

Statistical Analyses of the Retention Testing Protocol for Treated Lumber

Pressure-treated lumber is widely used for a range of outdoor construction applications, including those that are structurally critical (Fig. 1). The durability of treated lumber is dependent on the retention (or concentration) of preservative within the wood. Preservative retention is determined for every charge of lumber, but the measured retention value may differ if the same charge is analyzed a second or third time. Although such variation is known to exist, the extent of the variability has not been well quantified.



Figure 1. Treated lumber is often used where it is critical that the wood contain enough preservative to prevent damage from decay and insects.

Background

Retention of preservative in pressure-treatment lumber charges is determined by removing core samples from 20 pieces in each charge (Fig. 2). These cores are combined and milled to obtain a composite sample and then analyzed for preservative concentration. Retention levels in a subset of the charges are also checked in the same manner by a third-party inspection agency; in some cases, retentions are checked by other third parties. Because preservative retention in wood varies within and between boards, subsequent sampling of a charge may produce higher or lower retentions than the initial measurement. As a result, charges that have been found acceptable at the treating plant are sometimes reported to be inadequately treated during a subsequent inspection. This has caused some concern with the wood treating industry, and there is interest in better understanding how much variability



Figure 2. Retention in charges of treated lumber is determined by removing increment cores and combining them for chemical analysis.

can be expected when a charge is measured multiple times. In this research project, statistical analyses of industry treated-wood retention will be conducted to better characterize this variability.

Objectives

The objectives of this project are to (1) characterize the variability expected in retention values when treated-wood charges are measured multiple times and (2) determine operational target levels given the observed variability.

Approach

Statistical analyses will be based on “paired” charge retention data for commercial charges. These are charges for which both treating plant and inspection agency retentions are available. The identity of the treating plant and preservative will be masked by coding with generic labels, and preservative retentions will be normalized around the target retention. Data will also contain information on the “Use Category,” species grouping, and whether the sawn material is greater than 2 in. in thickness. Statistical quality control techniques will be used to analyze the data. A capability analysis will be conducted for the paired charged data relative to the specifications required by the testing agencies. Short- and long-term variability will be estimated for the capability study. This will include an assessment of data quality using accepted industrial statistical techniques.

Expected Outcomes

Project outcomes will include (1) recommendations of operational target levels given current short- and long-term variability relative to the lower specification limits; (2) recommendations on data quality; (3) recommendations on root cause analysis for reducing variability based on several mill tours. Results will be published and presented at an AWPA meeting and made available to AWPA Technical Committees. This information will allow AWPA committees to consider whether changes should be made to standards to increase the likelihood that charges will meet the retention standard when sampled by inspection agencies or other third parties.

Timeline

The project will begin in May 2016, with initial emphasis on obtaining commercial paired charge retention data. Work will then begin on the variance assessment and capability study, and mill tours will be conducted to gain familiarity with commercial practices. Initial findings and recommendations will be completed within 12 months. Following feedback and assessment, a final report will be prepared and the findings will be presented at the AWPA technical meeting in September 2017.

Cooperators

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