

Processing Technologies for the Forest & Biobased Products Industries

PTF BPI 2021



Program & Agenda

November 1-3, 2021

St. Simons Island, GA

Thank You to Our Sponsors!

Gold Level



Silver Level



ENGINEERED
WOODS



Bronze Level



EVERGREEN ENGINEERING, INC.
ENGINEERING AND CONSTRUCTION SERVICES



Georgia Research Institute
& Oak Creek Investments

FPS Midsouth
& Southeast
Sections

The 6th International Conference on Processing Technologies for the Forest and Biobased Products Industries is dedicated to the exchange of information and ideas about research on process technologies, quality control, and process improvement.

PTF BPI 2021 brings academia, industry, and government entities together to network on innovation and applied technologies.

The unique conference includes academic scholars sharing the latest research in forest and bio-based materials, plus leading manufacturers will highlight advancements in chemical technologies, supplier audits and product innovation. This conference provides a forum and sessions for technical managers, plant managers, production managers, product development engineers, process engineers, scientists, academicians, and students in the Forest and Biobased Products Industries.

Thank you for joining us!



Table of Contents

About PTF BPI.....	3
Meeting Information.....	5
King and Prince Beach & Golf Resort Map.....	6
Agenda.....	8
Keynote Speaker Biographies.....	20
Plenary Speaker Biographies.....	22

Contact Information

Forest Products Society

Chris Butts	Jennifer Whitlow	Mary Kendall Dixon
Executive Vice President	Program Coordinator	Communications Coordinator
cbutts@forestprod.org	jwhitlow@forestprod.org	mkdixon@asginfo.net

PO Box 932 | LaGrange, GA 30241 | USA
www.forestprod.org | 706-443-1337

PTF BPI Committee

Conference Chairs



Dr. Timothy M. Young
The University of Tennessee



Dr. Alexander Petutschnigg
Salzburg University of Applied Sciences

Organizing Chairs

Dr. Terry Liles
Huber Engineered Woods

Christopher Butts
Forest Products Society

Scientific Chairs

Dr. Brian Via
Auburn University

Dr. Sergej Medved
University of Ljubljana

Scientific Committee

Dr. Alan Antonović
University of Zagreb

Dr. Marius Barbu
University of Transylvania

Dr. Bob Breyer
Georgia-Pacific Chemicals

Dr. Danijela Domljan
University of Zagreb

Dr. Scott Leavengood
Oregon State University

Dr. David Harper
The University of Tennessee

Dr. Terry Liles
Huber Engineered Woods

Dr. Rubin Shmulsky
Mississippi State University

Dr. Martin Riegler
Wood K Plus

Dr. Adam Taylor
The University of Tennessee

Dr. Richard P. Vlosky
Louisiana State University

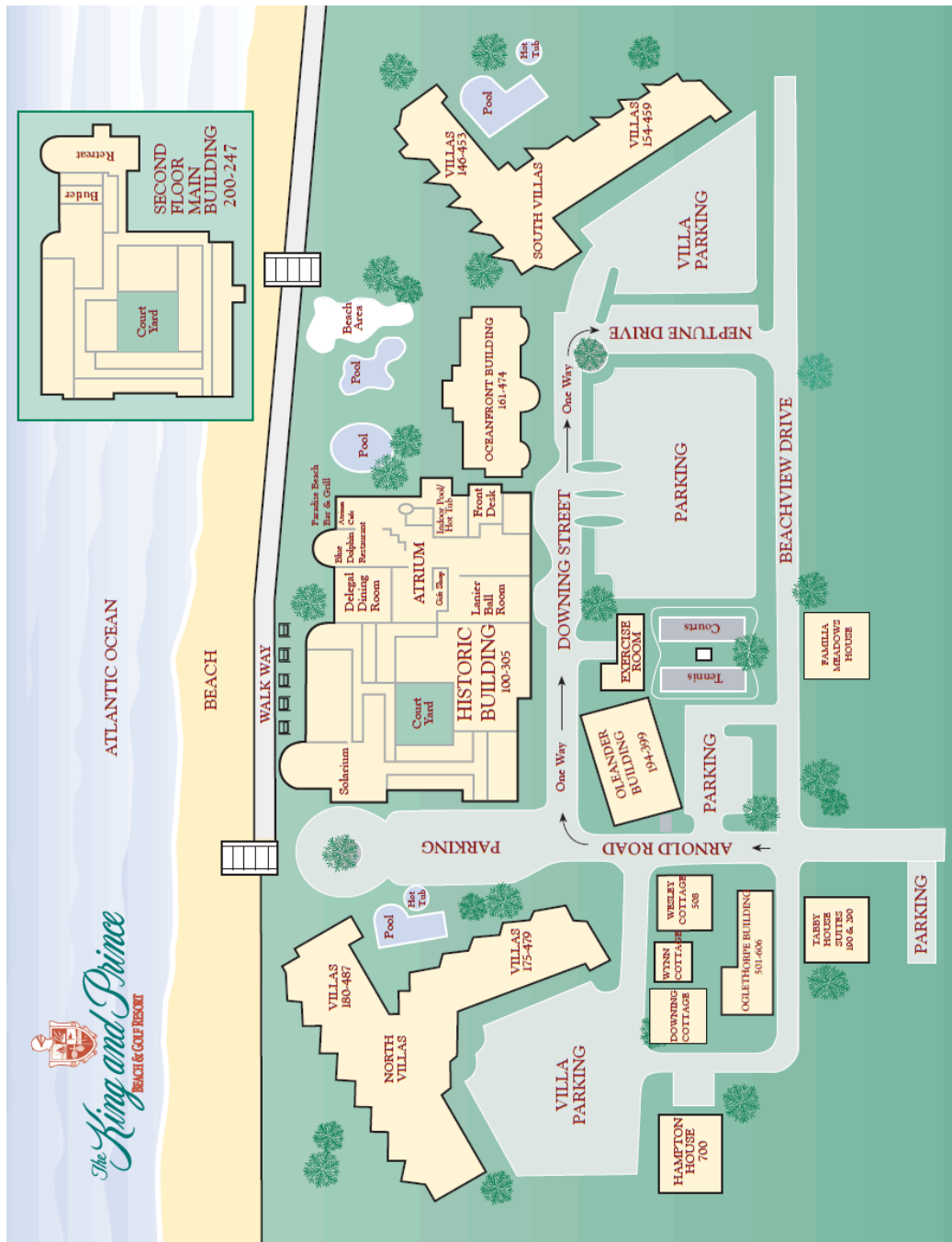
Dr. Siqun Wang
The University of Tennessee

Venue Information

The King and Prince Beach & Golf Resort

201 Arnold Road, St. Simons Island, GA 31522

912-638-3631 | www.kingandprince.com



***MÜNZING FENTAK® ADDITIVE SOLUTIONS
FOR THE WOOD INDUSTRY***

A wide range of additives featuring...



**Decorative
and Industrial
Paper Impregnation**



**Release Agents
for Improved
Processing**



**Catalysts for
MDF and
Particle Board
Resins**



**Aqueous
Organic Dye
Solutions and
Pigment
Dispersions**

***MÜNZING's worldwide production network of manufacturing plants in
Germany, USA, Australia and Malaysia, facilitate supply and prompt delivery
wherever our customers do business.***

Agenda

Monday, November 1

	Golf Outing at the King and Prince Golf Course
12:30 PM – 5:00 PM	Registration
1:00 PM – 5:00 PM	Introduction to Wood Materials and Adhesives* Adam Taylor, PhD The University of Tennessee Bob Breyer, PhD Georgia-Pacific Chemicals
1:00 PM – 5:00 PM	Design of Experiments for Rapid Innovation* Timothy Young, PhD The University of Tennessee
*Pre-Registration is Required	

Tuesday, November 2

7:30 AM	Registration, Exhibit Hall, and Breakfast Open
8:15 AM	Opening Remarks, Recognition of Sponsors, and Welcome

Keynote Presentations

8:45 AM	Roy O. Martin III Chairman, CEO, CFO, RoyOMartin
9:05 AM	Kurt Koch VP of Products Engineering and Quality, Huber Engineered Woods
9:25 AM	Wendy Owens Founder and CEO, Hexas Biomass, LLC
9:45 AM	Harold Arnold President, Fram Renewable Fuels, LLC

10:05 AM Break with Exhibitors

Plenary Presentations

10:30 AM	Charles Waddell President, Global Plasma Solutions <i>How to Make Your HVAC Systems Pandemic Ready with Needlepoint Bipolar Ionization</i>
----------	--

10:50 AM

Matt Holt

Director of Quality, Roseburg Forest Products
How Data Science is Changing the Forest Products Industry

11:10 AM

Charles Gale

Strategic Business Analyst, SmartLam North America
A Manufactures Review of the Supply Chain Challenges and Opportunities, and a Summarized Southern Sawmill's Survey Results of the Perceptions, Awareness and Participation of the CLT Market

11:30 AM

Bob Breyer

Senior Technology Manager, Georgia-Pacific Chemicals
The Future of the Forest Products Industry and How Can You Help Us Get There

11:50 AM

Open Questions and Discussion

12:00 PM

Lunch with St. Simons Historian

Concurrent Sessions

1:30 PM

Concurrent Session I: Wood Adhesives and Material Science I

Moderator: Rubin Shmulsky | Mississippi State University

David Harper | The University of Tennessee
Enhancing Nature's Surfaces: Using Informed Computational Models to Improve the Function and Performance of Biobased Materials

Brian Via | Auburn University
Soy Flour Substituted pMDI for Wood Composites

Abiodun Alawode | Auburn University
Performance of Different Fillers in Methylene Diphenyl Diisocyanate (MDI) Resin

Concurrent Session II: Structural Wood Materials

Moderator: Adam Taylor | The University of Tennessee

Steve Winistorfer | TECO
General Process of Testing and Certifying CLT



Revolutionizing Adhesive Solutions with Plant-based Technology

Green Boost™

- Protein based isocyanate emulsions
- Novel, Value Added NAF Adhesives

Green Ultimate™

- Formaldehyde & Isocyanate Free
- Plant-based Adhesive Solutions

www.evertree-technologies.com

Leaders in Moisture Measurement & Control



MoistTech utilizes Near-Infrared technology to provide the most accurate results possible.

***No Drifting, No Re-Calibrations,
No Constant Maintenance!***

Moisture content has a drastic effect on quality and can lead to problems in the pelletizing process. Measuring the moisture before and after the dryer & prior to pelletizing will yield significant improvements to the finished product and prolong the life of other equipment.

Proper Moisture Control Can:

Minimize Waste

Reduce Costs

Increase Product Quality

Maximize Plant Efficiency

info@moisttech.com

www.moisttech.com 941.727.1800

Mustafa N. Kaya | Mississippi State University
*Hygrothermal Behavior of Cross-Laminated Timber Panels
Partially Submerged in Water*

Guangmei Cao Anderson | Mississippi State University
*Fitting Statistical Distribution Models to MOE and MOR in
Mill-Run Red Pine and Spruce Lumber Populations*

Frank C. Owens | Mississippi State University
*Some Problems with Lower-tail Fitting in Modeling Strength
Distributions of Lumber*

Concurrent Session III: Data Science and AI

Moderator: Timothy Young | The University of Tennessee

Ed Sobek | Global Plasma Solutions
*Reducing SARS-CoV-2 Virus Air and Surface Contamination
Using Ionization Technologies and Data Science*

Terry Liles | Huber Engineered Woods
Application of EVOP in Wood Products Industry

Anton Astner | The University of Tennessee
*Component Yield Maximization of Organosolv Fractionated
Softwood Combines with Rapid Prediction of Lignin Thermal
Properties*

Chloe Ericksen | The University of Tennessee
Interfacing 'R' Software with JMP for Machine Learning and AI

3:00 PM

Break with Exhibitors

3:30 PM

Concurrent Session IV: Wood Adhesives and Material Science II

Moderator: Terry Liles | Huber Engineered Woods

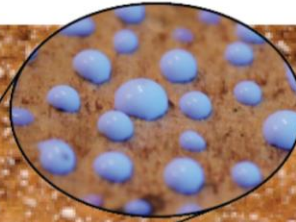
Siqun Wang | The University of Tennessee
*Optimizing Wood Composite Processing and Properties Via
Press Control Strategies*

Sudip Chowdury | The Willamette Valley Company
*Commodity to Value-Added Proposition: Engineered Waxes
for Enhanced Panel Performance and Improved Safety*



Willamette Valley Company

We're Taking
Wax to
the Next
Level!



Innovative Wax Product Lines

- Emulsion
- Slack & Slack Bends
- Bio-Based

Industry Leading R&D and
Technical Service/Support Teams

Consistent Quality - Every Time

Contact us today:

800.333.9826 | www.wilvaco.com | info@wilvaco.com

PARTNERING THROUGH SERVICE, INNOVATION AND INTEGRITY



YOUR TRUSTED CERTIFICATION PARTNER

PFS TECO delivers *Marks You Can Build On* across the construction industry. Our dedicated employee-owners take great pride in sharing their experience and expertise to help clients meet or exceed industry compliance requirements. Working together, we support client efforts to enhance the quality of our built environment and deliver peace of mind for them, as well as the customers they serve.

- Backed by 85 years of experience and industry leadership in inspection, certification, and testing
- Recognized and respected in construction markets, internationally
- Employee-owned to maximize team investment and productivity
- Approved and accredited through a variety of major regulatory bodies
- Flexible in process to meet individual client needs, yet meticulous in execution and implementation
- Committed to working ethically and sustainably in everything we do
- A leading and trusted partner in bringing the built environment to life


MANUFACTURED STRUCTURES


BUILDING PRODUCTS


HEARTH PRODUCTS


PRODUCT TESTING

CORPORATE HEADQUARTERS

1507 Matt Pass
Cottage Grove, WI 53527
608.839.1013

100% EMPLOYEE-OWNED

WWW.PFSTECO.COM


MARKS YOU CAN BUILD ON

Joseph Marcinko | Polymer Synergies
Solid State Deuterium NMR Used to Study the Mobility of Water in Wood and Its Influence on Moisture Cure Adhesives

Mark Gagnon | Penn State University
Pressurized Radio Frequency Heating of Wood to Meet ISPM-15 Requirements

Concurrent Session V: Innovation in Sustainable Biomaterials and Processes

Moderator: Ronalds Gonzalez | North Carolina State University

Kim Tutin | Captis Aire
Industrial Air Pollution Control Technology for Wood Processing Enables Operators to Sell Valuable Bioproducts, Sell Carbon Offsets, and Significantly Reduce Operating Costs as it Cleans the Air

Bob Breyer | Georgia-Pacific Chemicals
Why We Should Transform Plywood Bond Performance Testing

Rubin Shmulsky | Mississippi State University
Development of Access Mat Software for Efficient Specification, Safe Deployment, and Environmental Protection

Scott Leavengood | Oregon State University
Teaching Lean Manufacturing Principles via Remote Instruction

Concurrent Session VI: Innovation in Value Added Products

Moderator: Brian Via | Auburn University

Laya Khademibami | Mississippi State University
Abrasion Resistance and Hardness Assessment of Five U.S. Hardwoods

Levente Denes | West Virginia University
Chair Development Based on Body Pressure Distribution – A Research Effort

Danijela Domjlan | University of Zagreb, Croatia
School Furniture Design – A Comparison in Primary Schools in the Czech Republic, Croatia and USA

Richard Baldwin | Oak Creek Investments
*Keeping Structural and Decorative Wood Products Relevant:
 Development of Alternative Products, Fibers, and Processes*

5:30 PM

Cocktails by the Ocean

6:30 PM

Dinner Banquet

Wednesday, November 3

7:30 AM

Registration, Exhibit Hall, and Breakfast Open

Concurrent Sessions

8:30 AM

Industry News

Moderator: Fred Kurpiel | Georgia Research Institute

Roseburg Forest Products
The New Laminated Veneer Lumber (LVL) in Chester, SC

Egger Wood Products
The New MDF Mill at Lexington, NC

Huber Engineered Woods, LLC
The New OSB Mill at Cohasset, MN

Roy O. Martin | RoyOMartin
The New Mill at Corrigan, TX

8:30 AM

Concurrent Session VII: Industry Trends

Moderator: Rubin Shmulsky | Mississippi State University

Ronalds Gonzalez | North Carolina State University
*How Global Megatrends will Shape the Forest Product
 Industry in the Next 10 Years*

Don Hodges | The University of Tennessee
*A New MS-Forestry Curriculum at The University of
 Tennessee with a Unique Focus in Data Science*

Dick Baldwin | Oak Creek Investments
*Wood Utilization and Carbon Accounting within a Forest
 Based Circular Bioeconomy*

Richard Poindexter | Search North America
Wood Products Employment Trends & How to Keep Your Employees Engaged

10:00 AM

Break with Exhibitors

10:30 AM

Concurrent 'Virtual EU' Session I

Moderator: Tim Young | University of Tennessee

Klaus Richter | Technical University of Munich, Germany
Forest Based Bioeconomy in Germany: Current Status and Recommended Action

Alexander Petutschnigg | Salzburg University of Applied Sciences, Kuchl, Austria
Test Device for Multispectral Analysis of Roundwood End Faces

Martin Reigler | BOKU University, Vienna Austria
Assistance Systems for Wood Construction

Stefan Kain | Salzburg University of Applied Sciences
Smart Wood Materials from Additive Manufacturing

Fernão Magalhães | LEPABE, University of Porto, Portugal
New Cork-Acrylic Composite Foam Coating

10:30 AM

Concurrent 'Virtual EU' Session II

Moderator: Terry Liles | Huber Engineered Woods

Rupert Wimmer | BOKU University, Austria
Smart Materials, Magnetic Wood and Air Cleaning

Nathan Koelli | University of Applied Sciences and Arts TH OWL, Germany
Densification and Press-Drying of Wet Oil Palm Lumber

Csilla Csiha | Sopron University, Sopron, Hungary
The Relevance of Wood Moisture Content When Measuring Contact Angle

Mehieddine Derbas | Wood K Plus, Vienna, Austria
Tool Wear Identification by Monitoring Acoustic Emissions During Wood Milling

10:30 AM

Concurrent 'Virtual EU' Session III

Moderator: Bob Breyer | Georgia-Pacific Chemicals

Eugenia Tudor | Salzburg University of Applied Sciences,
Kuchl, Austria
Biomimicry of Bark-based Composites in a Circular Economy

Sergej Medved | University of Ljubljana, Slovenia
Wood-based Panels and Water: Love and Hate Relationship

Sergej Medved | University of Ljubljana, Slovenia
Alternative Resin System with Liquefied Wood for Particleboard

Alan Antonović | University of Zagreb, Croatia
*Liquefied Wood as a Catalyst for Melanine-Urea
Formaldehyde Resin Polycondensation in Particleboard
Production*

Jorge Santos | LEPABE - University of Porto, Porto,
Portugal
*Exterior Grade Particleboards 100% Biobased, Made From by
Products of the Food-Packaging Industry*

12:00 PM

Conference Concludes & Boxed Lunch Pickup

Enabling Engineered Wood Products

Our proprietary chemistry and technology enables one of the most sustainable building products on earth—engineered wood.

Hexion products enable...

- Increased heat resistance
- Increased water resistance
- Improved manufacturing productivity
- Utilization of the entire tree
- Increased CO₂ sequestering

Hexion has enabled the wood products industry for over 80 years.

Visit us at [Hexion.com](https://www.hexion.com)

we help use
95%
of each tree 

engineered wood
and panel solutions 

 **HEXION**
Responsible Chemistry

NO RESIN COMES CLOSE.

NOT EVEN RESI-BOOST® ADHESIVE.



THIS IS SO MUCH MORE THAN A SECOND GENERATION.

RESI-BOOST® Gen2 adhesive outperforms all the competition including our original RESI-BOOST® adhesive. Trials show such substantial advantages in lower application rates and energy usage while maintaining performance, that it can potentially generate significant savings per mill.

Like original patented RESI-BOOST adhesive, RESI-BOOST Gen2 reduces the threat of over-penetration of the adhesive, leaving more resin solids on the surface, enabling lower glue application rates, lower glue usage and lower glue cost. Wood failures increase providing the potential for downfall improvements. RESI-BOOST Gen2 improves significantly on original RESI-BOOST rates for even greater savings.

CYCLE TIME

RESIN USAGE



17% decrease in cycle time without increasing press temperatures

Resin usage reduction of 12% over conventional resins while maintaining bond strength

We can't promise these results for every mill, but our customers have achieved these outcomes with innovative RESI-BOOST Gen2 product. Every mill is different but trials with multiple mills have shown that the addition of RESI-BOOST Gen2 to their adhesive can significantly improve their operation and reduce costs.

Pre-Conference Workshops

*Additional Pre-registration Required

Introduction to Wood Materials and Adhesives

Monday, November 1 | 1:00 – 5:00 PM

Course Overview

This course will provide young industry professionals with a solid foundation and basic knowledge and understanding of the forest products sector to help build their careers. This course is ideal for suppliers, consultants, claims agents and others who do not have a formal education in the forest products sector.

Course Instructors

Adam Taylor, PhD | The University of Tennessee Center for Renewable Carbon
Robert Breyer, PhD | Georgia-Pacific Chemicals

Design of Experiments for Rapid Innovation

Monday, November 1 | 1:00 – 5:00 PM

Course Overview

This four-hour course provides an overview of the principles of designed experimentation in R&D and manufacturing settings. Factorial designs, ANOVA, and Robust product design are illustrated. No prior knowledge of statistics is required to attend the course. JMP 15 and Minitab 19 software examples are used to support the concepts covered. Easy to understand training notes are provided to participants.

The course is available for 0.4 CEU credits issued by The University of Tennessee.

Course Instructors

Timothy Young, PhD | The University of Tennessee Center for Renewable Carbon



Eliminate Build-Up, Reduce Downtime, & Lower Overall Costs **with TechKote®.**

Chemically-Formulated Release Agents For All Composite & Structural Panel Applications

With TechKote® release agents, additives, and platen conditioners from PSG, you can overcome processing challenges and achieve your efficiency goals without cost penalties. Leveraging its unique chemistry, TechKote® products will help you simultaneously improve productivity, reduce product and energy waste, and provide a cleaner, safer work environment while reducing your overall manufacturing cost.

Visit us at sascochemical.com/wood or call **(229) 435-8394** to get more information, samples, and pricing.



(229) 435-8394 | info@sascochemical.com

TechKote® and SASCO® are trademarks of Polymer Solutions Group.

Keynote Speaker Information



Harold Arnold

President, Fram Renewable Fuels, LLC
Hazelhurst, Georgia, USA

Harold has been involved in the forest industry his entire working life. He spent more than 23 years in the Forest Resources Division of Hercules Inc. and held the position of Western Region Superintendent prior to his leaving Hercules in 1995. Since then, he has exported chips and other forest products through port facilities at Savannah, handled a variety of consulting projects for forest products industries in the South, and completed several

international forestry related assignments as a consultant for the United States Agency for International Development.

Harold joined Fram Renewable Fuels, LLC in October 2005. His industry knowledge led to the development of Fram's first wood pellet facility in Baxley, Georgia. Appling County Pellets was constructed and began producing in late 2007. Since then, he has played a pivotal role in the development of the business and customer relationships that are so vitally necessary in this business. As the industry continues to grow Harold enhances the profile of Fram to further develop the wood pellet industry in the Southeast United States.



Kurt Koch

Vice President of Product Engineering and Quality, Huber Engineered Woods
Charlotte, North Carolina, USA

Kurt is the Vice President of Product Engineering & Quality for Huber Engineered Wood and works out of the Charlotte, NC corporate office. Kurt manages the Quality Assurance teams, Building Code recognition for HEW specialty products, Architect, Engineer & Builder continuing education activity and technical support services related to in-field product use.

Kurt holds a Degree in Civil Engineering from Clemson University as well as an MBA from the University of Washington in Seattle. Kurt is a professional engineer with registration in 20 States. After working as a consulting structural engineer and for Trus Joist/Weyerhaeuser as a General Manager for a new business unit, Kurt joined Huber Engineered Woods LLC in 2003.



Roy O. Martin III

Chairman, CEO, CFO, RoyOMartin
Alexandria, Louisiana, USA

Roy is the chairman, chief executive officer, and chief financial officer for RoyOMartin. A third-generation leader, Roy spent much of his youth and young-adult life working in various locations of the family business. After earning his bachelor's degree in mechanical engineering from Louisiana State University, Roy joined the company full time in 1985 and later completed his Master of Business Administration at LSU. The grandson of Roy O. Martin, Sr., he grew up in Alexandria, Louisiana, as the only son of

Roy O. Martin, Jr. (Roy O. Martin Lumber Company president from 1962-1978).

RoyOMartin is one of several wholly owned subsidiaries of Martin Sustainable Resources L.L.C., a privately held equity investment company. The name RoyOMartin honors the business pioneer and Martin family patriarch, Roy O. Martin, Sr. (Roy Sr.), who began the family's first business with a small sawmill in Alexandria, Louisiana in 1923 and soon thereafter bought a few acres of timberland. Martin Sustainable Resources L.L.C. is owned by several generations of Roy Sr.'s descendants. Its holdings are broad but focus primarily on land, timber, and mineral resources with special emphasis on sustainable forests and forest-products manufacturing businesses.



Wendy Owens

Founder and CEO, Hexas Biomass, LLC
Olympia, Washington, USA

Wendy Owens is the founder and chief executive officer of Hexas Biomass LLC (Hexas), a role that allows her to use her experience as a serial entrepreneur in the communications technology, materials engineering, biotechnology, and healthcare industries. Prior to founding Hexas, Ms. Owens was in biotech as a clinical scientist and advisor to major bio-pharmaceutical companies. She led research studies funded by the CDC, Biogen, Shire, Genentech, and other biotech and bio-pharmaceutical companies.

Ms. Owens also co-founded and ran an advance composite materials engineering company taking the company from technology development to patenting and commercialization. Ms. Owens served as advisor to the US Secretary of Commerce and US Trade Representative on an International Trade Advisor Committee (ITAC 8) for 14 years.

Plenary Speaker Information



Bob Breyer

Senior Technology Manager, Georgia-Pacific Chemicals
Decatur, Georgia, USA

Dr. Breyer (Bob) is the R&D Manager for Thermosetting Resins for Georgia-Pacific Chemicals which he joined in 1991. Throughout his tenure, his focus has primarily been wood adhesives. He holds PhD from University of New Orleans in Organic Chemistry. He is the current Vice President of the Forest Products Society.



Charles Gale

Strategic Business Analyst, SmartLam North America
Portland, Oregon, USA

Charles is currently the Strategic Business Analyst for SmartLam North America working on business process solutions for manufacturing locations in Columbia Falls MT, Dothan AL, and Galloway BC to benefit the supply chain and end customers in the mass timber industry. Previously he was principal consultant at Doug Fir Consulting LLC working directly with SmartLam and co-authored several North American mass timber supply chain studies most notably the www.masstimberreport.com. Prior to that he

was a Manufacturing business Analyst and Sales and Ops Planner at Stimson Lumber Company. In the past, Charles has published several general technical reports (GTR) on the macroeconomic wood product industry in the Northwest as well as provided foundational research. He helped secure \$12.3 million in stimulus funds for a Wood Product Revolving Loan Fund during 2008 to retain/revitalize Montana's distressed wood product industry during the great recession. He is part of the Sustainable Forest Initiative's (SFI's) task force, as well as an active member of Society of American Foresters and Forest Products Society. Charles holds a BS in Resource Conservation with an emphasis on Forest Resource Economics, and a Minor in Climate Change Studies from the University of Montana W.A. Franke College of Forestry and Conservation.



Matt Holt

Director of Quality, Roseburg Forest Products
Raleigh, North Carolina, USA

Matt Holt is the Director of Continuous Improvement and Optimization for Roseburg Forest Products Company and works out of the Raleigh, NC region. Matt manages the Quality Assurance team, Continuous Improvement, New Product Development, and two Manufacturing Facilities.

Matt completed his undergraduate and graduate work at The University of Tennessee. After working in multiple locations across the Carolinas manufacturing Particleboard, MDF, TFL, and treated paper for Arauco, Matt joined Roseburg in 2020.



Charles Waddell

President, Global Plasma Solutions
Charlotte, North Carolina, USA

Charles "Charlie" Waddell is the Chief Technology Officer and Founder of Global Plasma Solutions, Inc., a manufacturer of Needlepoint Bipolar Ionization (NPBI) products for the indoor air purification market. His experience includes designing HVAC systems for the residential, commercial and industrial markets as well as for the automotive, hand dryer and aviation industry. Charlie holds a BSEE from Old Dominion University, Norfolk, VA.

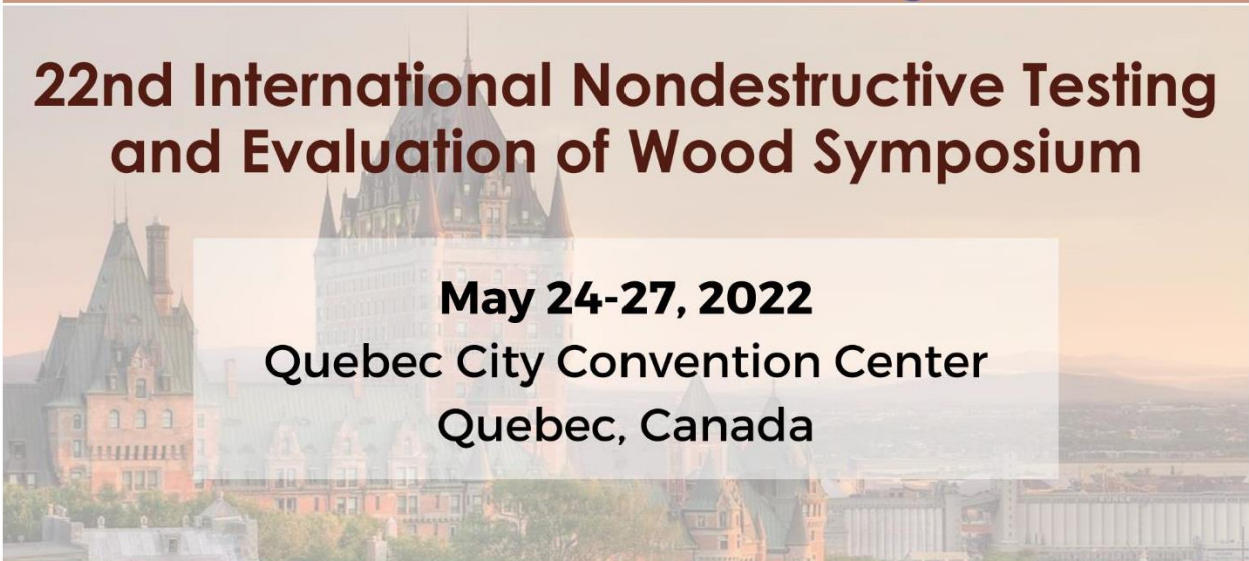
Charlie is an active member of ASHRAE and currently a participant of ASHRAE SSPC 62.1, TC 2.3 (Gas Phase Filtration), TRG4-IAQP, and formerly the secretary of TC 8.12 (Desiccant Dehumidification & Components). Charlie has over 18 years of HVAC design and application experience. Charlie's portfolio includes 30 patents granted, 28 patents pending, and an article published in Engineered Systems Magazine on desiccant dehumidification. Charlie is an instrument rated private pilot and enjoys flying for business and pleasure.



International Conference on Wood Adhesives

May 11-13, 2022
Hilton Portland Downtown
Portland, OR

www.woodadhesives.org



22nd International Nondestructive Testing and Evaluation of Wood Symposium

May 24-27, 2022
Quebec City Convention Center
Quebec, Canada

www.ndtesymposium.org



75th Annual International Conference

June 13-16, 2022
Madison Marriott West
Madison, WI

www.fpsconference.org