

Dimensional stabilization via forced slab drying

Quebec City

June, 2005

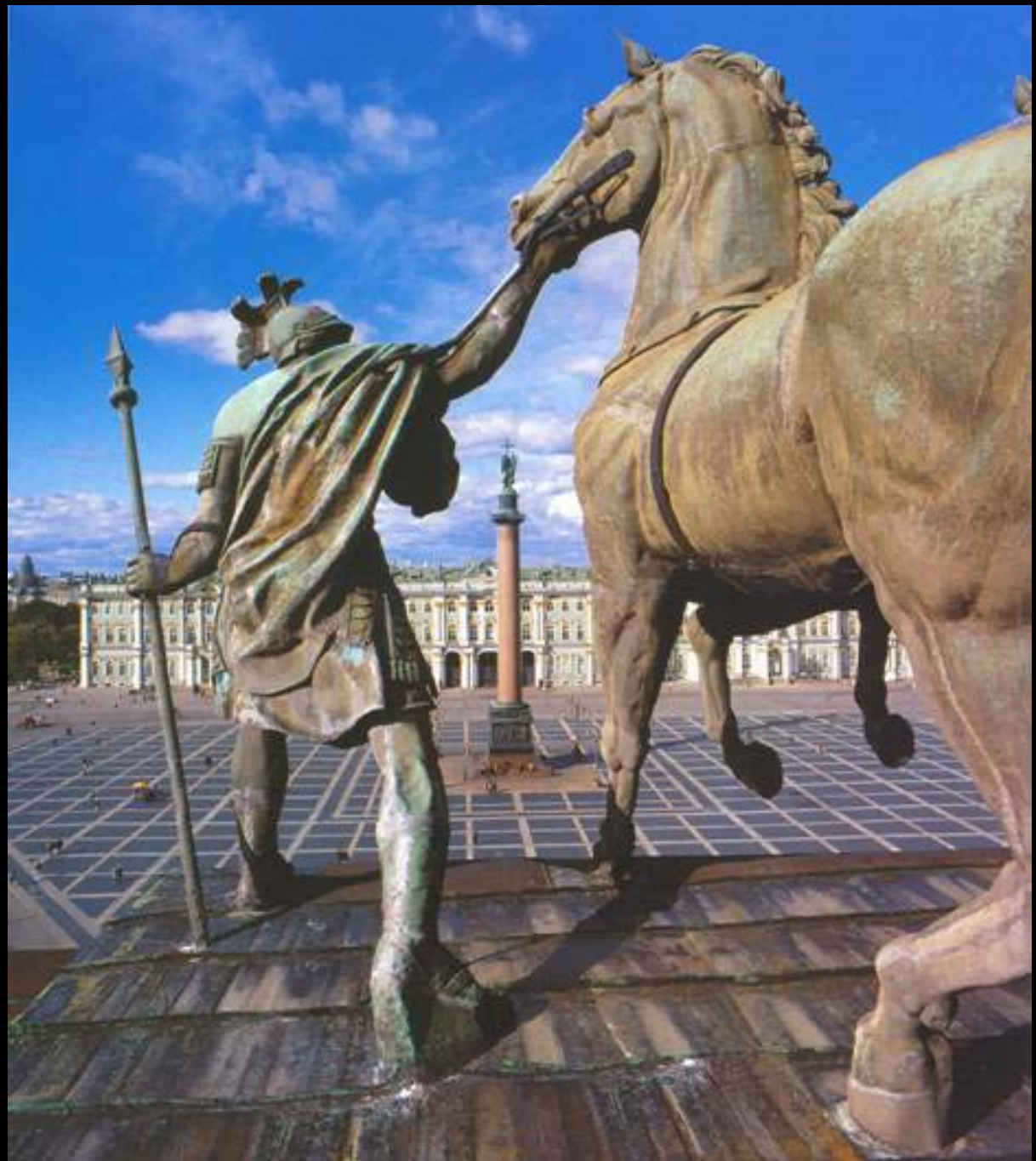


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Come along...



Dimensional stabilization?

Forced slab drying?

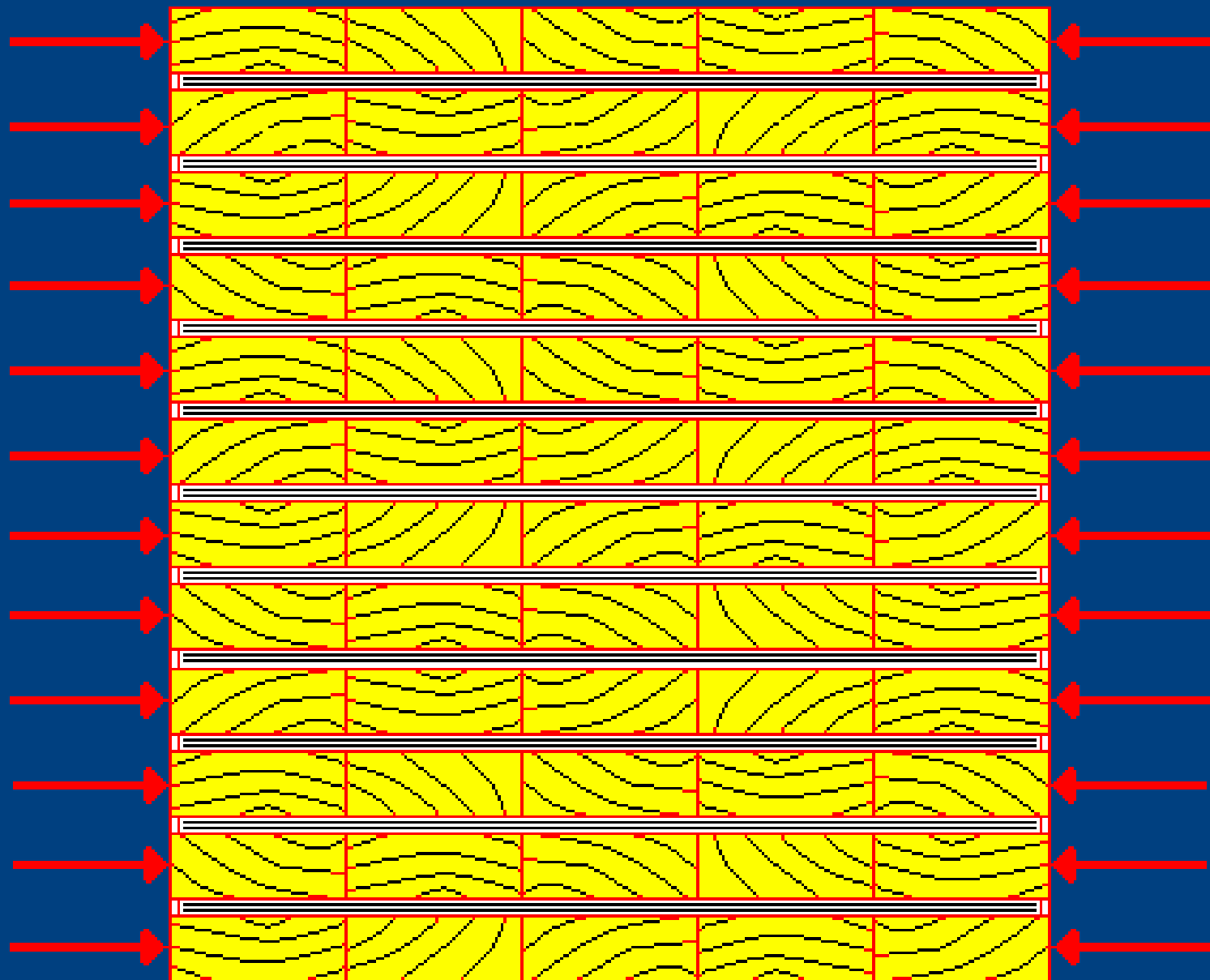


Dimensional stabilization...

- Development and maintenance of the desired shape over time
- In the case of lumber, the “desired shape” is an orthogonal, three dimensional, rectangle
- “Over time” suggests perpetuity

Forced slab drying...

- Restriction and restraint to the extent that individual pieces in any given lumber course are positively held, edge to edge, as a single slab.
- As such, individual pieces support each other and are held straight.



Why during drying?



The raw material



Why would you ever cut
that tree?



Why during drying?

- The high temperature *plasticizing* atmosphere in the kiln offers a window of time during which we can remove the water and “encourage” the individual pieces to conform to our needs

Process is somewhat analogous to steam bending

- In each case moist wood is heated to some point of softening or plasticization
- The wood is restricted in a desired shape
- Upon cooling, or drying, the wood becomes fixed in position

How much force?

- Hypothetical calculation...to remove 2-inches of crook in a 16 foot long 2x6 (rough, green).
- Assume uniform loading and an E value of 1.5 million psi.

$$\omega = (32 \Delta y E b h^3)/(5 L^4)$$

- ω = force per inch
- Δy = maximum deflection (crook) 2 inches
- $E = 1.5 \times 10^6$ psi
- $b = 2$ inches
- $h = 6$ inches
- $L = 192$ inches

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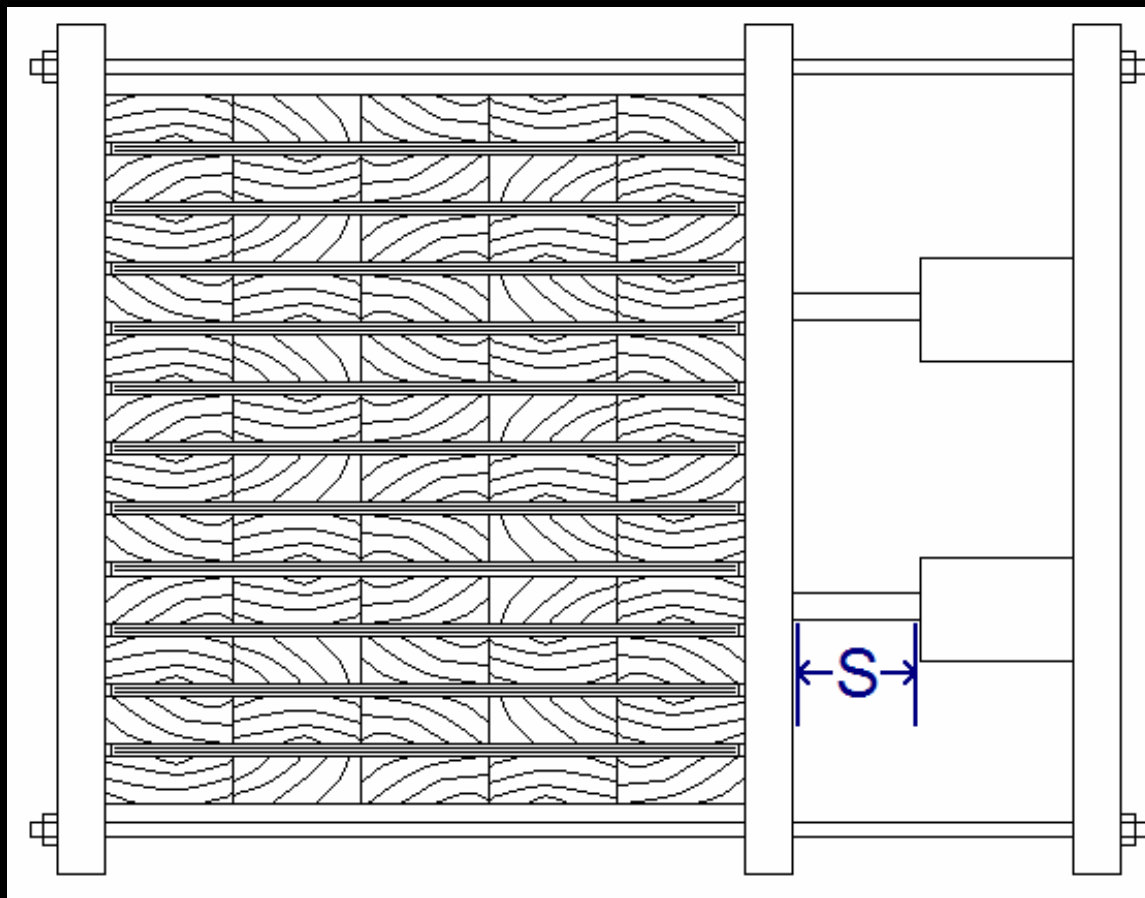
- ω = force per inch
- Δy = maximum deflection (crook) 2 inches
- $E = 1.5 \times 10^6$ psi
- $b = 2$ inches
- $h = 6$ inches
- $L = 192$ inches
- 6.2 pounds per lineal inch
- 75 pounds per lineal foot
- 1,180 pounds total along the length

- 1,180 pounds total along the length for each board
- Plus additional force to overcome friction between the stickers, more force required at the bottom of the package



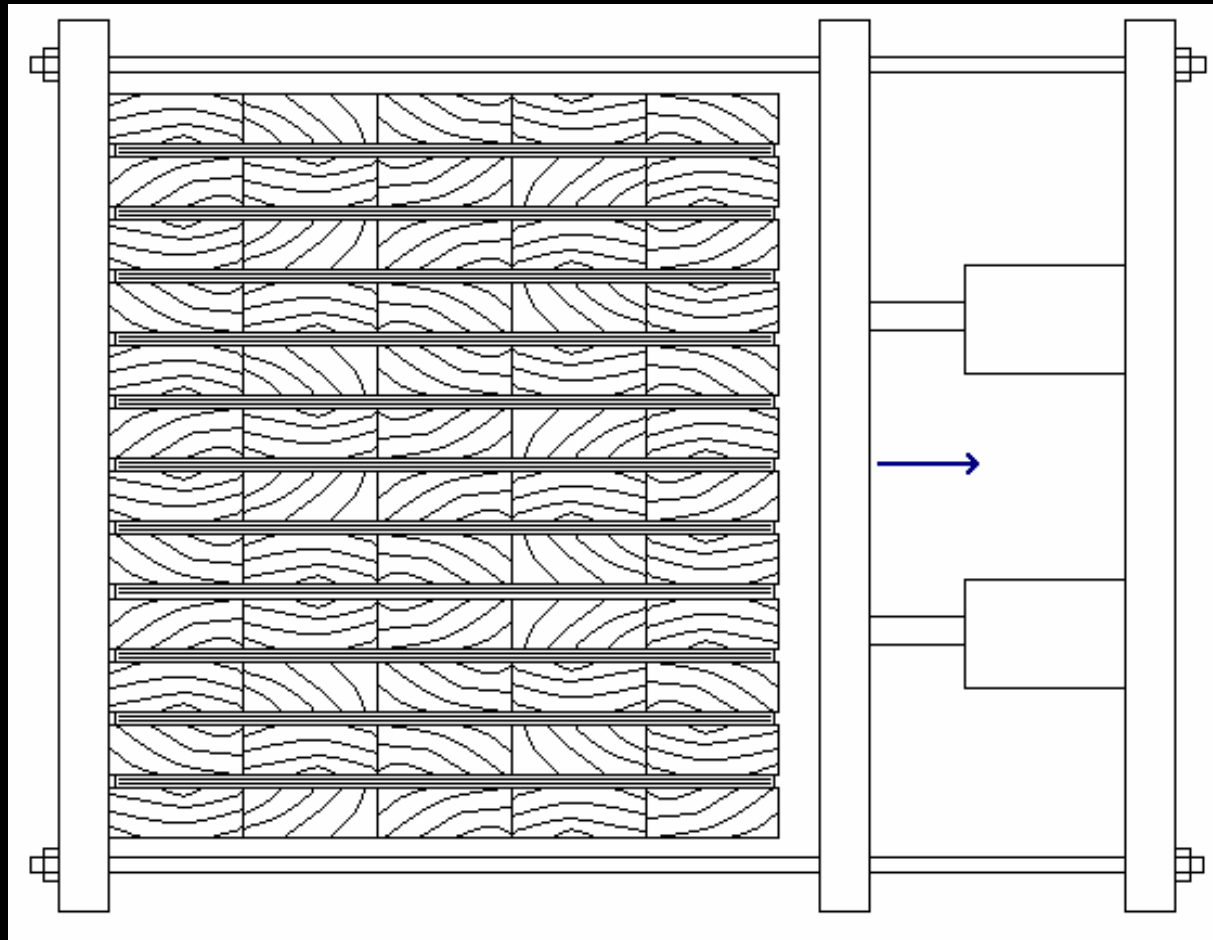
- This 1,180 pound force value likely decreases as temperature increases.
- This 1,180 pound force value likely increases as:
 - The wood becomes with moisture removal
 - The propensity for warp increases with moisture removal
 - Additional force is required to overcome friction within the package

- Sufficient stroke is necessary both to cinch the pile together and to accommodate shrinkage (about 3 inches in an 8 foot wide package)





- Once the lumber is dry, the pressure is released and the “slab” reverts back to boards.





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