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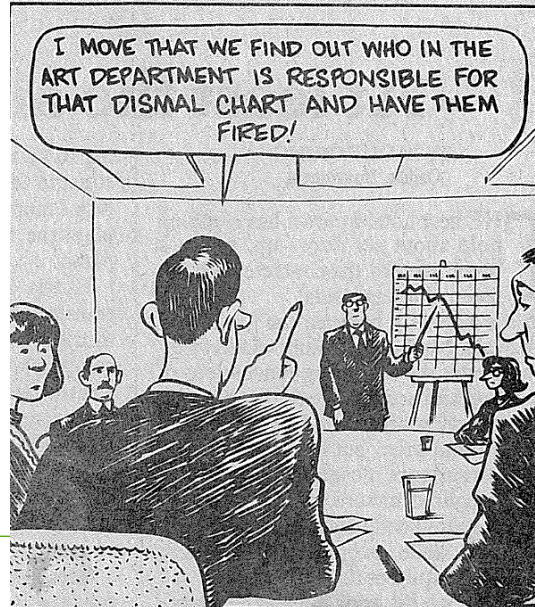


Ten Easy Steps
Towards Successful
Drying

Peter Garrahan



Cartoons are like ties – keep them long enough & they're back in fashion.



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Ten Easy Steps Towards Successful Drying

- Doing the basics right
- Concept of 'Best Practices'
- Quality Control
- Continuous Improvement
- Sigma Six
- etc., etc.

All of these rely on us knowing what is the right thing to do.

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Ten Easy Steps Towards Successful Drying

Most kiln operators know 'the right thing to do' but don't have the faith in their convictions to push hard for them.

This presentation is a review of 'the right things to do' and hopefully give each of you more support to go back and implement them.

Ten Easy Steps Towards Successful Drying

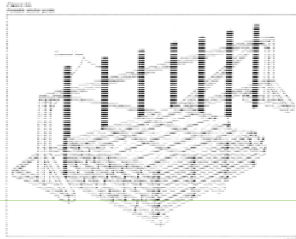
Tough economic times should not be a reason to spend less attention to detail.



Rather it should be the opposite. We should be looking for every opportunity to earn an extra penny or two.

No. 1 – Lumber Piling

- **No. 1 – Lumber Piling**
- -sticker spacing
- -sticker alignment
- -bunk placement and alignment
- -squareness of packages

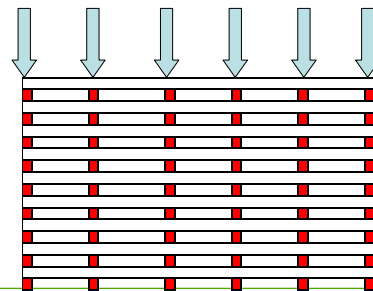


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No. 1 – Lumber Piling

- Sticker spacing
 - Forintek study on 2-inch softwoods
 - Reduction in downgrade
 - Approx. 1% improvement in dry value

- Value loss is high on upper grades
- Lower grades more prone to warp due to defects



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No. 2 – Green Storage/Air Drying



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No. 2 – Green Storage/Air Drying



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No. 2 – Green Storage/Air Drying

Objectives

- Preserve quality
- Promote drying
- Create or maintain uniformity

Benefits

- Safe storage of material to accommodate delays in process
- Reduce energy consumption at kilns
- Achieve a more uniform final MC

No. 3 – Kiln Loading Practices and Baffling

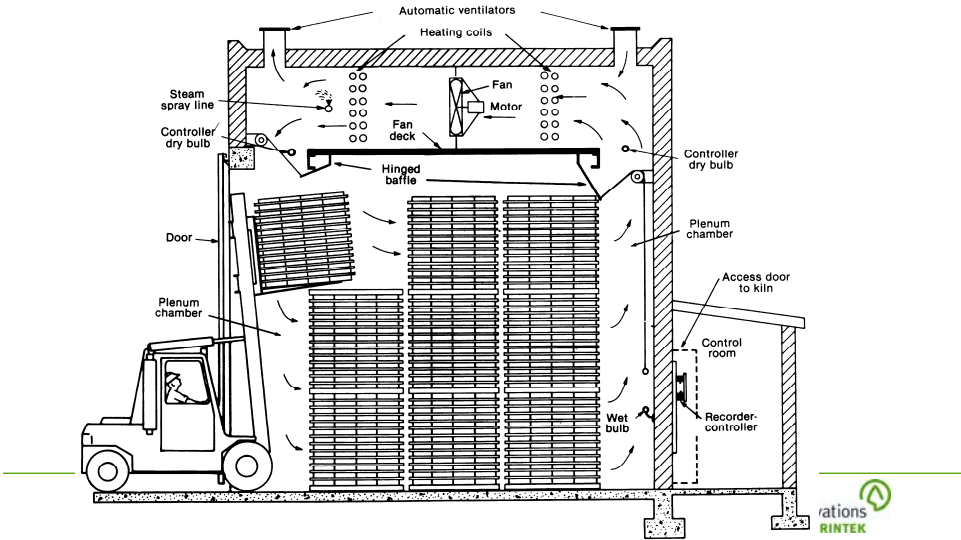
- Easier to load neat packages into a kiln



vs.

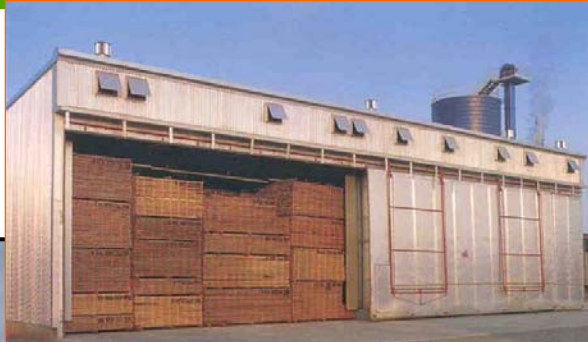


No. 3 – Kiln Loading Practices and Baffling



No. 3 – Kiln Loading Practices and Baffling

Poor packaging
 = Poor baffling
 = Poor airflow

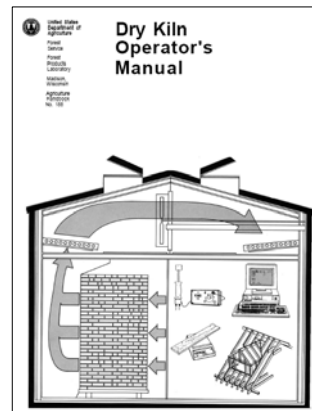
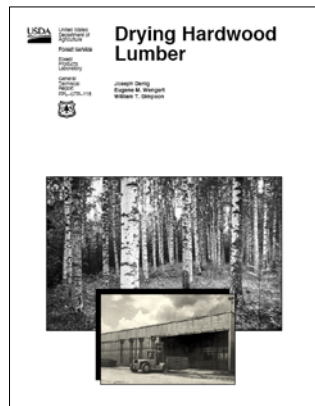


No. 4 – Picking and Following the Right Schedule

- Develop a library of drying schedules
 - Conservative vs. aggressive
 - Green vs. air dried
 - Light color vs. regular grade
 - High grade vs. lower grade
- Pick the right schedule for the situation
 - Product
 - Customer
 - Urgency

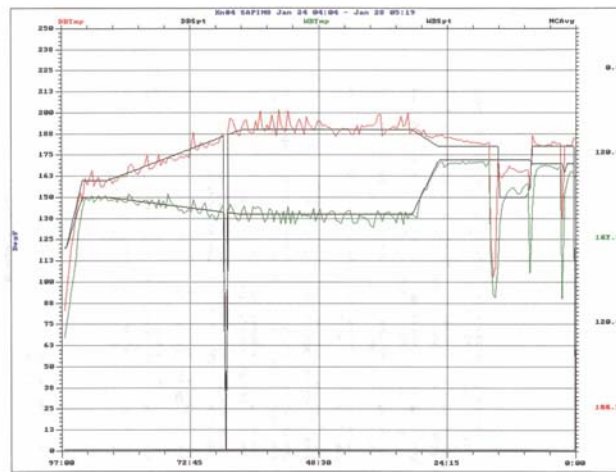
No. 4 – Picking and Following the Right Schedule

- Sources of Schedules



No. 4 – Picking and Following the Right Schedule

- Don't let your drying schedule be your Christmas wish list

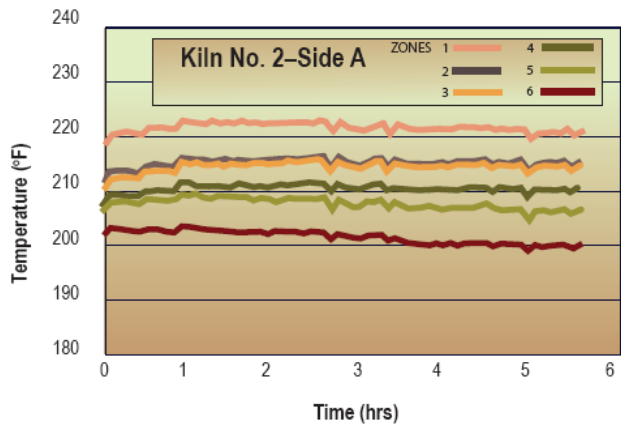


No. 5 – Uniformity of Drying Conditions

- Objective
 - Expose every board to the same drying condition
- Drying Conditions
 - Combined effect of DB temperature, WB temperature, and airflow

No. 5 – Uniformity of Drying Conditions

- DB Temperature
 - Target +/- 5° F Softwood
 - +/- 2° F for Hardwoods (or less)



No. 5 – Uniformity of Drying Conditions

- Thermocouple thermometers are the easiest and cheapest way to collect data on kiln performance.



No. 5 – Uniformity of Drying Conditions

- WB temperature
 - Use thermocouple and temporary WB apparatus to check on WB accuracy and uniformity around kiln.



No. 5 – Uniformity of Drying Conditions

- Airflow
 - Target +/- 50 to 100 fpm
- How to measure
 - Anemometer
 - Readings along exiting side of load



No. 6 – Preventive Maintenance

- **Objective**
 - Keep kilns operating full time to maximize productivity and minimize drying cost
 - Avoid drying defects that could result due to interruptions in the process i.e. stain, variable MC
- **Develop rigorous programs for maintenance**
 - Checklists



No. 6 – Preventive Maintenance

- **Checklists by day, charge, and month**
Example of pre-startup checklist

PRE-STARTUP CHECKLIST

Item	Date and Time Checked
1. Start fans and verify proper operation	
2. Check and/or replace wet-bulb wick	
3. Check water flow to wet-bulb	
4. Baffles in good condition and lowered into place	
5. Check operation of roof vents	
6. Inspect kiln doors and gaskets	
7. Set up charge records, list any unusual conditions	
etc.	



No. 7 – Tighter Kiln for Better Humidity Control

- Humidity control is a key factor in drying that potentially affects product quality, drying time, energy usage, and drying cost.

Objective

- Ability to follow kiln schedule
- Reduce drying cost

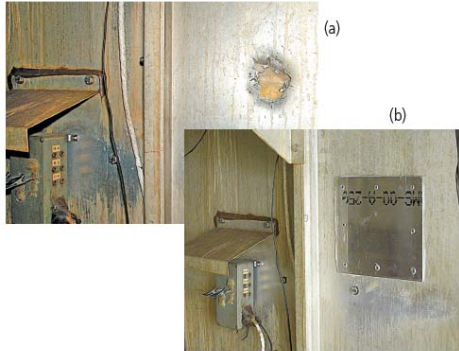
No. 7 – Tighter Kiln for Better Humidity Control

- Even a few minor leaks can impact on kiln performance How about when the leaks are a bit more than minor.....



No. 7 – Tighter Kiln for Better Humidity Control

- **What to do**
 - Repair/replace door gaskets
 - Provide extra sealing along bottom of kiln door
 - Repair and/or adjust leaky vents
 - Kiln coating to seal structure
 - Re-caulk joints when required
 - Repair holes or damaged areas

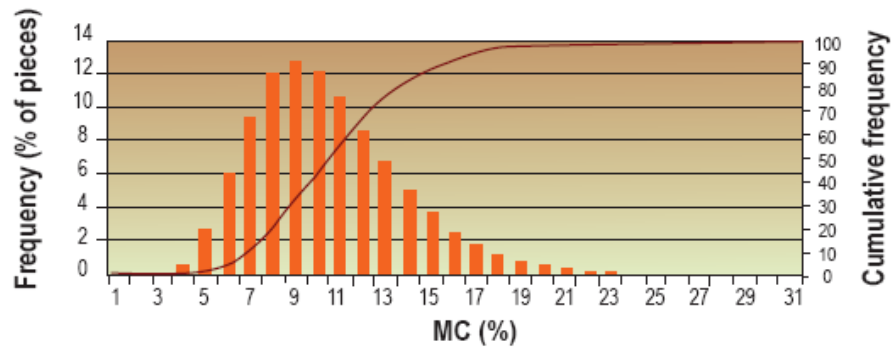


No. 8 – Final MC Control

- **Objective**
 - Achieve the targeted final MC
- **Benefits**
 - Avoid over-drying or wets (rejects by customer)
 - Better performance of final product

No. 8 – Final MC Control

Distribution of final MC ($MC_{avg} = 11.0\%$, $SD=3.5\%$)



No. 8 – Final MC Control

- How to improve final MC control
 - Sample boards
 - Use more
 - Be more careful in selection
 - Conduct hot checks
 - Correlate readings to post drying checks
 - Post-drying checks on MC
 - In-line moisture meter
 - Handheld meter checks
 - Correlate back to sample boards and hot check results

No. 9 – Dry Material Storage

- Objective
 - Maintain final MC of product
 - Protect from re-wetting
 - Protect from further drying
- How
 - Lumber wraps
 - Outdoor covered storage
 - Indoor heated or unheated storage

No. 9 – Dry Material Storage

Need to Consider EMC vs. MC of wood



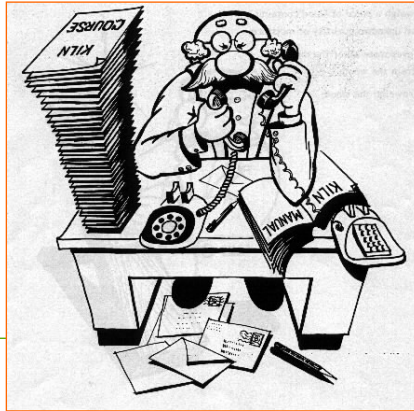
- Time of year
- Customer requirements
- Length of time in storage



No. 10 – Improve Your Knowledge Level

- Objective

- Make sure that you are applying the best drying practices for your operation in consideration of the material to be dried and the capabilities of the equipment you are working with.



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No. 10 – Improve Your Knowledge Level

- How

- Attend kiln course(s)
- Attend your NEKDA meetings
- Read industry journals
- Stay in touch with fellow kiln operators
- Surf the internet i.e. Woodweb
- Be your own teacher
 - Experiment and develop the rules that work for your mill

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No. 10 – Improve Your Knowledge Level

- Drying is a dynamic process and presents new challenges to the kiln operator every day. Make sure you are ready for the challenge.



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