# CLT Exposed: Sunny Architects' Dreams, Rainy Reality and How to Make Everyone Happy

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**ABSTRACT**

Cross laminated timber (CLT) has in recent years grown from a clever invention to a much-celebrated modern product and building technology revolutionizing timber construction across the globe. For most of the past 25 years the CLT organic development of manufacturing process and the technology of erecting prefabricated houses based on this product resulted in a range of efficient, resilient and often spectacular structures. Inspired by this exciting development architects dream tall tempting us with visions of breathtaking wooden towers scraping cloudless blue skies with very pretty exposed wood panels. And… this is precisely where the opportunity for the wood preservation community miraculously pops up.

# AWPA Biodeterioration Hazard Map Revisited, Again

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**ABSTRACT**

The American Wood Protection Association (AWPA) use category system (AWPA 2014) is currently used to set above- and below-ground retentions for all commercial wood preservatives and follows the AWPA hazard map for many of its decision criteria. The AWPA hazard map is a composite based on information from several sources, such as utility pole condition surveys by the Rural Electrification Association and climate zones as described by Scheffer (1971). The current decay hazard class system utilizes measures of the physical environment (mean temperature and rainfall) to estimate decay hazard and do not include measures of fungal biodiversity. The goal of this on-going research at FPL is to provide baseline fungal biodiversity data for forested sites within the current AWPA hazard zones in both soil and exposed untreated wood. Preliminary results, timelines and expected outcomes for this project will be discussed.

# Five Year Inspection of ACZA Treated Hardwood Ties in Track

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**ABSTRACT**

While ACZA's predecessor, Ammoniacal Copper Arsenate (ACA) successfully protected Douglas fir ties back in the 1940's, and more recently Ammoniacal Copper Zinc Arsenate (ACZA) has protected Douglas fir bridge timbers and crossties, ACZA has never been used for hardwood ties. Ongoing lab testing continues to confirm that ACZA is a preservative system which deserves consideration for protecting hardwood ties. In addition, its performance in treating difficult or refractory species of wood has been documented through its wide range of uses approved in AWPA. However, commercial treatment, installation and successful performance in an active railroad track is the ultimate test for crossties. Mississippi State University was retained to perform in track inspections on ties previously installed and to sample test ties for future analysis.

Initial findings, detailing the treatment information for the test ties and showing the ties to be performing well, were presented in Asheville, NC (2015) and more recent information obtained from a subsequent inspection following an additional three years of exposure is covered here.

# Update on Revisions to 2018 National Design Specification for Incising-Effect Adjustment Factors for Strength and Stiffness

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**ABSTRACT**

The effect of the incising process has been found to be dependent on the depth, length and damage around and below individual incisions and the pattern and number of incision (density) per surface area. Engineers derive allowable engineering design values for the strength and stiffness of treated and incised lumber and timber using the National Design Specification (NDS) for Wood Construction (AWC 2015). Engineering models based on the use of *Reduced Section Modulus* (RSM) have been developed for calculating incising strength factors adjustments for specific incising patterns and lumber/timber sizes. Proposed changes to the 2018 NDS, if accepted, will allow and encourage the use of such models as an alternative way to calculate incising strength factors adjustments for any incising pattern or lumber/timber size.

# An Update on the Micronized Copper Chemistry

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Understanding the chemistry of Micronized Copper wood preservatives, provides a valuable insight into the chemistry of copper reactions with wood components. The lower pH of micronized copper dispersions results in the reaction of the very acidic carboxylic acid functions. The residual micronized copper is also able to react with soil components, most likely fulvic acid. Reactions with wood extractives are limited by the lower solubility of extractives in aqueous solutions, but this can be overcome by biological degradation of the extractives. Understanding the chemistry of micronized copper preservatives may assist in understanding other systems which rely on reaction with wood to enhance durability.

# Copper Azole Type A (CBA-A) Pole Field Study

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**ABSTRACT**

In 2002, 58 Southern Pine utility poles (3 charges) were treated with Copper Boron Tebuconazole (CBA-A). The poles were put into service at a rural electric coop near Charleston, SC. This area would be considered a zone 5 Hazard Class exposure, due to its proximity to the coastal area.

In 2014 the poles were visually inspected and cores were taken in the standards area of within 1 foot of the brand (upper zone). Additional cores were taken within 18" of the ground (lower zone). To determine the preservative remaining in the poles the cores samples were cut into ½ inch zones from the surface to 3.0 inches from the surface. Sections were analyzed for Copper, Tebucanazole and Boron. In 2015, Mississippi State University performed soil sampling and analysis for Copper and Boron in various proximities and depths of six of the poles.

# Correlation of HPLC, XRF & NAA Instrumental IPBC Measurement Methods in Wood Materials

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The use of Iodo-Propynyl-Butyl Carbamate ("IPBC") is a well-known Biocide additive for many Wood Treatment applications, and there are several well-established instrumental analytical methods (extraction HPLC, XRF, and NAA) that have been standardized within AWPA. There have been questions regarding the use of XRF and NAA because they measure Iodine rather than IPBC. There have also been questions regarding measurable limits of IPBC when using extraction-HPLC. The irreversible molecular interactions, possible hydrogen bonding and van der Waals interactions, formed between IPBC and hydroxyl groups from wood components, as well as the capillary forces existing in the wood cell lumen may inhibit the extraction of IPBC. Non-destructive X-Ray Fluorescence ("XRF") surface analysis can look at either a discrete surface or a ground-up composite of the Wood to measure the Elemental Iodine part of the IPBC. The "bulk" measurement capabilities of Neutron Activation Analysis ("NAA") generally give greater sensitivity than XRF because NAA evaluates the whole wood sample. This presentation will compare a preliminary examination of the relative accuracy, precision and sensitivity of these various technologies.