Preservative treatment of many wood species from the western parts of North America poses a major challenge because of the high percentages of refractory heartwood. As a result, penetration requirements for western species in the AWPA standards are largely based on what could be achieved with creosote in incised Douglas-fir ties in the 1930s. The assay zones for assessing preservative retention also reflect historic practices, although these values were derived from the depth of core that produced results that were similar to those found with the gauge retentions used previously. Questions understandably arise as to what preservative penetration retention and assay zone are really required to meet consumer expectations for performance. These questions were addressed through a review of performance data on full-sized treated commodities from a large number of field tests and one service trial where preservative penetration and retention were well documented. The results suggest that shallow penetration may be sufficient for nominal 2 inch material in above-ground, low-decay-hazard applications where spores are the primary mode of infection if the preservative has adequate levels of mobility in a bio-available form. Critical structural applications and ground contact materials that may be challenged by mycelial strands require deeper penetration but as little as 5mm of penetration may be adequate. CCA retentions that were only 80% of the AWPA standards are still serviceable after 19 years plus in ground contact and CCA retentions 50% of the AWPA requirements are still serviceable after 30 years plus above ground. ACQ/CA retentions that were only 50% of the AWPA specifications are still serviceable 6 years plus in ground contact. The performance of these various treatments may reflect the fact that the assay zone for western species is greater than the penetration depth (10 mm penetration vs 15 mm assay zone). As a result, preservative loadings in the actual treated zone tend to be much higher than are actually required to achieve biological performance.

A New Method for Preservative Penetration Determination

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ABSTRACT
The proper penetration of preservatives is essential to the long term field performance of treated wood products. Heretofore, preservative penetration has been evaluated via colorimetric indicators or penetration surrogates that turn color in certain wavelengths of light coupled with a human deterministic
assessment. In the 2014 U.S. treated wood industry, there are approximately 150 plant quality control supervisors, approximately 80 third party agency inspectors, and handful of ALSC inspectors that evaluate preservative penetration by looking for color changes. Color is in the eye of the beholder. The concept of this research is to standardize this color assessment by using machine vision to assess preservative penetration. Machine vision uses a high definition camera coupled with computer generated algorithms to assess preservative penetration one pixel at a time.