiln, we are looking to make sure all of the wheels are on the track, we don't want a wreck. Also, making sure the sticker lines are on the truck bunks, crossouts are lined up with the stickers, and the chimney is sufficient. Everything looks good. The packages are square, nice straight line from top to bottom and end to end giving us nice consistent width of our plenum. Airflow should be uniform. But wait, as we look at this charge we notice the top is not level. A couple of packages are a course too high, and a couple of packages are a couple of courses too low. We went through a lot of effort and work to repair or replace our overhead baffles and now there are some pretty large openings up there because of inconsistent package height. When loading lumber onto the kiln trucks, try to keep consistent packages on the plenum side of the trucks. Load the inconsistent packages on the other side. This will keep your top line level. It takes a little more effort and attention, but the results will outweigh the effort.

How we schedule the flow of lumber through the kilns and how we manage our green yards can have a big impact on the efficiency of our operation. There are a lot of areas of opportunity in green yard management, track management, and scheduling. Since time is limited today, we will have to save these ideas for another day.