

# USING WOOD MOISTURE METERS

NEW ENGLAND KILN DRYING ASSOCIATION  
FALL MEETING  
OWEGO, NEW YORK

**DELMHORST**<sup>®</sup>  
===== INSTRUMENT CO. =====

WHEN ACCURACY IS THE POINT.<sup>™</sup>

October 30-31, 2007

# TOOLS TO MEASURE MOISTURE CONTENT

- PIN METERS

DC RESISTANCE

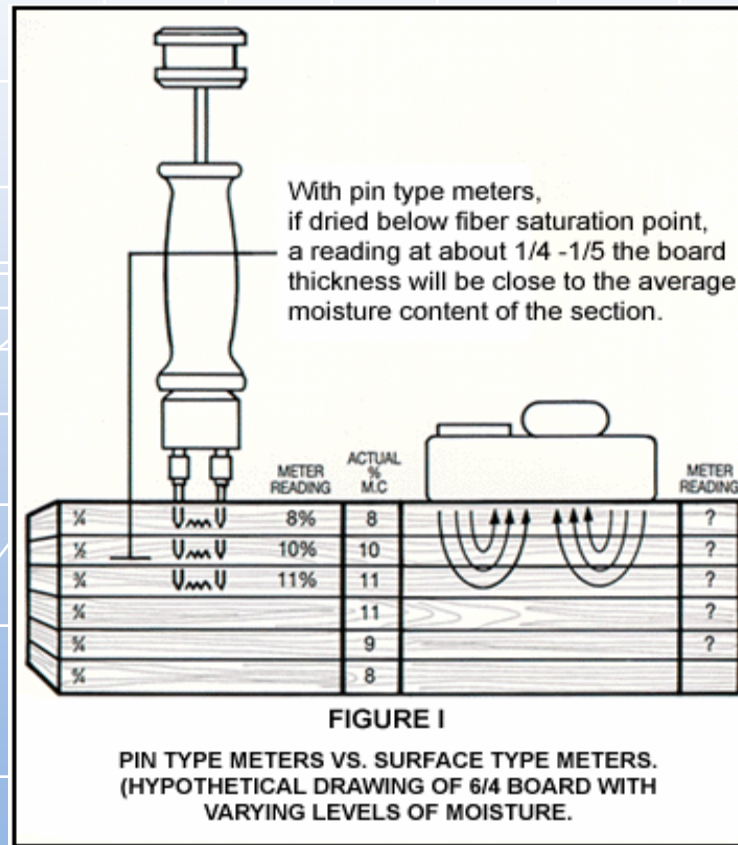
- PIN-LESS METERS

DIELECTRIC/ RF

- OVEN TEST

PRIMARY METHOD

# PIN vs. PINLESS



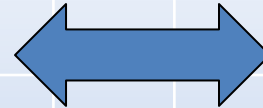
# WHY USE A MOISTURE METER?

- Results are immediate
- Less labor
- Larger sample
- Wet spots
- Easy to use

# ABOUT THE METER

Principle of operation

Electrical Resistance



MC

Range

30% to 6% - highly reliable

30% and higher – “free moisture” – use as qualitative readings only!

# ABOUT THE METER

## Accuracy

Electrical / Primary

+/- 0.2

Secondary

+/- 0.5.....6-12%

+/- 1.0....12-20%

+/-2.0....20-30%

# ABOUT THE METER

## Original Calibration

- Laboratory conditions
- Temperature and RH controlled
- Very thin, uniform samples
- 5/16<sup>th</sup> penetration – non-insulated pins

# WHAT FACTORS AFFECT METER READINGS?

- Moisture Content!
- Moisture Gradient/Thickness
  - shell/core readings, insulated pins
  - 1/5 rule
- Temperature
  - as the wood temp rises, indicated MC also rises and vice versa



# WHAT FACTORS AFFECT METER READINGS?

- Species
  - different electrical characteristics
  - SPF "group"
- Electrode
  - 2 or 4 pins/ insulated or not
- Grain Direction
  - pins parallel to the grain

# J-2000 Moisture Meter

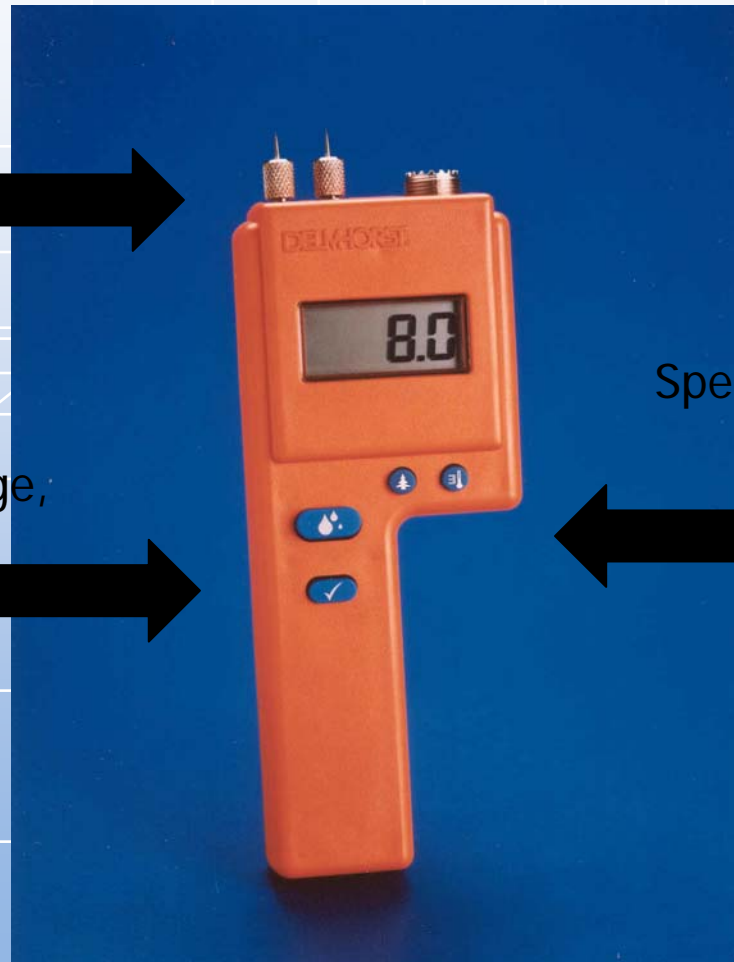
5/16" penetration,  
non-insulated pins



Total readings, average,  
highest



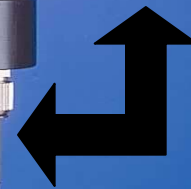
Species - Temperature  
corrections



# 26-ES Electrode



**Insulated pins, 1-1/8" penetration**



# WHAT FACTORS AFFECT METER READINGS?

- Basic Care
  - Calibration, batteries, pins
- You – The User
  - Input the proper settings
  - Watch for surface moisture
  - Drive pins to the proper depth

# USE THE METER FOR DATA ACQUISITION

- Statistical Functions
  - Obtain data on entire population
  - Average, Std dev., Confidence int.
- Management Tools
  - Use with basic elements of the wood-moisture relationship in mind

# RDM3 DATA ACQUISITION METER

Use with integral or external electrodes

Data storage, statistics

Generate reports



# STD DEV – describes variability

- Kiln 1 –  
30 samples –11.5%-20%  
Average – 15%      SD= 3.08%
- Kiln 2 –  
30 samples –14%-16%  
Average 15%      SD= 0.71%

# STATISTICAL SUMMARIES

RDM3 US  
Job #1  
Douglas Fir

Number of Readings	51
First	7/22/05 8:04AM
Last	7/22/05 8:10AM
Minimum Value	7.1%
Maximum Value	20.0%
Average	11.4%
Standard Deviation	3.4
Coefficient of Variation	0.301
Confidence Interval	8.6%

Notes:

RDM3 US  
Job #2  
Douglas Fir

Number of Readings	52
First	7/22/05 8:08AM
Last	7/22/05 8:09AM
Minimum Value	7.2%
Maximum Value	21.0%
Average	14.3%
Standard Deviation	4.0
Coefficient of Variation	0.282
Confidence Interval	7.1%

Notes:



# HOW MANY MEASUREMENTS?

- Number of Readings =  $\left[ \frac{(2 \times \text{Standard Deviation})}{\text{Degree of Accuracy Required}} \right]^2$

$$152 \text{ readings} = [2 \times .0308 / .005]^2$$

- Law of Large Numbers – minimum 30 samples
- Wood is not homogenous
- Non-uniform kiln conditions
- Variations within species and within a board

# OTHER ISSUES.....

- Static Electricity – low RH and high resistance
- Using the meter inside the kiln – caution!
- Frozen Lumber
- Treated Lumber - OK < 15%
- Meters do not always agree – standards, correction factors, pins' penetration

# RESISTANCE MOISTURE METERS RECAP

- Proven, indispensable tools
- Fast and accurate
- Follow manufacturer's procedures
- Know the meter's capabilities
- Apply your knowledge and experience

# Company Contacts

- **Sales and Marketing – Paul Laurenzi x 224**
- **Administration – Sandra Laurenzi x 232**
- **Repair Services – John Laurenzi x 225**
- **Marketing Coordinator – Josh Rothman x 223**
- **Sales/Customer Service – Alan Dlugasch x 247**
- **Sales/Customer Service – Vincent Baldassari x 227**
  
- **Toll-free 877-DELMHORST**
  
- **[www.delmhorst.com](http://www.delmhorst.com)**