

TEMPERATURE CORRECTIONS FOR MECHANICALLY GRADED LUMBER

David W. Green, Engineer
James W. Evans, Statistician
USDA Forest Service, Forest Products Laboratory
Madison, WI, USA

James D. Logan, President
Jim Allen, Engineering Manager
Metriguard, Inc.
Pullman, WA, USA

The continuous lumber tester (CLT) is the most widely used grading machine in the world. With the CLT, the flatwise bending stiffness of lumber is measured as it passes through the machine. The modulus of elasticity (MOE) is calculated from the force required to bend the lumber to a fixed deflection of 7.94 mm (5/16 in.), and this MOE is used in assigning a machine grade. Quality control testing is also required to assure proper grade assignment. Usually, quality control is based on tests of bending stiffness and strength. In commercial practice, the lumber passing through the CLT may still be hot from drying. In cold climates, the lumber could also be frozen when passing through the machine or when quality control tests are conducted. Unless allowances are made for the temperature of the lumber, problems may occur in grade assignment or during quality control testing.

Research at the USDA Forest Service, Forest Products Laboratory (Madison, WI, USA) has established the effect of temperature on the MOE of both dry and green lumber at 12 percent moisture content from -23°C (-10°F) to 66°C (150°F). Figure 1 shows the mean trend in MOE as a function of temperature for four data sets. The data sets range in size from 30 to 75 specimens and include both visually and mechanically graded lumber for three species groupings: Douglas Fir-Larch, Southern Pine, and Spruce-Pine-Fir. Relative to the MOE at 23°C (73°F), the MOE is 9 percent higher at -23°C and 9 percent lower at 66°C.

A new digital data processor has been introduced for the Metriguard CLT and HCLT machines. Approximately a dozen of these units have been placed in service. A wood temperature detection system is being developed in which the wood temperature will be measured and used to correct the stiffness measurement back to a room temperature value. This will replace a much simpler system of adjusting grade threshold values twice per year to compensate for temperature in cold climates, and will allow mixing cold lumber with hot lumber from kiln charges. Reducing variability attributed to temperature variations in the wood will allow grading at more optimum grade thresholds and will result in improved grade yields.

A future paper, to be submitted to the Forest Products Journal, will present full details of the study for both green and dry lumber. An analytical procedure for estimating the effect of temperature at intermediate moisture content levels will also be developed.

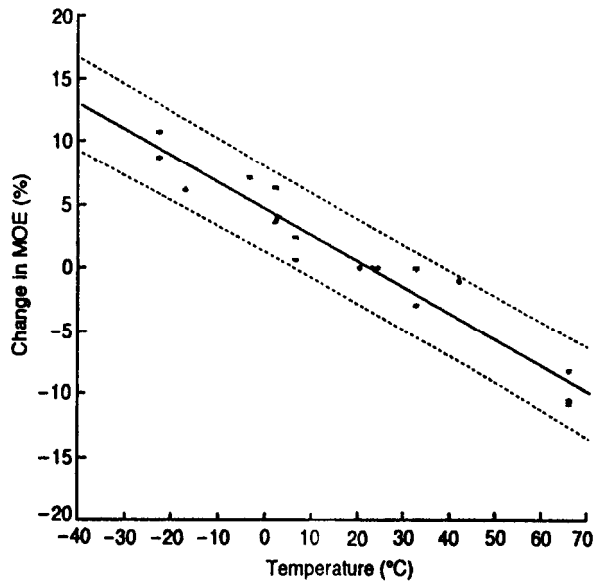


Figure 1. Effect of temperature on modulus of elasticity (MOE) of dry lumber.

Cet ouvrage est une publication des Presses Polytechniques et universitaires romandes, le catalogue des publications peut être obtenu par courrier à l'adresse suivante, EPFL - Centre Midi, CH-1015 Lausanne, par E-Mail A ppur@epfl.ch, par téléphone au (0)21 693 40 27.

Vous pouvez consulter notre catalogue général sur notre serveur:
Please consult our general catalog on the Web: <http://ppur.epfl.ch>

ISBN 2-81074-387-7

© 1998, 1st C&ion

Presses polytechniques et universitaires romandes,
CH - 1015 Lausanne

Tous droits réservés. *All rights reserved*

Reproduction, même partielle, sous quelque forme
ou sui quelque support que ce soit, interdite sans l'accord écrit de l'éditeur.

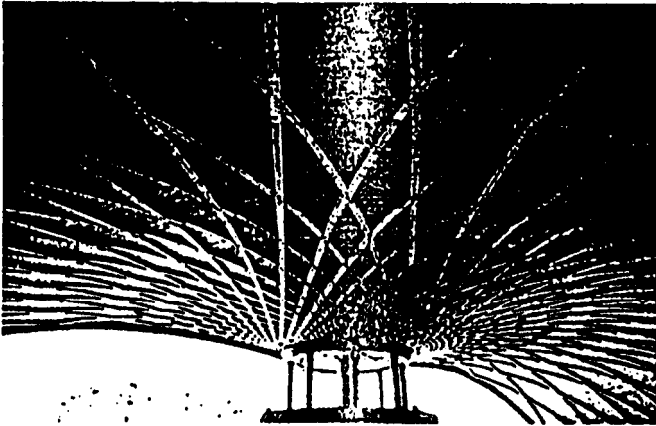


W C T E '98

SWISS FEDERAL
INSTITUTE OF TECHNOLOGY
LAUSANNE - SWITZERLAND

5th WORLD CONFERENCE ON TIMBER ENGINEERING

August 17-20, 1998
Montreux, Switzerland



PROCEEDINGS

Volume 2

Edited by J. Natterer and J.-L. Sandoz

Presses polytechniques et universitaires romandes