UPGRADING DRY KILN FANS

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Introduction

1. Approximately five years ago we at Idaho Veneer Company decided to improve our drying program. Therefore, we enlisted the help of a consultant from the Eugene, Oregon area by the name of Doug Stowell (Eagle Wood Products).

2. At that time we had three single track 50 foot kilns, a 104 foot double track line shaft, and a 84 foot double track cross shaft.

3. After our development of Eagle schedules, adding vent capacity, and computer control we were able to shut down two of the three single track kilns. With installation of the variable pitch six foot fans which gave us 1100 foot air, and re-work of the schedules, we eliminated the last of the single track kilns and reduced the reliance on the 104 foot double track. Last fall we installed a new 104 foot single track with 1450 foot plus air velocity, eliminating the 104 foot double track.

Steps Leading up to The Installation of The New Fans

All of our work and efforts went into the 84 foot Wellons kiln.

1. Drying Schedules
   We modified all of our drying schedules which decreased our drying time, and improved our grade.

2. Vents
   We purchased more vents effectively doubling our venting capacity. This was needed to eliminate all stain in Idaho white pine, while using aggressive schedules, and to do a better and quicker job of drying hem/fir. This also played a big role in using full capabilities of new fans.

3. Computer Program
   We purchased the Wagner KC 889 program. After we installed this, we were able to decrease our drying time by about 3%.

4. Fans
   We had eight 66 inch fixed pitch fans and replaced them with 9 variable pitch fans. We powered these with 15 hp motors, and used a 200 hp variable frequency drive.

   A. We interfaced the frequency drive with the Wagner Program. We could then control the air flow. We had to take amperage readings on the motors at different temperatures to determine where to set the motors during the schedule to get maximum air flow.

B. The maximum amperage on each motor is 23 amps. We had ours set a little too high and after about a year, we had to replace all of our motors.

5. Slick 500 PLC
   This we interfaced with the frequency drive to monitor each motor, not allowing them to receive more than 23 amps. So now in our schedules we enter 100% fan speed and it runs the motor up to 23 amps, which gives us maximum air flow all the time regardless what the temperature is.

6. Acuators
   We have a shaft running full length of the kiln on each side, which opens the vents as the acuators turn them. We had conoflow acuators that worked very well with our other fans. But with our new fans, the entering air side struggled to open, and when we would call for 20% and below vents they would not open. So then we purchased heavy duty Wellons actuators, developed in the South East U.S., because of the same type of problems opening vents in systems with high speed air. That solved this problem. The vents would then open.

7. Vent Shafts
   The original shafts were too weak. The near end closest to the acuator would open just fine, but the far end on the intake would only flex and twist. So we replaced the original 2 inch shaft, with a 3 inch.

8. Condensate
   With the added air velocity we found that we condensed a lot more steam, so much more that we water logged our center and overhead coils. The ways we solved these problems are:

   A. We trapped every bank of coils.
   B. We increased the size of our condensate lines making sure we had proper slope to use gravity to help drain the coils.
   C. We are looking at buying our condensate tank to further assure minimum back pressure on the traps.

9. Drying Schedules
   We had to modify all of our schedules, because we began to get a lot of season check and roller split. We had to pull the water out at a higher rate of speed to compensate for this. But if we pulled the water out to fast we would get to much stain on our Idaho White Pine Commons. This took several tries to get it just right. The dimension lumber wasn't quite as critical because the appearance is not as important. Therefore the air flow heat and humidity have to walk a fine line to produce a white bright board.

10. Stickers
    We changed the thickness of our sticks from 3/4- to 1-inch. This did not increase the velocity, but increased the volume of air. This in turn gave us brighter wood, decreased drying time and more uniform moisture which means a tighter moisture curve.

11. Results
    A. Decreased drying times (FIGURE 1)
    B. Actual Air velocities (FIGURE 2a and b)
    C. Better quality (whiter, softer, and more pliable)
    D. Less steam
    E. Less electricity

12. Conclusion

We have been so impressed with our results, we purchased a 104-foot single track high speed air kiln, to take the place of our 104-foot double track. We now have only two dry kilns drying more lumber, and producing better quality at a lesser expense.

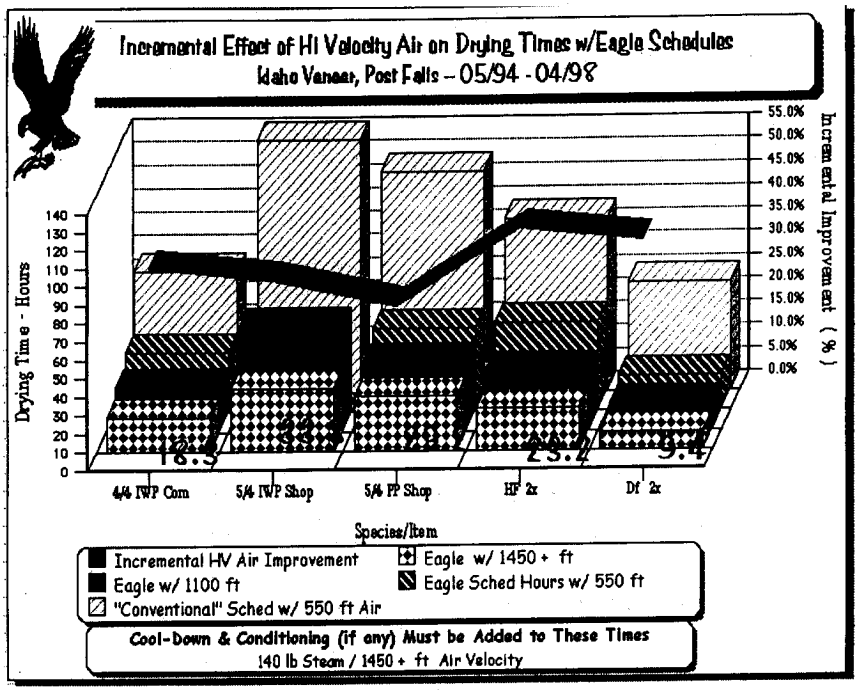

FIGURE 1. Reduction in drying times.

							Row Average
	2100	1800	1850	1700	2000	1800	1875.0
	1850	1800	1700	1650	1550	1750	1716.7
	1700	1800	1750	1550	1600	1500	1650.0
	1650	1600	1400	1500	1550	1700	1566.7
	1650	1550	1600	1500	1300	1600	1533.3
	1550	1500	1550	1650	1450	1300	1500.0
	1400	1500	1550	1600	1450	1300	1466.7
Top Package	1500	1450	1450	1500	1450	1350	1450.0
	1500	1400	1550	1600	1400	1350	1466.7
	1350	1500	1600	1400	1450	1400	1450.0
Average	1625	1590	1600	1565	1520	1505	
Bolster Average	2500	2600	2800	2100	2100	2500	2433.3
	1400	1500	1550	1350	1450	1500	1458.3
	1600	1500	1400	1400	1400	1300	1433.3
	1450	1400	1450	1300	1350	1350	1383.3
	1450	1450	1350	1400	1300	1400	1391.7
	1400	1500	1500	1600	1300	1350	1441.7
	1650	1650	1450	1400	1350	1400	1483.3
	1450	1550	1600	1500	1200	1400	1450.0
	1500	1500	1600	1450	1250	1400	1450.0
Bottom	1400	1600	1800	1500	1350	1500	1525.0
Package	1600	1600	1700	1500	1400	1500	1550.0
Average	1490	1525	1540	1440	1335	1410	
Grand Average ⟶	1512.1						

FIGURE 2a. Air velocity distribution for Coe single-track kiln.

Control Room								Dry End		
1	2	3	4	5	6	7	8	9	Row Average	
1150	1200	1500	1350	1500	1400	1400	1200	1250	1328	
950	1100	1450	1250	1250	1350	1250	1200	1100	1211	
1000	1150	1300	1100	1150	1100	1250	1450	1050	1172	
850	1200	1300	1200	1200	1150	1050	1200	1100	1139	
1200	1150	1100	1200	1250	1150	1150	1200	1000	1156	
1000	1200	1050	1100	1200	1050	1100	1200	1050	1108	
1000	1150	1050	1100	1300	1100	1200	1200	1150	1139	
900	950	950	1100	1050	1150	1150	1150	1050	1050	
		1150				1200			1175	
Average	1008.3	1137.5	1205.6	1175.0	1237.5	1181.3	1194.4	1225.0	1093.8	
Bolster Avg	1600	1650	1600	1700	1800	1800	1800	1700	1800	1717
	1050	1000	1000	1000	1000	1050	1050	1100	1100	1039
	1000	1050	1050	1000	1000	1050	1150	1050	1000	1039
	1050	1000	1000	950	1100	1050	1100	1100	1050	1044
	950	1000	1050	1100	1000	1050	1000	1050	1050	1028
	850	950	1050	1100	950	1100	1150	1100	1050	1033
	1150	1000	1000	1050	1100	1200	1150	1150	1050	1094
	1100	1100	1100	1050	1000	1300	1100	1150	1000	1100
	1000	1150	1100	1000	1100	1050	1150	1150	1100	1089
	1050	1100	1050	1150	1000	1150	1100	1150		1094
	1100									1100
Average	1030.0	1038.9	1044.4	1044.4	1027.8	1111.1	1105.6	1111.1	1050.0	
Grand Average ⟶	1112.2									

FIGURE 2b. Air velocity distribution for Wellons double track kiln.