Colley/Hartford Memorial Lecture: Wood as a Green Resource: Leadership for all 3 dimensions of sustainability

Kathyn Fernholz
Dovetail Partners
Minneapolis, Minnesota

Kathryn (Katie) Fernholz is President/CEO of Dovetail Partners, a nonprofit environmental think tank based in Minneapolis. Katie is a dynamic and compelling thought-leader on environmental concerns and sustainability. She brings a unique combination of a broad understanding of the complex interconnection between society and the environment, and the experience of her own personal journey from a family organic farm to forestry school to being an international expert on the responsible management of natural resources.

ABSTRACT

Wood is the world's most versatile and renewable material. It is a climate-positive, socially beneficial, and economically resilient resource that requires innovation and advocacy for the benefits to be fully realized. This presentation explores how leadership across the sector advances all three dimensions of sustainability - economic, environmental, and social - and leads to more opportunities for embracing wood as a strategic green resource. Emerging market trends, innovations in wood-based materials, and the expanding role of forests in the circular economy offer great potential. Supporting rural livelihoods, strengthening workforce pathways, and ensuring that communities share in the benefits of a growing bioeconomy are the responsibilities of today's sustainability leaders. Drawing on insights from Dovetail Partners' research and cross-sector collaborations, Kathryn Fernholz will highlight actionable insights for industry professionals, partners, and leaders seeking to align environmental integrity, social well-being, and economic prosperity to support growth in the responsible use of wood.

Keynote Address:
Durability and Extension of Life in Outdoor WOOD Structures – The Old Stays New!

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Wood Research and Development
Jefferson, Oregon

Dan Tingley is the senior structural engineer and wood technologist at Wood Research and Development. He has worked in the wood products industry for more than 45 years. He is the inventor of the award-winning FiRP® Panel reinforcement technique, which makes use of high-strength reinforced plastics to strengthen wood products and holds more than 40 published patents in the reinforced wood field. Dr. Tingley sits on the Subcommittee on Section 9 – Wood Structures of the Canadian Highway Bridge Design Code, AREMA Technical Committee 7 – Timber Structures, and AREMA Technical Committee 10 – Structures Maintenance & Construction where he was instrumental in development of the Handbook of Conventional Maintenance Practices for Railway Bridges. Dr. Tingley and WRD authored the Timber Bridge Inspections, Maintenance, Restoration and Design Detailing Guide, published by the Canadian Wood Council in 2024.

ABSTRACT

Timber is one of the oldest materials used for construction of bridges, marine structures, and other outdoor structures which are often exposed to very harsh environmental conditions. In the twentieth century, misconceptions about the durability of wood structures caused new wood construction to be largely displaced by steel and concrete.

Wood is a naturally durable material in many respects. It can withstand short-term overloading; it is chemically resistant; it is resistant to fatigue damage; and it is not harmed by freeze-thaw cycling. The largest threat to the durability of wood structure is fungal decay. With proper detailing and preservative treatment to prevent decay, outdoor wood structures can easily have life spans of 75 to 100 years. There are many examples of timber bridges which have been in service for 200 years or more.

This presentation will discuss modern and historical methods for improving the service life of wood structures. It will bring modern timber products to the forefront with discussions about mass timber in outdoor structures and how such structures as parking garages and bridges are now utilizing mass timber in outdoor or harsh environmental conditions utilizing advanced pre-machining and post treatment strategies to improve longevity. It will specifically focus on methods of decay prevention in these harsh environmental conditions. Design interventions, such as careful consideration of drainage, airflow, and connection details to control moisture content are the first

line of defense. In harsh environments, these methods are typically combined with the use of naturally durable wood species or preservative treated wood.

The presentation will also discuss modern methods for restoring and upgrading older wood structures which have begun to deteriorate. Methods discussed will include member replacement, improved connection details, installation of high-strength fiber reinforcements, and application of preservatives and remedial treatments. Additionally, modern methods for inspection and assessment of existing structures will be discussed.

Dr. Tingley will demonstrate how experienced timber designers and builders can implement proper design, construction, treatment, and maintenance practices to extend the durability of wood structures.

NHLA 1st Annual Report on the North American Thermally Modified Wood Market 2025

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ABSTRACT

Thermally Modified Wood (TMW) is emerging as a high-performance, sustainable alternative to chemically treated and tropical hardwoods in North America. This presentation provides a comprehensive analysis of the current state of the TMW market in 2025, its growth trajectory, performance characteristics, and strategic opportunities for stakeholders across the wood products industry.

Key Findings

- **Market Growth**
- **Performance and Sustainability**
- **Market Drivers**
- **Key Applications**
- **Challenges**

Strategic Recommendations

1. **Establish Standards and Certification**
2. **Industry Collaboration and Branding**
3. **Outreach to Specifiers and Consumers**
4. **Enhance Technical Data and Warranty**
5. **Foster Innovation and Investment**

This presentation serves as a strategic roadmap for manufacturers, specifiers, policymakers, and investors to unlock the full potential of thermally modified wood in North America. Both hardwood and softwood segments are covered, including:

- Thermally modified hardwoods (e.g., ash, oak, maple, poplar) used in decking, flooring, siding, furniture, and millwork.
- Thermally modified softwoods (e.g., pine, spruce, fir) used in cladding, fencing, garden structures, and non-load-bearing components.

The analysis spans the full value chain, from raw material sourcing and processing technologies to end-use applications and distribution. It also addresses industry infrastructure, such as kiln capacity, certification efforts etc. The time frame includes historical developments over the past two decades, the current state as of 2024–2025, and forward-looking projections through 2030.

Moisture Analysis of Wood in Timber-Concrete Composites During Concrete Curing

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Cookeville, Tennessee

ABSTRACT

Timber concrete composites (TCC) consist of a timber beam with a concrete slab poured over top with a connection between the two materials. As a hygroscopic material, wood is affected by changes in moisture and will change moisture content depending on the environment. As concrete uses water for the hydration reaction, both concrete and wood will uptake water from the environment. Understanding the moisture relationship between these two materials will help assess risks for TCC floors and help identify any remedies. To better assess this interaction, the moisture content of small-scale TCC specimens exposed to two initial conditions was measured during the concrete curing process. The two treatment groups are: dry blocks, at initial service conditions, and wet blocks, with the contact surface between the wood and concrete exposed to water for 72 hours prior to placement of concrete. The blocks were tested over a 28- day period with specimens harvested on days 0, 1, and 28, and 3 replicates per treatment and time. These time periods were selected to assess the moisture content in the specimens immediately before and after concrete placement in addition to after the 28-day cure time. The specimens were cut into a four by five grid pattern and moisture content was determined gravimetrically for each subsection to determine the moisture distribution in the specimen. There was an initial spike in moisture content in the first layer of the dry specimens after the placement of concrete. By day 28, the moisture dispersed through the rest of the layers of the wood, elevating the moisture contents; however, the ending moisture contents of all the layers were not high enough to be related to deterioration. The wet specimens began at a moisture content much higher than the dry specimens because they were exposed to water. After the placement of concrete, the first layer of the wet specimens saw a loss in moisture. By day 28, the other layers saw little moisture content increase. The first layer ended at a value that could lead to deterioration if not fixed. The loss of moisture in the first layer of the wet specimens and the small dispersion of moisture through the other layers suggests that the moisture was escaping another way, likely the concrete. Further findings and results will be discussed in the presentation.

A Laboratory Study on DCOI Decomposition in Soil

Gerald Presley
Oregon State University
Corvallis, Oregon

ABSTRACT

With the loss of pentachlorophenol as a wood pole preservative, DCOI has become a widely used alternative in the last few years. DCOI is known to biodegrade when present in low concentrations in aqueous solutions, but public information on its ultimate fate in soils is lacking. As the use of this preservative as a wood pole treatment continues to grow, utilities will have need to have a better understanding of the ultimate fate of DCOI and its metabolites in soil. This work describes a lab scale study to measure DCOI decomposition in soil under controlled laboratory conditions. DCOI was spiked into three different soil types prior to incubation over a 1-month period at 30C. DCOI was quantified over the incubation period to estimate microbial metabolism of the compound. Efforts to consistently identify DCOI metabolites were not successful in this trial as they were typically present in low enough abundances to inhibit regular detection in the study. This work provides an initial estimate of DCOI decomposition rates in different soil types and will provide publicly available methodologies for the extraction and quantification of DCOI in soils.

Predicting DCOI Migration from Overhead Decking

Matthew J. Konkler (1), Gerald Presley (1), and Jeffrey Morrell (2)

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ABSTRACT

DCOI is increasingly used as a pentachlorophenol replacement. One possible application will be in decking over water. All preservatives have some water solubility, including DCOI. Understanding DCOI migration will be important for applications over aquatic environments. This presentation uses previous migration data developed by the senior author in the Brooks/Konkler Environmental Assessment Modelling Tool to compare DCOI and penta migration from decking. The results will help inform model updates.

Evaluation of Physical and Mechanical Properties of Three Thermally Modified U.S. Wood Species

Anjila Lamichhane
Clemson University
Clemson, South Carolina

ABSTRACT

Thermally modified wood (TMW) is a chemical-free wood with improved dimensional stability, durability, and fungal resistance to decay, offering an environmentally friendly alternative to chemically treated wood. Thermal modification reduces equilibrium moisture content and thereby extending service life, making TMW attractive for applications such as siding, decking, garden furniture, cladding, saunas, and musical instruments. However, the reduction in some mechanical properties of some species after heat treatment restricts the overall TMW use for structural applications. Although widely adopted in Europe, its benefits have stimulated growing U.S. market interest, as markets increasingly prioritize eco-friendly, high-performance building materials that support elegant biophilic design in modern architecture and presenting also a viable alternative to tropical hardwoods. Thus, this study will investigate the effects of thermal modifications on physical and mechanical properties of three wood species: southern yellow pine (Pinus spp.), yellow poplar (Liriodendron tulipifera L.), and white ash (Fraxinus americana). Lumber will be heat treated in a Wood Drying Engineering (WDE) thermos-vacuum system up to 216 ºC, with untreated boards serving as controls. Each board will be visually graded, and properties such as density, moisture content, dimensional stability, hardness, dynamic modulus of elasticity (MOE), static MOE and modulus of rupture (MOR) will be measured. The results of thermally modified samples will be compared with that of control, to determine if thermal modification improves the wood performance. This study will support the utilization of domestically produced wood, reduce reliance on imported tropical species, and promote broader adoption of TMW in the United States. Recent National Hardwood Lumber Association (NHLA) article emphasizes the need for greater education and outreach to architects, builders, and consumers about the benefits and performance of TMW. Establishing standardized product specifications and certification programs is also crucial for ensuring consistency and confidence among users. Addressing these industry needs will help accelerate TMW adoption in the United States and expand its role in sustainable wood construction.

Integrating Boron Based Protection in Framing and CLT for Minimizing Carbon Footprint and Improving Climate Resilience

Dr. Jeff Lloyd
Nisus Corporation
Rockford, Tennessee

ABSTRACT

The presentation follows the information given in Lloyd and Poe 2025 and the success of the Proposal for The Protection of Otherwise Unprotected Wood.

An update on the need will be given, along with data generated since the Fall, from laboratory and commercial treatments targeting the approach.

Evaluating the Durability of Preservative-treated Glulam Through Nondestructive Time of Flight Measurement

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ABSTRACT

Glued laminated timber (glulam) can be preservative treated to improve its durability, expand its specification and use in outdoor applications in environments with a high potential for biodeterioration. Improvements in durability and environmental adaptability of ordinary glulam are made possible by pressure impregnation with preservative. This study investigated the acoustic properties of glulam using nondestructive techniques as it pertains to preservative treatment and field durability. Glulam panels were manufactured from three wood species: southern pine (Pinus spp.), Douglas-fir (Pseudotsuga menziesii), and a mixed hardwood group. The panels (2.5 × 5.5 × 37.25 in.) were fabricated, conditioned to 8–12% moisture content prior to treatment, weighed, and evaluated using nondestructive time of flight (TOF) stress wave measurements. These specimens were randomly assigned to four groups; one untreated control group and three preservative treatment groups using the following commercial preservatives: DCOI (4,5-Dichloro-2n-octyl-4-isothazolin-3-one), copper azole type C (CA-C), and micronized copper azole (MCA). TOF data and field exposure observations were collected at 0, 6, and 12 months to assess changes in acoustic wave velocity over time. To assess the impact of wood species and preservative treatments on TOF measurements, statistical analyses were conducted using both one-way and two-way analysis of variance. There were statistically significant differences in wood species in different time intervals. Results indicated that both preservative chemistry and wood species significantly affect acoustic response and durability performance, suggesting interdependent effects on structural integrity and long-term serviceability. Findings from this research contribute to the development of effective standards for preservative-treated engineered wood products and support broader adoption of mass timber systems in exterior applications. Keywords: glued laminated timber, southern pine, Douglas-fir, mixed hardwood, DCOI, CA-C, MCA, and nondestructive techniques.

Effect of Five Treatments on Three U.S. Softwood Species to Prevent Termite Damage in Thailand

Dr. Kent Wheiler
University of Washington
Seattle, Washington

ABSTRACT

Three U.S. softwoods for structural applications – Douglas Fir, Hem Fir, and Southern Yellow Pine – were treated with CCA, copper azole, borate, borate with Imidocloprid, and Preserve Tech to retention levels according to the AWPA UC2 standard for above ground application, then exposed to termites in Thailand. Results of the first four years' annual inspections will be presented.

Development of a North American Industry Standard for Thermally Modified Wood

Sailesh Adhikari, Dallin Brooks, and Dana Spessert
National Hardwood Lumber Association
Memphis, Tennessee

ABSTRACT

Thermally modified wood (TMW) is increasingly used in exterior and interior applications due to improved dimensional stability, reduced moisture uptake, and enhanced durability. Both hardwood and softwood species are now commercially thermally modified and marketed across North America. However, the absence of a unified industry standard has resulted in variability in product performance, inconsistent specifications, and challenges for designers, specifiers, and code officials.

To address these issues, the National Hardwood Lumber Association (NHLA) convened an industry-led Task Force to develop the first standardized framework for thermally modified wood applicable to both hardwood and softwood products. This presentation summarizes progress to date, including efforts to establish common terminology, classification approaches, and performance-based criteria linked to modification severity. Key attributes under evaluation include mass loss, equilibrium moisture content, color change, mechanical performance trends, and durability-related indicators, with emphasis on alignment with existing AWPA and ASTM test methods.

Evaluation of Water Ingress into Various Retentions of Creosote Treated Sweetgum, Liquidambar styraciflua, Via Wetting Angle After Weathering

Ershad Ahmmed [a], Jason Tyler Street [b], Rowlen, A. L.[c], and Kevin W. Ragon [d]

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ABSTRACT

This study examines the impact of toluene diluted creosote retention levels on the hydrophobic performance and moisture ingress kinetics of sweetgum (Liquidambar styraciflua) during weathering. Pure creosote is a highly effective preservative, but its physical properties often limit the accuracy of laboratory testing and the depth of penetration in certain wood products. Toluene-diluted creosote enables a precision delivery system for research and specialized industrial applications. Wood durability is primarily governed by environmental variables—pH, temperature, and moisture—with hygroscopic adsorption acting as the critical catalyst for biological and physical degradation. To mitigate these effects in heavy-duty applications like railway ties, creosote treatment is employed to enhance surface hydrophobicity and chemical resistance. Quantitative analysis was performed by measuring contact angles weekly over an 8-week accelerated weathering period to evaluate surface energy changes across retention levels of 4, 8, and 16 lb/ft³. Statistical analysis confirmed a significant reduction in contact angles ($p < 0.05$) across most treatments, indicating a progressive loss of hydrophobic integrity. Notably, samples with a retention of 16 lb/ft³ maintained a contact angle above 90° after 8 weeks, demonstrating sustained resistance to liquid water penetration. In contrast, low-retention samples reached a 0° wetting angle by week 5, signifying total surface wetting. The findings conclude that maximizing creosote retention significantly optimizes post-weathering hydrophobic performance.

Pre-treatments of Building Materials Exposed to Potential Flood Zones

Chris Barber
Kop-Coat
Pittsburgh, Pennsylvania

ABSTRACT

Pre-treatments for building materials exposed to potential floods are available that incorporate AWPA recognized systems and EPA approved components. This presentation will present types of integral treatments that can be used with Engineered Products to assist with performances in flood zones.

Protecting Homes and Health from Moisture after a Flood

Dr. Jeff Lloyd
Nisus Corporation
Rockford, Tennessee

ABSTRACT

The presentation is taken from certified Pest Management Continuing Education Units. It is designed to discuss the issues associated with moisture and fungi and appropriate mitigation steps to minimize the danger to health and the damage to homes that accompanies a flood event. A Ten Point plan for consideration is given, and the dos and don’ts of EPA registered products will be discussed.

Building Resilience into Treated Wood Poles

Richard George
Polesaver
Gloucestershire, United Kingdom

ABSTRACT

The frequency, intensity, and economic impact of extreme weather events is increasing. Rising temperatures, higher precipitation, more frequent flooding, and a record number of billion-dollar natural disasters are placing unprecedented stress on utility infrastructure. At the same time, utilities are under pressure to improve grid resilience while managing vast pole networks with constrained budgets and resources.

Wood poles remain the backbone of the U.S. distribution grid, but their long-term performance is increasingly scrutinized as utilities assess alternative materials. In many cases, this reassessment is driven by concerns around decay, moisture exposure, and storm survivability rather than inherent deficiencies in wood itself.

This white paper examines how climate-driven hazards specifically affect the performance of treated wood poles, with a focus on the ground-line zone, the primary location of decay initiation and structural vulnerability. Drawing on long-term field data, laboratory testing, and disaster performance insights, it focuses on the composition of proven ground-line protection which preserve structural strength where it matters most. By addressing the dominant failure mechanism, treated wood poles can remain a resilient, cost-effective, and environmentally responsible solution even under increasing exposure to flooding and extreme weather.

Wood Railroad Tie and Timber Resiliency in Natural Disasters

Nathan E. Irby, Ph.D.
Railway Tie Association
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ABSTRACT

Our nation's railroad infrastructure is largely supported by preservative-treated forest products with over 130,000 miles of track serving freight and people transport across our great country. Severe weather can take lives, disrupt commerce, and wreak havoc on critical infrastructure, and while no material is immune, treated wood is resilient and environmentally-preferred. Through flood, fire and wind, railroads must endure, and with wood still the dominant medium to carry rail over land, water and desert, the most-likely choice through tough conditions.

Biopolymer-Based Wood Protection: γ-PGA for Fire and Fungal Resistance

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ABSTRACT

γ-Polyglutamic acid (γ-PGA) is a non-toxic, environmentally-friendly natural biopolymer produced mainly by Bacillus species during fermentation. Due to its antimicrobial properties and film-forming ability, it has been employed in the medical field for wound dressings. However, the potential of γ-PGA for wood protection from fungal microbes is yet to be reported. This study examined the antifungal effectiveness and fire performance of γ-PGA as a dual wood-protection treatment, evaluating it against five common wood-decaying fungi including three white-rot species (Trametes versicolor (T.v.), Pleurotus ostreatus (P.o.) and Irpex lacteus (I.l.)), and two brown-rot species (Gloeophyllum trabeum (G.t.) and Rhodonia placenta (R.p.)), using both in vitro and in vivo tests. The thermal stability of pine and aspen wood blocks, as well as the fire resistance of pine samples treated with various γ-PGA concentrations via vacuum impregnation, was also assessed. In the in vitro tests, γ-PGA completely distorted the growth of G.t. fungus at the studied concentrations, leading to an irregular growth pattern and ultimate inactivity of the fungus after 21 days. The treatments also slightly restricted the growth of P.o. while T.v., I.l., and R.p. showed lower sensitivity and continued to grow even at 10 mg/mL concentration. The in vivo durability tests showed a gradual improvement in fungal resistance and a decrease in mass loss with increasing concentration of γ-PGA from 0% to 10% for both pine and aspen. Thermogravimetric analysis in nitrogen atmosphere demonstrated that γ-PGA slightly improved the thermal stability of pine wood species, although mass-loss calorimetry showed that increase in γ-PGA concentration increased their peak heat release rate and had no significant effect of their total heat released. Limiting Oxygen Index test results also showed that increasing γ-PGA concentration decreased surface flammability of pine wood, with 10% γ-PGA treatment warranting a high 32% oxygen concentration to sustain flaming. Overall, the results indicate that γ-PGA has strong potential for enhancing fungal resistance in wood but will need modification to further improve fire performance.

How Are You Maintaining Your Curves?

Dr. David Jones
Timber Products Inspection
Peachtree City, Georgia

ABSTRACT

Data provided by a third-party agency and a chemical manufacturer can help determine not only how the retention levels at a facility are distributed, but also the shape of that distribution. While the bell curve is the most widely known distribution, should it be the distribution to strive for? Distributions such as Poisson, Weibull, or Log-Normal may have advantages for a facility, if they use the available data to their advantage.

Wood Happens: Managing Variability in the Real World

Kim Merritt
Southern Pine Inspection Bureau
Pensacola, Florida

ABSTRACT

Variability is the ultimate reality show in preservative-treated wood — and not all variability is cast in the same role.

In our daily treatment operations, variability shows up in different forms, each bringing its own drama to the process. Some contestants we can manage. Others? We just can't simply vote off the island.

- **Sampling variability** – where core selection, pattern consistency, and unbiased, representative sampling practices can reduce noise and strengthen decision-making.

- **Laboratory variability** – including sample preparation, grinding uniformity, instrument calibration, and XRF verification practices that directly influence analytical confidence.

- **Wood variability** – the inherent biological variation in species, density, moisture content, grain orientation, growth characteristics, and seasonal factors that cannot be eliminated — only understood and managed.

Sampling and laboratory variability provide valuable reality checks, revealing what our processes are actually doing and where adjustments are needed. Wood variability, however, doesn't take direction. It requires strategic charge staging, parameter adjustments, and seasonal optimization to outwit and outlast all the variables in play.

By distinguishing between controllable variability and inherent material variation, facilities can stop reacting to every dramatic twist and start managing the storyline, improving compliance confidence while minimizing unnecessary overtreatment.

Because in the real world, wood is always the star, but it doesn't always follow the script - but if you listen carefully, it always tells the story.

Wood Tie and Timber Quality Control Best Practices

Nathan E. Irby, Ph.D.
Railway Tie Association
Vicksburg, Mississippi

ABSTRACT

Wood is a natural, renewable resource with a plethora of residential, commercial and industrial applications. Managing the transformation of a wood product from tree to product requires an extensive quality control plan with multiple points of inspection, from green, to dry, to value-added (machined, stained, treated, etc.) to ensure quality from beginning to end. Railroad wood ties and timbers undergo over a dozen quality control checkpoints during manufacture to installation in railroad track. Understanding the material, potential defects and relevant limitations, while keeping in mind its intended purpose, is key to creating and implementing a quality control plan aimed at material quality for in-service safety and efficiency.

Latest Innovations in Wood Protection

Dr. Stephen Uphill
Arxada
Conley, Georgia

ABSTRACT

Within the ever tightening regulatory and economic landscape, it is essential to utilise all modern technologies to drive and improve wood protection science. This presentation outlines cutting edge techniques combining advanced biological insight, high-throughput experimentation, and digitally enabled manufacturing.

Quantifying the Environmental Performance of Treated Wood: Laboratory Aquatic Migration of Polycyclic Aromatic Hydrocarbons (PAHs) from Creosote Treated Wood

Kaelin Quigley
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Corvallis, Oregon

ABSTRACT

Creosote is a well-known, effective wood preservative with usage dating back to the mid-19th century. Today it is primarily used as a preservative for railroad ties in the United States and as a preservative for utility poles and marine pilings in some parts of North America. Creosote is a byproduct of the coking process and largely consists of polycyclic aromatic hydrocarbons (PAHs). PAHs are ubiquitous pollutants in the environment, and some PAHs are classified as either known or probable human carcinogens. PAHs are formed from incomplete combustion such as the burning of fossil fuels (anthropogenic) or natural ecosystem processes like wildfire as well as from fossil fuel-derived tars. The fate of PAHs is widely studied, but the methods for studying the movement of these chemicals in aquatic systems vary widely. PAHs are poorly water soluble and most methods use a higher affinity matrix (passive sampling) to accumulate PAHs over time, thereby generating a more measurable chemical signal. This study sought to investigate different methods of passive sampling to measure PAH migration from creosote treated commodities with the goal of identifying an efficient passive sampling method for creosote-based PAH capture in water. Experiments were done in stainless steel tanks under controlled conditions using creosote treated posts as the PAH source. Water was circulated around the treated wood and four different passive sampling matrices were submerged in the tanks for defined periods of time. PAHs adsorbed to the materials were quantified and compared to PAH concentrations measured directly from water at each timepoint. This study will provide methodologies for studying the migration of PAHs from creosote treated wood under a variety of conditions.

Portable Methods for the Analysis and Characterization of Treated-Wood Products

Glenn Larkin
LarChem LLC
Houghton, Michigan

ABSTRACT

The wood protection industry can benefit from modernization, especially when it comes to the rapid, non-destructive analysis and characterization of wood that has been modified by biocides, chemicals, densification, and thermal treatments. There are many options available today that may allow immediate wood penetration and retention analysis at the point of manufacture, with little or no sample preparation beyond collection of increment cores. If feasible the cost savings could be considerable. These methods would also allow inspections of wood in-service with immediate results that could execrate remedial actions, when warranted. This presentation is intended to review some of the available options and present early results using handheld RAMAN and Infrared (IR) spectroscopy, handheld X-Ray Fluorescence (XRF) Spectroscopy, handheld Nuclear Magnetic Resonance (NMR) Spectroscopy, and Handheld Laser Induced Breakdown (LIBS) Spectroscopy. If available in time for the meeting, data will be presented for direct analysis of boron in DOT-Treated wood and copper in copper treated wood using one or more of these portable methods.

Developing Mass Timber Inspection Methodology for Early Decay Detection Using Resistance Drilling Data and Artificial Intelligence

Opeyemi Odule
Oregon State University
Corvallis, Oregon

ABSTRACT

Mass timber (MT), like solid wood, is naturally susceptible to decay when wetted and can delaminate with successive wetting and drying. These processes reduce the structural integrity of engineered wood products and may contribute to service-life failures. As the use of MT expands, there is a growing demand for inspection tools that can reliably evaluate internal conditions while minimizing damage. This research investigates the use of resistance drilling (RD) for early detection of decay in mass timber. This semi-destructive technique records the torque required for a rotating needle to penetrate the wood matrix to detect internal changes. Because RD generates high-resolution profiles of internal integrity, it shows strong potential for early detection of defects in MT structures. This study systematically collects and analyses RD data across lumber-based (cross-laminated timber) and veneer-based (mass ply panels) MT products. Fungal decay at varied severities was intentionally introduced to MPP and CLT samples through controlled fungal exposure. A subset of samples was also intentionally delaminated through cyclic wetting and drying. Two commercially available RD devices were used to evaluate sensitivity and consistency, and to gather measurements. Visual inspections of dissected samples provide the reference data needed to differentiate natural defects from decay and delamination. Data collected on test samples will be used to train machine learning models to improve the detection, classification, and quantification of internal defects and decay. This research aims to establish RD augmented by advanced analytics as a practical and scalable tool for structural health monitoring of MT.

Keywords: Resistance drilling, Mass Timber, Decay, Early detection.

Beyond the Retort: What's Coming to Plant Operations and Why It Matters

Rick Embry
Embry Automation & Controls
Evansville, Indiana

ABSTRACT

The next wave of change in treating plant operations isn't just happening inside the cylinder. New tools are giving plant operators better information earlier in the process, where it matters most. Some of those decisions today depend entirely on people who won't always be there. This presentation covers what's available now, what's coming, and how it connects, from the measurement and classification of incoming material to the data layer that ties it all together.

Modified Above Ground Termite Test Method

Paul Merrick
President, AWPA
Gig Harbor, Washington

ABSTRACT

A modified above ground termite test method developed for use with *Reticulitermes* in central Florida will be discussed. The central Florida site has an overstory of pine & oak with a sandy, well-drained soil and a robust termite population. The method adopts features from the widely used AWPA methods E21 and E26. A vented box is used to protect the samples from the weather. Samples are paired with an untreated control using a flexible plastic cover which permits easy inspection. Observations after 2 years of testing will be presented as well as ideas for method improvement going forward. Further discussion within technical committee P6 is offered.