VARIATION IN SPECIFIC GRAVITY AS IMPACTS MOISTURE CONTENT READINGS

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The reason we have gone in-depth in understanding the specific gravity was to meet our customers need for a narrow range in moisture content and the accuracy of our moisture meters. As we changed drying schedules to narrow the MC range we found that a certain amount of the samples checked were different when checked against oven-dry and the largest reason related back to density.

Our customers have found that when we were able to provide them a wood product that is in the 8 to 12 percent MC range that there is more stability and less product downfall in their remanufacturing and assembly plants. The costs of quality drying are shared with our added value customers. They realize the cost savings benefits when their spec for a narrow moisture content range is met.

Internal costs are reduced when the moisture measuring system is reading accurately. The costs that occur are from rehandling and redrying, plus the value loss by overdrying, handling damage, and degradation after redrying if dry lumber is marked as wet. Without the most accurate feedback information to the kiln operator from the planer as to MC of a kiln charge, the dry kiln operator will have difficulty in making and using the best dry kiln schedule.

As we take the variation out of the drying procedure we need to look at the accuracy of the instruments we are using to measure MC. We started with the hand held moisture meters and did two different tests using three different meters. The first test was a Gage R/R for repeatability and reproducibility for equipment variation and operator variation. The second test was for accuracy, a moisture meter reading versus ovendry (FIGURES 1a through 3b).

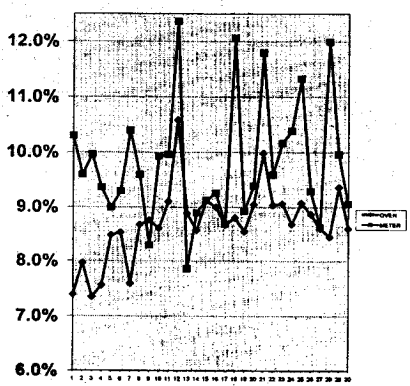

FIGURE 1a. Moisture content based on oven-dry method versus contact meter reading.

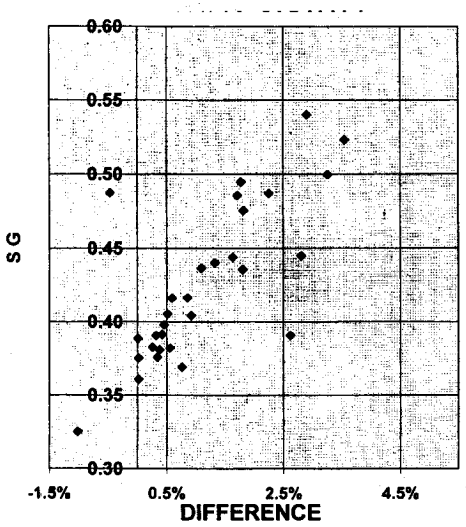

FIGURE 1b. Specific gravity versus difference between contact meter reading and oven-dry moisture content.

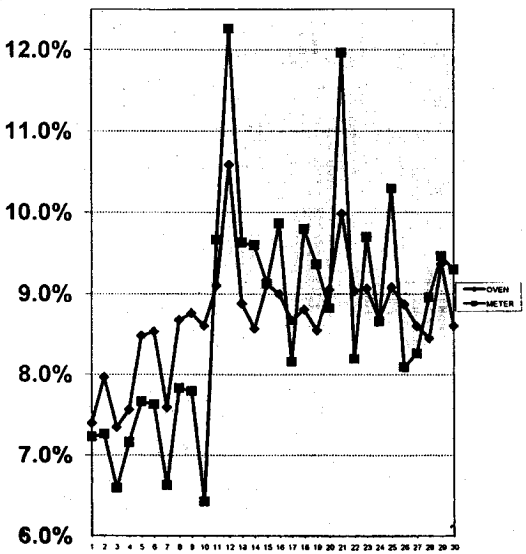

FIGURE 2a. Moisture content is based on oven-dry method versus reading form pin-type meter number.

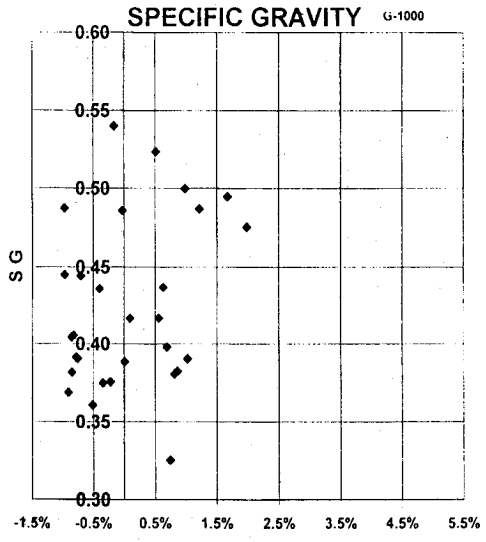

FIGURE 2b. Specific gravity versus difference between pin-type meter #1 reading and oven-dry moisture content.

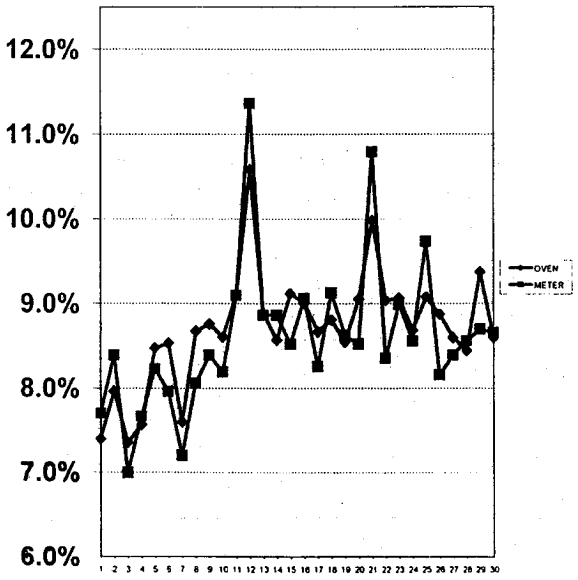

FIGURE 3a. Moisture content based on oven-dry method versus reading from pin-type meter #2.

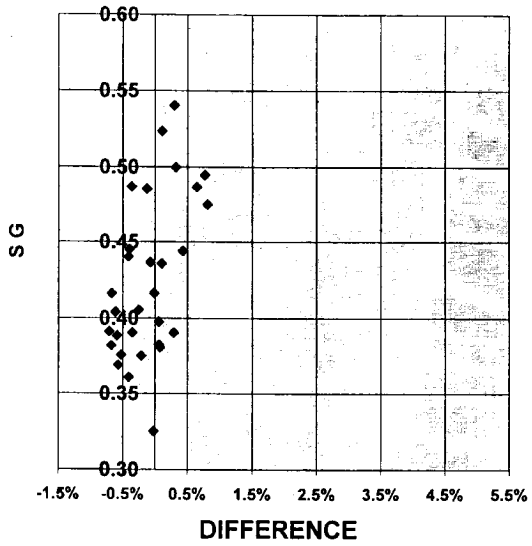

FIGURE 3b. Specific gravity versus difference between reading from pin-type meter #2 and oven-dry moisture content.

The procedure used for determining the specific gravity was made by using the ASTM Standards test method D 2395 using volume measurements and weight in grams to .01 at ovendry weight.

The inaccuracy when using a contact type meter for MC readings seem to be greatly related to the specific gravity setting per specie rather than the equipment. The inaccuracy when using the pin meters did reflect on specific gravity but not to the same degree as the contact meter. Specific gravity or density does effect the accuracy of our inline moisture meter readings. Tests show of the 2.75% wet dropout, only 2% of that amount were actually wet, 75% of that amount was the density of mass pitch, and 23%of the 2.75% was specific gravity related.

The logs that feed our Southern Oregon region come to us from a large geographical area, the California Sierras, the Cascades, and areas in Eastern Oregon, elevations from near sea level to ten thousand feet. The logs can be old growth, second growth, or even third growth trees (FIGURE 4).

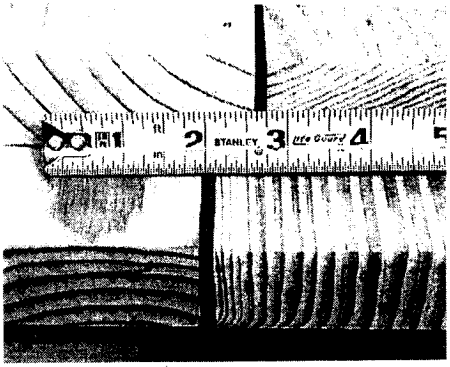

FIGURE 4. Logs coming from diverse stands over a wide geographical range yield lumber with varying properties.

The test average for specific gravity for ponderosa pine at oven dry was 0.42 with a maximum of 0.61 and a minimum of 0.32 (FIGURE 5). The test averages for specific gravity for sugar pine at oven dry was 0.39 with a maximum of 0.51 and a minimum of 0.32 (FIGURE 6).

Ten test sample boards were sent to Sweden to be checked on a Density Meter and compared with our specific gravity test. The test results show a plus or minus of 0.03 difference from our oven dry results (FIGURE 7). The next step to record a more accurate moisture reading may be the use of a dual meter, a moisture meter and a density meter combination.

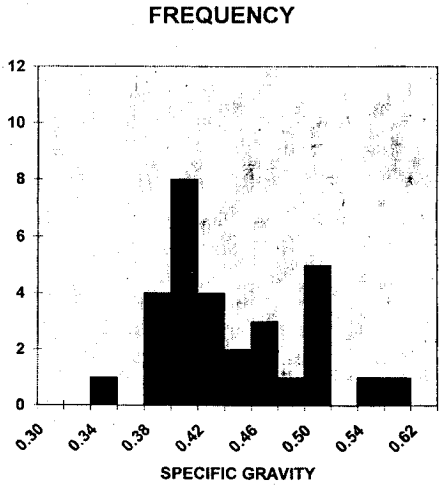

FIGURE 5. Frequency distribution for specific gravity of ponderosa pine.

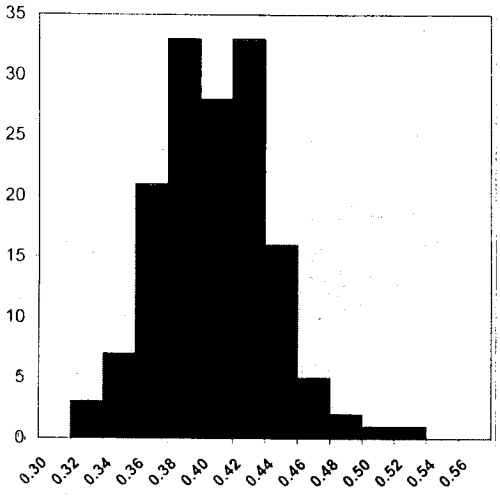

FIGURE 6. Frequency distribution for specific gravity of sugar pine.

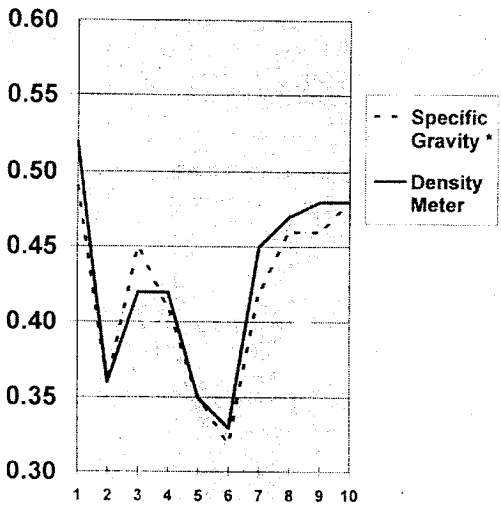

FIGURE 7. Density meter compared to specific gravity.