



# Kiln Clinic

April 8, 2008 – North Conway, NH

Question: Experience in changing kilns over to hot water

- Lose ability to have steam spray, water sprays are not as effective.
- Need to add circulating loops and pumps (it does not move itself like steam)
- Might be better to add second heat transfer system
- Need more surface area for same heat transfer (one mill doubled their surface area but this is not a general rule)
- Highest water temperature desirable. Need 60 to 80 deg. Difference between kiln and water temp.
- Benefit from reducing boiler supervision
- Can get up to 23-240 (with pressure)
- Temperature drop along length of pipe/coil



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Question: Experience with vacuum kilns – quality, dependability, etc.

- faster drying rates
- lower temperatures but you can still cause degrade
- how is wood to be heated? i.e. thermal oil, hot water, RF, etc.
- Lower temperature therefore less potential to create stain
- Good for applications involving high value (niche applications)
- Bulk flow (free water) is rapid therefore geometry is important
- Red oak dried particularly well
- Drying times are short i.e.  $\frac{1}{4}$  to  $\frac{1}{20}$ <sup>th</sup> of conventional kilns.
- Cost of drying (energy) may well be higher
- Species difficult to dry in a conventional kiln will still be difficult
- Appealing from small capacity standpoint
- Small capacity may help respond to markets
- Water (condensate) must be disposed of (usually just ph adjustment)



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Question: When is it time to replace tubes in the boiler

- usually a failure near end of tube (by tube sheet)
- watch water usage to detect problems
- annual inspection look at scale
- there are instruments to measure thickness but expensive
- Can measure inside and outside dia. with calipers to measure deterioration
- Water treatment is critical
- Poor layup can have an impact on failure i.e. closing down due to economic situation
- Report that tubes should last 25+ years
- At Madison Lumber they have had magnet system in place for 10 years
- With magnets it is important to keep a small flow going to prevent pitting and maintain protection.
- Magnets eliminate blow downs



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## Question: Alternatives to No. 2 oil

- biodiesel (???)
- fuel values of wood/ wood residue (around 9,000 btu/lb. softwood)
- fuel value is reduced by MC
- burnability goes down as MC goes up to a upper limit of about 110% above which it will not burn on its own
- wood pellets at same density give similar heating value
- No. 6 oil – need to pre-heat it
- No. 4 oil – no savings
- Eclipse Engineering – Combustion Engineering Guide – useful for fuel values



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Question: Variations in final MC of white pine i.e. different courses

- Quarter sawn boards will dry slower and therefore be wetter
- Shutting kiln down near end and let it sit overnight.
- When problem isolated to a course or two it may be related to piling issues i.e. boards on edge caught between packages
- Check to see if you can see light through the packages
- Other things that can block air flow – maintaining a chimney between packages (use a 2x4 between packages)
- Fan problems i.e. one not working
- Run of similar boards in a row i.e. high proportion of wetwood
- Differentiate between wet pockets vs. wet boards i.e. natural causes vs. kiln caused problems
- Check the easy things first i.e. airflow, steam, etc.



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Question: Running higher temps for setting pitch and problems with kiln corrosion

- Need 195 to 200 F. to set pitch in pine with live steam
- Better heat transfer with steam but do you need the high humidity to set the pitch?
- Could apply coatings to structure to protect it.
- Report by Bob Little on kiln corrosion
- Either need to eliminate condensation or protect surfaces
- Need to be careful specifying materials for a new kiln i.e grade of stainless steel or aluminum components
- Raising temperature at start of run contributes to condensation problems
- Increase heating capacity to raise temp. rather than using more live steam.
- Is boiler water contributing to corrosion
- When setting pitch you are driving off volatiles, need to get wood temperature over highest temp. it will achieve in service.



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Question: Time frame for green lumber to produce brown stain

- During summer Madison Lumber finds 10 days to be the limit of storage before the kiln.
- Keeping temp. below 130 until FSP will help minimize stain
- Potential problems with some old logs mixed with fresh
- Watering log piles helps
- Dips for brown stain i.e sodium fluoride, Nexgen



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Question: Are there problems with fast growth rate in E.W. pine i.e. 4 rings/inch or less

- Proportion of juvenile wood may be greater (is this a problem for pine?)
- Acoustic properties change
- heartwood proportion may change
- grain character may diminish





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Question: Side bend – anything other than sawing pattern

- longitudinal shrinkage differential i.e. juvenile wood, reaction wood
- cross-grain issues from cutting through a taper
- lumber thickness variations can contribute to more side bend (crook)
- some sort of restraint in the kiln i.e. physical restraint or plastic strapping
- cutting deeper into a log may be contributing to more side bend
- May be able to detect tension wood at the sawmill and trim or rip out



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## Question: Preserving fin pipe (deterioration)

- Steel pipe – currently using a system saver – is there anything better.
- perhaps something in corrosion report by Bob Little
- keep pipes hot to prevent corrosion
- clean regularly to get rid of build up on exterior – this also improves efficiency
- keep steam sprays off as long as possible



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## Question: Burning bark - trials and tribulations

- dirt, stones, etc, contribute to more clinkers
- proportion of bark going up
- grinding bark helps fuel handling
- accelerated wear on refractory
- MC of bark may be 80 to 100%
- larger scale solutions (i.e. gasification) but more problematic for smaller operations
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Question: Uses of waste from manufacturing process in urban area

- Sawdust burners can be set up to run well in an urban environment
- produce pellets that can then be burned. Pelletize on site or with another mill
- small scale gasification
- landscaping / nursery applications, bedding (need to be careful if black walnut is present)
- water treatment facilities may be able to use it



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Question: Variations in final MC

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Question: Tube life in boiler

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Question: Chemical or other treatments for brown stain

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Question: Brown stain specifically in the fall i.e. only one pack per load

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Question: Testing final MC in kilns now that we have computer controls and other instruments

- Hot check with meter
- Shell and cores
- Before and after conditioning
- Controls are good tools but still need lots of supervision
- Probes and traditional samples
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Question: Efficient use of kiln time

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# Kiln Clinic

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Question: Regain in moisture for dry  
lumber stored outdoors

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# Kiln Clinic

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Question: Double stacking thin material  
(back to back)

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# Kiln Clinic

April 8, 2008 – North Conway, NH

Question: Burls in poplar opening up –  
mostly in sapwood

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# Kiln Clinic

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Question: Distortion in beech

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Question: Dense tropical hardwood checking

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Question:

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