White Pine Shrinkage - Practical Observations and Determination

Shrinkage Occurs During Kiln Drying; or does it?

The purpose of drying lumber is:

- Because we like to watch wood dry.

- To make money.

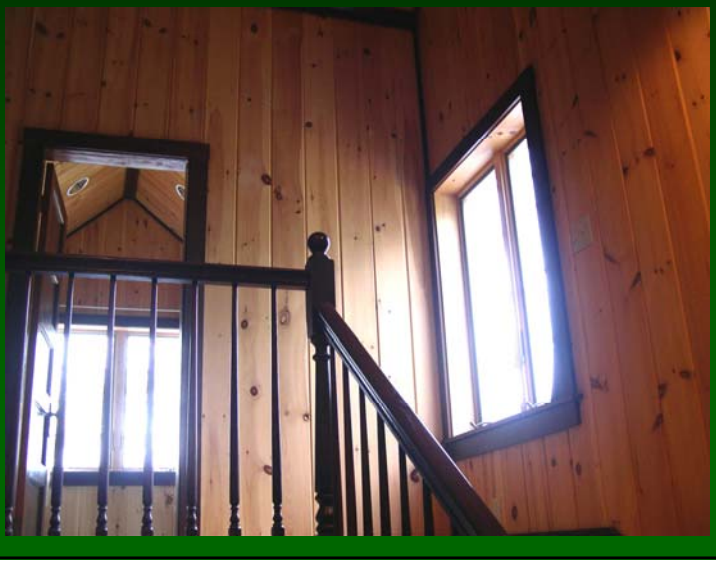
- To satisfy the needs and desires of our customers.

So, ……

A situation developed ….

- 8-inch v-matched tongue & groove white pine boards
- Premium Grade
- Installed as vertical paneling in a home
- Subsequently, spaces were noticed between boards; homeowner unhappy

A situation developed ….



A situation developed ….

- The homeowner found an expert who opined that MC at time of installation was as high as 17, 20.3 and 21.6%
- Opined that this supposedly high MC caused excessive shrinkage
- With legal counsel, filed a claim for damages of ~$200K

If the boards were wet when installed, why?...

- Were they wet from the kiln?
- Was there improper storage?
- Did they wet from the yard?
- Did they get wet during transport?
- Did they get wet at the lumber yard?
- Did they get wet at the home during construction?
- Were the boards not acclimated?

Or, ….

- Was the determination by the expert that the boards were wet when installed incorrect?

He ….

- Measured current MC with a meter.
- Measured the overall distance over sections of, for example,
- 22, 39, 7 and 10 boards
- Assumed they were installed tight
- Assumed they were 6.875 in wide initially
- Measured spaces currently between boards

He ….

- then from these dimensions, calculated theoretical shrinkage.
- from this theoretical shrinkage, back calculated MC at time of installation.
- … Any problems with this?

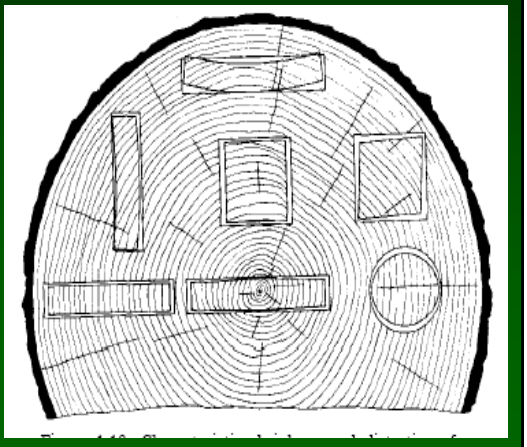
$$\Delta D = D_I\left[C_T(M_F - M_I)\right] \qquad (12\text{–}2)$$

where ΔD is change in dimension, D_I dimension in units of length at start of change, C_T dimensional change coefficient tangential direction (for radial direction, use C_R), M_F moisture content (%) at end of change, and M_I moisture content (%) at start of change.

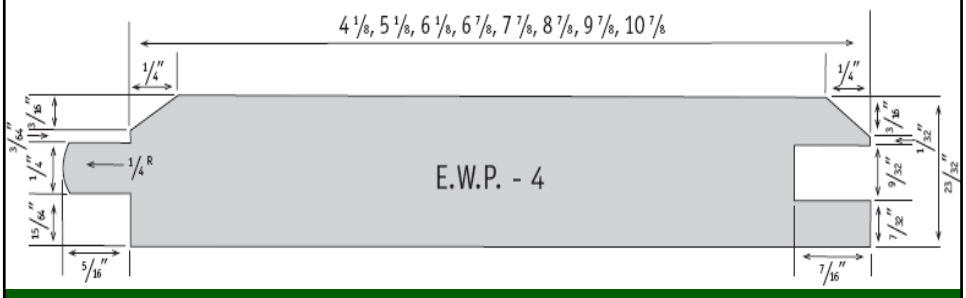
Values for C_T and C_R, derived from total shrinkage values, are given in Table 12–5. When $M_F < M_I$, the quantity $(M_F - M_I)$ will be negative, indicating a decrease in dimension; when greater, it will be positive, indicating an increase in dimension.

Wood shrinks more tangentially

- He assumed board shrinkage was 50% tangential and 50% radial
- Is this accurate?



- If the orientation is radial, it takes a higher change in MC% to cause a particular dimensional change
- Therefore, assuming a larger radial component results in a higher initial MC calculation.



Other important issues,

- He did not measure individual boards.
- However he presented a calculated initial %MC for individual boards, from assumed individual board shrinkage.
- But, individual board shrinkage was calculated from aggregate current total width of 7 to as many as 39 boards divided into the assumed initial width.
- The values calculated were specifically dependent upon the assumption that the boards were tightly installed, with no open space.

- However, there was no evidence that each board was in fact installed tightly. This was only an assumption.

- Interestingly, at many locations where there were spaces between boards, the boards were tight above and below.
- These boards were crooked!
- So, was a space due to crook or shrinkage?

NELMA grade rules

- Premium grade; 3/8 inch crook allowed in an 8 foot board!

And, ….

Panelization

- The finish which was applied to these boards caused adherence in a number of locations, so movement of boards was as a “panel”, creating one large space instead of several smaller spaces.

So, ……

- What really happened?

A second expert,

- Measured current %MC
- Measured current actual board dimension
- Assumed that boards were, conservatively, 80% tangential and 20% radial orientation (the USDA Wood Handbook suggests assuming tangential orientation)
- Observed panelization
- Observed crook

The sawmill's expert calculated ….

- An average initial %MC of 13.7%;
- 12.1% if all tangential orientation

Interestingly,…

- What is the NELMA %MC specification for kiln dried boards?
- <19%,
- <15%
- <12%?
- read the rule book, look at the contract

So, what happened and who won?…

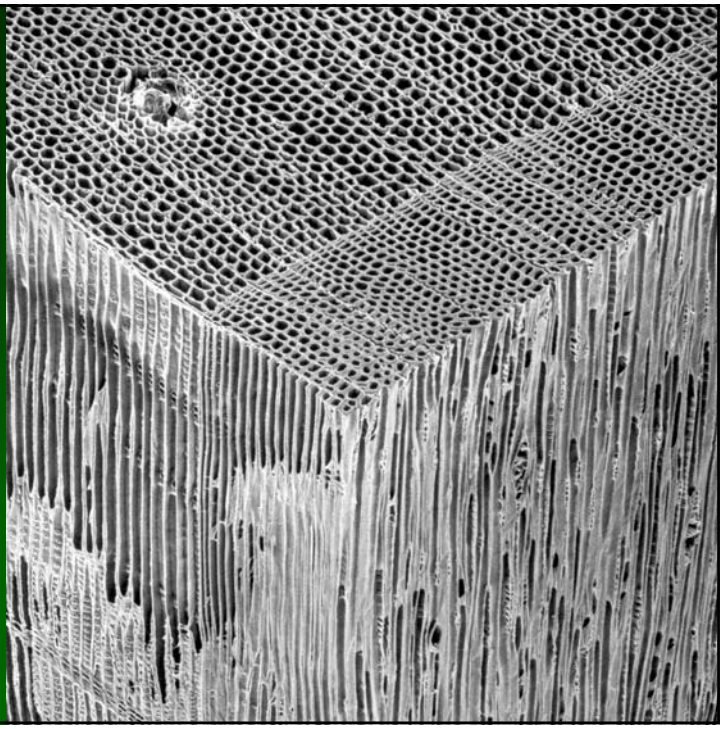
- Nobody won!
- There was a much smaller settlement
- The lawyers and experts were paid.
- The lumber supplier unnecessarily spent time and money addressing the issue.
- The insurance company provided coverage with your money

White Pine –

is an Ideal Material :

- Attractive
- Economical
- Strong, stiff, lightweight
- Natural, renewable, sustainable
- Long lasting
- Low shrinkage
- Excellent insulator
- Readily available, locally
- Ready design, fabrication, modification

White Pine



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White pine boards are good!