



*The Department of*

# SUSTAINABLE BIOMATERIALS

HONORED  
FRIENDS  
VISIT WEI

TRIP  
TO 2015  
PACKAGING  
JAMBOREE

STUDENTS RECEIVE  
CERTIFICATIONS AND  
SCHOLARSHIPS  
MORE



The VT Packaging team took first place at the Corrugate Regatta.

## TRIP TO 2015 PACKAGING JAMBOREE

BY MEGAN **STALLINGS**, *JUNIOR, PACKAGING*

Thirteen packaging students traveled to the [30th annual Packaging Jamboree](#), held this year at Clemson University in South Carolina. This is one of the major packaging institutional events across the states. The students attended industry networking events, keynote speakers, and technical sessions under the guidance of two packaging faculty, Dr. Young Kim and Dr. Bob Bush. Around 100 students attended in total, some of the other universities in participation were Michigan State University, Wisconsin Stout, and RIT.

There were ample opportunities for networking with the companies in attendance. Many of the companies lead Breakout sessions where they talked about their industries and new technology. Additionally, all of the organizations had a booth that was available throughout the event. The companies included Pratt Industries, International Paper, Sonoco, 3M, and others. Our students were also able to speak with the area representatives for our professional organizations, Institute of Packaging Professionals (IoPP) and Technical Association for the Pulp and Paper Industry (TAPPI).

COVER: Landon Holbert, freshman in the packaging program, raises the VT corrugate boat's figurehead in victory.

Students from all of the universities were able to tour the Clemson Packaging facilities. It was a great opportunity to see what a larger and



more established program can provide for its students. It was also nice for the students to see lots of familiar equipment that we have in our labs here at Virginia Tech.

The last event of the weekend was a Corrugated Regatta. Students were given unlimited amounts of corrugated board, one roll of duct tape, and about an hour to construct a boat. The boat had to hold one passenger. That passenger would paddle the boat 25 yards in the Clemson competitive indoor swimming pool. The teams were primarily divided by schools; however, the Virginia Tech team had one Clemson member.

After an hour of construction the boats hit the water. Of the first three boats that hit the water only one successfully made it to the other side. Virginia Tech was in the second heat of racers. Once they hit the water it was obvious they were paddling to first place.

It was great to reconnect with old friends from other universities and meet new ones. The opportunities that events like this provide students are priceless. Networking with current industries representative and future co-workers in the packaging industry will build lasting professional connections. Many thanks to the Sustainable Biomaterials department for helping to sponsor our travels and to Clemson Packaging for hosting such a great event!



### Watch Now

Check out the VT Packaging program attend the 2015 Packaging Jamboree and compete in the Corrugate Regatta on [YouTube](#). Learn about our packaging program as well on our [VT Packaging channel](#).

# JUNG KI HONG EARNS PhD

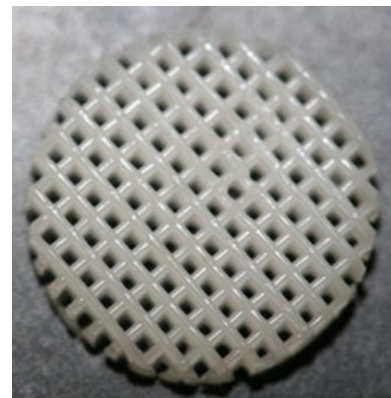
BY MAREN ROMAN

Mr., excuse me, Dr. Hong, has been working with Maren Roman for the past eight years. He joined the department in August 2006, after being awarded a Fellowship from Dynea through the Wood-Based Composites Center, and earned his M.S. in Forest Products in 2009. In his master's research, he investigated the potential use of cellulose nanocrystals as an additive in thermosetting wood adhesives. His results demonstrated that cellulose nanocrystals increase the curing speed of phenol-formaldehyde adhesive resins, which could enable significant energy savings in the curing of thermosetting wood composites. Having developed an interest for polymer composites, he then decided to switch majors and pursue a Ph.D. in Macromolecular Science and Engineering. For his good performance as a graduate student, he was selected for a prestigious four-year Doctoral Scholarship of the Institute for Critical Technology and Applied Science.

In his Ph.D. research, Jung Ki evaluated surface-oxidized cellulose nanocrystals as multifunctional reinforcement in poly( $\epsilon$ -caprolactone)-based scaffolds for bone regeneration. His project spanned multiple disciplines and required knowledge and expertise in calcium-phosphate mineral formation chemistry, bone biology, and materials science, specifically nanoparticle and polymer nanocomposite characterization. He demonstrated that surface-



oxidized cellulose nanocrystals significantly increase the stiffness of poly( $\epsilon$ -caprolactone) while promoting the formation of a calcium-phosphate mineral on their surface. He furthermore showed that the nanocomposite can be processed into customized porous scaffolds



3D printed bone scaffold made from surface oxidized cellulose nanocrystal/poly( $\epsilon$ -caprolactone) nanocomposite

by 3D printing and that it supports bone cell growth and differentiation.

For his Ph.D. research achievements, Jung Ki was selected as one of six finalists to compete for the PMSE Division's Eastman Chemical Student Award in Applied Polymer Science at last year's ACS Fall Meeting in San Francisco, CA. Jung Ki successfully defended his dissertation

on February 6. During his years at Virginia Tech, Jung Ki has developed a high degree of professionalism and become an excellent oral presenter, earning first place for his oral presentations at our annual Eastman Chemical Company-sponsored graduate symposium twice. Jung Ki will be sorely missed by the cellulose community in Kelly Hall.



## STUDENTS RECEIVE INDUSTRY ACCEPTED CERTIFICATION AND A SPECIAL SCHOLARSHIP

BY LASZLO HORVATH

The Center for Packaging and Unit Load Design at Virginia Tech started its competitive Sustainable Packaging Designer Trainee (SPDT) program in 2012. Since then every year, four undergraduate students from Virginia Tech's Packaging Systems and Design program are accepted to participate in this year-long program. During the year, the students learn how to design and conduct industrial packaging tests, how to communicate more effectively in writing and through professional oral presentation, how to manage projects more effectively and how to optimize processes using the principles of Lean Management. In 2014, the students also had the opportunity to participate in an industry accepted certification program administered by the International Safe Transit Association (ISTA). All of the 2014 SPDTs, Joe Dietrich (junior), Steven Brown (senior), Erica Roesel (junior), and Samantha



Phanthanousy (senior), successfully passed the certification and became ISTA Certified Laboratory Technicians. In addition, to the certification, the board of ISTA awarded a \$500 scholarship to each of the students. In April 2015, the students will also have a chance to represent Virginia Tech's packaging program at the 2015 ISTA Transpack meeting.





Jan and Claire, front left, and Gail and Kit accept gifts from the students — this year's WEI customizable bottle opener

## HONORED FRIENDS VISIT STUDENTS IN THE WOOD ENTERPRISE INSTITUTE BY EARL KLINE

In March and April the Wood Enterprise Institute was honored by visits from Jan and Kit Kennedy and Brooks Whitehurst, all who have been strong supporters and contributors to WEI and other programs in the College of Natural Resources and Environment. On Tuesday, March 31 Jan and Claire Kennedy and Kit and Gail Kennedy from the Acorn Alcinda Foundation joined the WEI students during their weekly business meeting. The Acorn Alcinda Foundation supports entrepreneurial leadership. Jan and Kit were given an update of progress made toward WEI's 2014-2015 project activities. The students responded well to Jan and Kit's tough questions about WEI business activities.

The next honor was when Brooks Whitehurst visited the students on April 7. Brooks has

been a long-time contributor to the Wood Enterprise Institute to support the learning experience offered to develop leaders and entrepreneurs of the future. The WEI team enjoyed Brooks' valuable professional business advice and witty comments about all the unexpected things that happen even when well thought-out plans are made.



Mr. Brooks Whitehurst contributing his insightful business tips coming from his many years of successful business experience.



# ANNUAL LEADERSHIP CONFERENCE OF THE NATIONAL WOODEN PALLET AND CONTAINER ASSOCIATION

BY LASZLO HORVATH

The National Wood Pallet and Container Association (NWPCA) held its annual Leadership Meeting in Tucson, AZ March 11-13, 2015. Laszlo Horvath was invited to represent Virginia Tech's Packaging Science program.

The meeting was NWPCA's largest conference with more than 500 attendees from all over the world. The attendees learned about the

latest pallet trends in the USA, Australia, UK and Europe and the Asian region, became familiar with the latest unit load design methods, and learned how to run their business more effectively. During the meeting there was a lot of excitement about Virginia Tech's new Packaging Systems and Design program and about how system based unit load design will transform the industry.



# HINDMAN SPEAKS ON CONSTRUCTION SAFETY IN INDIA

BY DAN HINDMAN

On March 21 and 22, the Initiative for Construction Safety Awareness (ICONSA) conference was held in New Delhi, India. ICONSA was a collaboration between Virginia Tech and the Indian Institute of Technology at Kanpur. From Virginia Tech, Drs. Daniel Hindman and Thom Mills spoke at the conference, accompanied by Dr. Sudhir Misra of IIT-Kanpur.



A variety of construction safety topics were covered including a comparison of construction safety practices in the United States and India. One of the startling differences was that there is no national service in India to collect information on construction injuries and fatalities, which prevents safety experts and researchers from focusing on industry-specific topics.

The Center for Innovation in Construction Safety, Health and



Daniel Hindman, left, and Thom Mills in front of the [Red Fort Complex](#) in Delhi, India.

Well-Being (IC-SAFE) has a mission to improve construction workers safety, health and well-being by improving, connecting and integrating industry education and research. The collaboration of ICONSA spawned several future ideas including a graduate student from IIT Kanpur working at Virginia Tech this summer, and the development of an International Journal of Construction Safety associated with Springer.



## VT PACKAGING PROGRAM CELEBRATES GRADUATING STUDENTS WITH COOKOUT

BY YOUNG KIM

The Packaging Systems and Design Cookout outside of Cheatham Hall was filled with BBQ, desserts, drinks, and games. We introduced curious individuals about our program, celebrated the seniors' success and graduation from the Packaging program, and wish them the best with their future endeavors. We also

announced the new leadership team for the Packaging Systems and Design Club led by the new President, Kristine Roupas. As this marks the end of the 2014-2015 academic year, we wish everyone a great summer, and are counting down the days toward the start of another successful year.





Members of the International Academy of Wood Science (IAWS) in attendance at the WWD meetings in Odunpazarı, Eskişehir, Turkey gather with Mayor Kazim Kurt celebrating the success of the meetings. Pictured are (from left) Professor Barry Goodell (VT), Professor Nami Kartal (Istanbul University, Turkey), Mayor Kazim Kurt, Dr. Chung Yun Hse (USDA Forest Service, Louisiana), Dr. Howard Rosen (USDA Forest Service – retired). Not pictured (Professor Pieter Baas, Naturalis Biodiversity Center and Leiden University, Netherlands.)

## 2015 WORLD WOOD DAY BY BARRY GOODELL

The World Wood Day Symposia sponsored by the International Wood Culture Society was held this year in Odunpazarı Eskişehir, Turkey from March 17 – 23th. World Wood Day (WWD) is a cultural event celebrated annually in March to highlight wood as an eco-friendly and renewable biomaterial and to raise awareness on the key role wood plays in a sustainable world through biodiversity and forest conservation. The first official public WWD celebration was held in Tanzania in 2013 and the 2015 WWD international celebration was held in Turkey with the theme of “Wood & Humanity” with the goal of the conference being to rediscover and recognize the contribution and beauty of wood as well as to rethink its significance in contemporary society. Highlights of the meetings included a Research Symposium, Woodcraft

Sculpting with craft-persons from around the globe, Children’s events, Exhibitions, and Performances on wooden musical instruments with performers from around the world.

Several members of the International Academy of Wood Science (IAWS) were present at the 2015 meetings (pictured). Professor Barry Goodell of the Sustainable Biomaterials Department at Virginia Tech was an invited speaker and gave a presentation on: *“Expanding the Use of Wood for New and Advanced Materials to Build a Sustainable Society”*. Goodell also Chaired the WWD Symposium session on: *“Traditional Knowledge and Modern Practice”*. We appreciate the support of the International Wood Culture Society and Mr. Mike Hou, Chair IWCS in making this event possible.



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**SBIO**  
Extension

## Extension highlights

The wood products industry in Virginia is a critical contributor to the economy of the state, an industry represented by more than 1,000 primary and secondary industries and over \$25 billion in economic impact.

The Department of Sustainable Biomaterials (SBIO) at Virginia Tech is one of the leading U.S. academic programs in the field of renewable materials with a focus on cellulosic materials such as wood products. Besides research and teaching efforts, SBIO has an important role in dissemination of new knowledge in the area of renewable materials through SBIO's three extension specialists.

### Spring 2015

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### Specialists

#### Brian Bond

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Wood Processing

#### Urs Buehlmann

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Secondary Industry  
Manufacturing

#### Henry Quesada

[quesada@vt.edu](mailto:quesada@vt.edu)

Continuous  
Improvement

## VT Solar Kiln Built and Used in a Virginia High-school Program

Paul Chirico, the carpentry teacher at Fluvanna County High school, worked with local businesses, citizens and his students to construct a solar lumber dry kiln last year using the Virginia Tech plans. Paul was able to get some materials donated and had students from one of his classes build the structure. He managed to accomplish this within his first year teaching at the school. He has done a considerable amount of work developing a well-organized shop and curriculum at Fluvanna High School. He felt that the solar



kiln would allow the acquisition of unique materials and provide further learning opportunities for his students. Paul is in the process of acquiring a portable sawmill to assist with producing their lumber.

While building the solar kiln, Paul made some unique modifications such as using Volvo engine fans for the kiln fans, which can ultimately be converted to solar power. Some contributors for materials for the kiln include: Huber Systems, Wesley Wilson, 84 Lumber, and the Farm Bureau. Paul is using the solar kiln to dry locally produced lumber, which will be used in class projects. Paul is a graduate of the Forestry Program at Virginia Tech.

Dr. Brian Bond visited the carpentry classes in March to provide some instruction about the lumber drying process, the wood industry in Virginia and the use of the solar kiln. Dr. Bond spoke to three of the carpentry classes that day and had the opportunity to assist Mr. Chirico on utilizing the solar kiln.



Paul Chirico, left, with his Fluvanna High School carpentry students in front of the solar kiln they constructed.

## Extension Specialist Henry Quesada lectured at Auburn University

In March 18, 2015 Dr. Henry Quesada, associate professor and extension specialist at the Department of Sustainable Biomaterials



Dr. Henry Quesada during his presentation at Auburn University

lectured at the School of Forestry and Wild Life Sciences at Auburn University. The title of his presentation was “Payments for Environmental Services (PES): The Case of Costa Rica”. Dr. Quesada and his family have forest land in Costa Rica under the PES system. The invited-talk reflected on

Henry’s experiences and the benefits of the PES system and it was attended by over 60 graduate students and faculty from the School of Forestry and Wild Life Sciences.

## Energy Savings Through Lean Thinking online training now available at eXtension Wood Products Community of Practice

Industries interested in learn on how to apply Lean Thinking principles for energy savings can now accessed these series of videos recorded during a workshop last year. The educational videos can be accessed by following this link:

<http://www.extension.org/pages/72587/energy-savings-through-lean-thinking:-videos-and-presentations#.VTkly0uiv7N>



The goal of this online training is to introduce the concept of lean thinking and how lean management impacts energy consumption. Tools to identify energy waste in the process will be introduced and procedures to calculate potential energy savings will be demonstrated. Case studies will be presented to demonstrate how energy management practices have been implemented in manufacturing industries.

This online training is part of the extension project *Agricultural Energy Efficiency Grant* funded by the Virginia Tobacco Indemnification & Community Revitalization Commission.

## **New extension article on Statistical Process Control (SPC) for Forest Products Industries now available**

Creating value requires managers to master quantitative and qualitative techniques to document and analyze information used in the decision making process. Statistical Process Control (SPC) is a tool that allows administrators both in service and manufacturing industries to monitor process capability to ensure customer requirements are met efficiently and effectively.

Extension specialist Henry Quesada and post-doctoral researcher Edgar Arias have developed this educational material to provide forest products industries with basic information and applications of SPC tools. The article includes examples of the most common quality control charts as well as methods for diagnosing problems. The article can be accessed by following this link:

<https://pubs.ext.vt.edu/ANR/ANR-140/ANR-140.html>

### Forest Products Marketing Workshop

Marketing is one of the most important support processes of any business organization. Without good marketing strategies a company will not be able to properly design, price, promote and distribute their products. Participants in this short course will learn about marketing principles and how they can be applied to gain a competitive advantage in forest products industries. Topics that will be covered:

- Review of Forest Products
- Manufacturing Practices in Forest Products industries
- Current issues affecting the Forest Products industry
- Marketing history
- Economic trends impacting marketing activities
- Products and Pricing
- Promotion and Place
- Salesmanship and Sales Techniques
- Basic Marketing Research
- Competitive position
- Understanding competitors
- Value chain in Forest Products
- Market Intelligence
- Writing and presenting a Marketing Plan

The workshop will be held during September 3-4, 2015 at the National Hardwood Lumber Association (NHLA) headquarters in Memphis, TN.

More details can be found at this link: <http://www.cfpb.vt.edu/?p=716>



# Introduction to Structural design of Wood Buildings

Announcing a short course presented by the American Wood Council and Virginia Tech on Introduction to Structural Design of Wood Buildings per the 2015 NDS, September 30-October 2, 2015, Blacksburg Virginia.

This course will focus on practical code-conforming design of wood structures based on provisions of the 2015 NDS and other AWC standards. At the beginning of the course, we will review the structural design properties of lumber, the derivation of allowable design stresses, and safety factors that are involved in the design process. We will design simple framing elements showing what factors apply to the allowable design properties of lumber and timbers and explain why the various factors apply to a design situation. The methodology of lateral load design to resist wind and seismic loads will be presented. The design methodology for diaphragms and shear walls will also be demonstrated by examples using several AWC design standards and Guides.

The objectives of this course are a mastery of wood design basics and understanding of the many factors routinely used and required by the *2015 National Design Specification for Wood Construction (ANSI/AWC NDS-2015)*. All design calculations will be based on our strict interpretation of the *ANSI/AWC NDS-2015*. In addition to presenting designs that are consistent with model code provisions, the instructors will discuss “good practice” when it may apply to worked examples. Three hours will be devoted to structural testing demonstrations and related discussion at the Brooks Forest Products Research Center.

The course notebook will contain the structural analyses and designs presented at the course, thereby relieving the participants of extensive note taking. The registration fee includes lunches,

refreshment breaks, and the new 2015 Wood Design Package containing the following publications:

- ANSI/AWC NDS-2015 National Design Specification (NDS) for Wood Construction – with Commentary,
- ANSI/AWC SDPWS-2015 Special Design Provisions for Wind and Seismic (SDPWS) with Commentary, and
- ASD/LRFD Manual for Engineered Wood Construction, 2015 Edition.

### ***Continuing Education Credit***

Issued by Virginia Tech, participants will receive a certificate for 1.5 Continuing Education Units (CEUs) equivalent to 15 hours of instruction.

Also, this course is approved for continuing education credit required of certificate holders by the Jack A. Proctor Virginia Building Code Academy of the Virginia Department of Housing and Community Development.

### ***Course Instructors***

The course instructors are 1) **J. “Buddy” Showalter**, P.E., Vice President of Technology Transfer at the American Wood Council (AWC), 2) **Dr. Frank Woeste**, is a wood construction and engineering consultant, Retired professor of Bio-systems Engineering Virginia Tech (VT), Adjunct Professor of Sustainable Biomaterials, Virginia Tech (VT), and Adjunct Professor, Composite Materials & Engineering Center, at Washington State University (WSU), and 3) **Dr. Joseph Loferski**, Professor of Sustainable Biomaterials at Virginia Tech. Joe has international

reputation and experience in the areas of performance of wood and wood composites in buildings and preservation of historic wood buildings.

For more information and to register for the course go to:

<http://www.cpe.vt.edu/sdwnds>

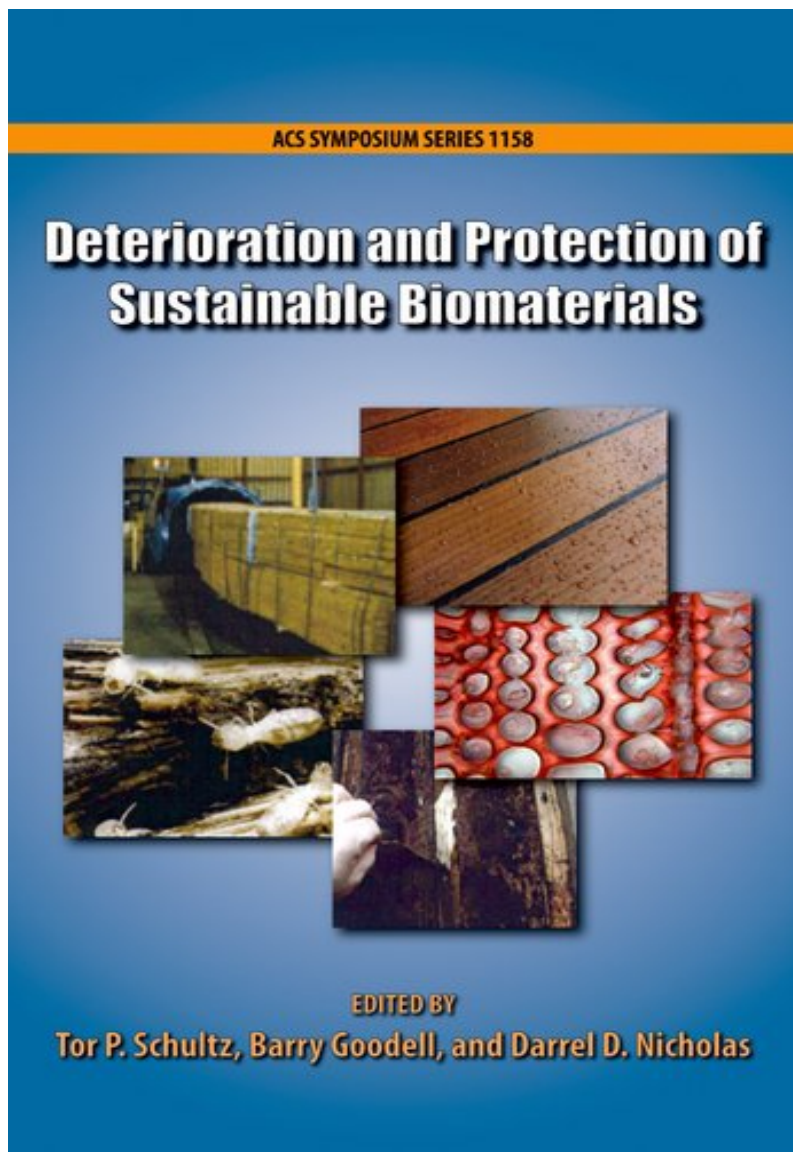




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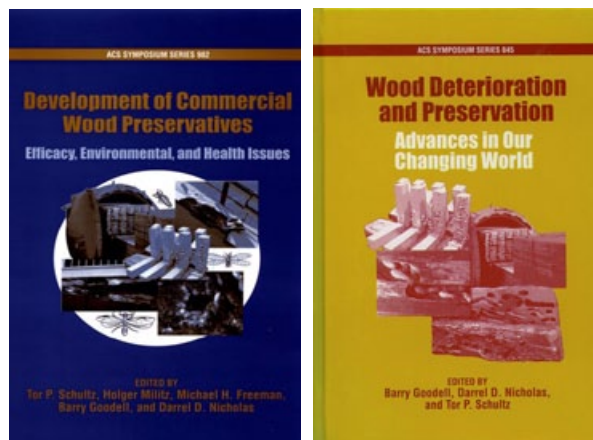
# DETERIORATION & PROTECTION OF SUSTAINABLE BIOMATERIALS.

The definitive textbook in the field. First published December 2014



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## **Deterioration and Protection of Sustainable Biomaterials - 2014**

<https://global.oup.com/academic/product/deterioration-and-protection-of-sustainable-biomaterials-9780841230040?cc=us&lang=en&>

## **Development of Commercial Wood Preservatives: Efficacy, Environmental, and Health Issues - 2008**

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## **Wood Deterioration and Preservation: Advances in Our Changing World - 2003**

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