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INSIDE VT WOOD

News from Barry Goodell, Department Head

GREETINGS to all Alumni, Friends, Faculty and Students of the Department of Wood Science and Forest Products at Virginia Tech. This is my first Inside VT Wood newsletter as the new Department Head here. It is an honor to have been selected by the Faculty to lead the Department, and to fill the “big shoes” from my predecessors. Dr. Audrey Zink-Sharp did a fantastic job in guiding the Department and moving it forward for the past 18 months after Dr. Paul Winistorfer moved upstairs in Cheatham Hall to take the helm as the Dean of our College. Paul has some great ideas for future directions of the College, and Audrey has agreed to continue on as Associate Department Head, so I have excellent continued support. Thank you to both of them for all their work over the years, and to the Faculty of the Department for all they have done to maintain a strong program with a collegial atmosphere.

My wife, Dr. Jody Jellison, and I moved in mid-January and drove down through a series of snowstorms to beautiful Blacksburg and we are enjoying life here very much – especially when we hear about the 3+ feet of snow and sub-zero temperatures that hit Maine shortly after we left. Jody is the new Associate Director of the Virginia Agricultural Experiment Station on campus, and we both have a lot to learn about the traditions of Virginia Tech and how things are done here. So, please bear with me as I work through that –and also feel free to provide me tips on moving things forward! I met with Dr. Geza Ifju, former Department Head, just yesterday for coffee. Geza still has an office in the Brooks Lab; he comes in frequently and is doing very well. But he reminded me of the importance of the faculty-staff, and student community in Cheatham and Brooks, and I will do my best to encourage and build on that sense of community as one of the things that has made this Department the best in the country.

In coming newsletters over the year, you will hear about changes that will be coming to the Department — some of those based on state requirements — but those changes will be positive for the Department as we strive to grow and provide leadership within the broad framework of forest products, sustainable biomaterials to the Commonwealth, the Nation, and globally. All of these will be focused in attracting more students to the Department to meet the demand for our graduates.

We have a very dynamic Faculty here in the department with some great ideas for development and progress in many diverse areas. You can read about and see pictures of some of their recent activities in the rest of this newsletter. Please feel free to contact me via email or phone anytime.



Dr. Barry Goodell

WEI Project Update

By Earl Kline

The 2010-2011 [Wood Enterprise Institute \(WEI\)](#) has completed its first semester and the student team has developed its business plan for spring. As part of this year's plan, a new product, a Virginia Tech coaster set, is being offered to target a new customer base. The team's market research has indicated that this new product can expand market

diversity while profitably adding to WEI's bottom line. In the upcoming spring semester, student activities will focus on implementing their business plan; that is, promoting, producing, and selling their products. The students are keeping score to gauge how well they are meeting set targets while executing their business plan. The challenge for this year's WEI business is that the team has set high target expectations which mean they must execute many critical operations with minimal wasted effort to deliver quality products to their customer base.



2010-2011 Wood Enterprise Institute.

L-R: Andrew Bernard, Jon Diamond, Shawn Crawford, Will Rand, Matt Mohr, Scott McDonald, Conan Cook, and Jandir Santin. Inset: this year's new product — set of 4 coasters and holder.



The [Wood Enterprise Institute](#) is a student owned and operated enterprise to give team members hands-on experience and learning results that only come by leading and managing real day-to-day production business operations. During the Fall semester, the WEI team works together to develop a business plan. Then in the Spring semester, the business plan is executed and the score

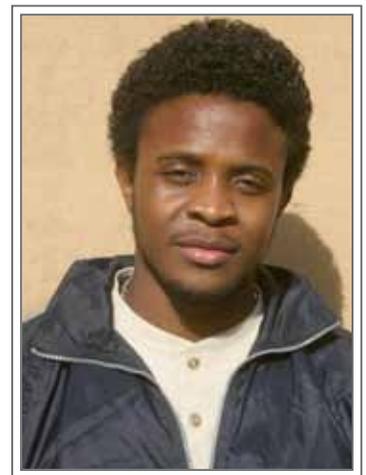
is kept in terms of business and financial metrics to help manage operations according to the plan. The results and experiences from WEI are invaluable for students who will soon have to make business decisions in the organizations they will manage and lead someday. Please visit [WEI](#) for more news.

Ezechiel Prampin Joins the Department

By Urs Buehlmann

Ezechiel Prampin has joined our department for one semester as a spring semester intern from Quisqueya University (UNIQ) in Haiti. Ezechiel is one of 20 Haitian undergraduate students to whom Virginia Tech has offered an opportunity to write their required undergraduate theses while on campus. The program, entitled “*Investing in Haiti's future through higher education: A program of support for students and junior faculty at Haitian Universities*” and spearheaded by C. Bryan Cloyd, Professor of Accounting and Information Systems at Virginia Tech intends to provide support for Haiti's devastated higher education system due to the earthquake last year.

Ezechiel, while staying with us, will do research and write his undergraduate thesis on the characteristics of bamboo-based materials. Bamboo is a widely available, fast growing natural resource of Haiti and offers opportunities for local businesses to produce high-quality construction materials. Ezechiel will be collaborating with Urs Buehlmann, Timo Grueneberg, and Daniel Hindman as well as with other faculty and students of the University. Ezechiel's office is at the Brooks Forest Products Center and he can be reached at ezechielprampin@gmail.com.



Ezechiel Prampin

Virginia Tech faculty explains Mass Customization to Wood Products Manufacturers

By Urs Buehlmann

On January 19, 2011 Department of Wood Science and Forest Products faculty member Urs Buehlmann was invited to speak at the annual meeting of the Maine Wood Products Association in Skowhegan, ME. Eighty-six members of the association assembled to tour Kennebec Lumber in Solon, ME, to listen to newly-elected Governor of Maine, Paul LePage's comments on the need for Maine to assist natural resources businesses in the State, to listen to a discussion on the impact of the new healthcare law on businesses and to learn about mass customization of wood products.



Figure 1. Urs Buehlmann (left) in discussion with members of Maine's Wood Products Association

Mass Customization (MC), the fulfillment of customized orders at an industrial scale with competitive prices and competitive lead times is, for a variety of reasons, considered a promising strategy to successfully compete in today's highly competitive, global markets. While standardized, mass-produced products are made more cheaply in offshore countries, customized products with features customized by end-customers prior to production typically have to be manufactured close to the customer to accommodate communication and delivery. In fact, empirical evidence supports this connotation, as shown in Figure 2. Research by Lihra et al. (2008) , ranked four industries, kitchen cabinetry, office furniture, upholstered furniture, and household furniture as to their levels of mass customization offered to customers. This research ranked the kitchen cabinet industry as offering the most opportunities to customers to mass customize their product, followed by the office furniture, upholstered furniture, and household furniture industry (Figure 2, left). When this finding is compared to levels of imported cabinet and furniture products (Schuler and Buehlmann 2010) , household furniture, followed by upholstered furniture, and office furniture show the highest level of foreign imports. Kitchen cabinetry, the industry segment offering the widest ranging opportunities to mass customize products, shows the lowest level of imports (Figure 2, right).

Industry sector	MC level	Production mode
Kitchen Cabinets	Configuring	Assemble to order Make to order
	Accessorizing Varietizing	
Office Furniture	Accessorizing	Assemble to order Ship to order
	Configuring	
Upholstered Furniture	Accessorizing	Assemble to order
Household Furniture	Varietizing	Ship to order
	Popularizing	

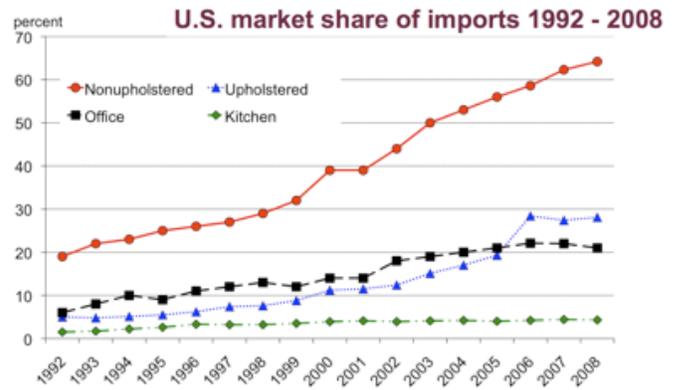


Figure 2. Levels of mass customization offered by industry segment and percentage of imported products 1992 to 2008.

Such a challenging proposition did lead to a healthy discussion after the presentation. Comments ran from “We cannot mass customized as we produce for other businesses,” to “Our business is working hard to offer more customized products to our customers.” A repetition of the presentation given to the Vermont Wood Manufacturers Association annual meeting on January 28, 2011 that was attended by 27 members (Figure 3) resulted in similar comments. However, one member indicated that his company allows customers to custom-design their products, which creates considerable inefficiencies in production. The important point to remember is that mass customization is the fulfillment of customized orders at an industrial scale with competitive prices and competitive lead times and thus should not be mistaken for a complete personalization of products.

A copy of the presentation can be obtained from Urs (540.231.9759; buehlmann@gmail.com). A series of workshops on mass customization is planned for April 2011 and will involve Virginia Tech faculty. For more information contact Urs.



Figure 3. Urs presenting at the Vermont Wood Manufacturers Association annual meeting on January 28, 2011.

Buehlmann et al. article fourth most read article on Woodworkingnetwork

By Urs Buehlmann

The article “Housing market’s impact on the woodworking industry” by Urs Buehlmann, Matt Bumgardner, Al Schuler, and Karen Koenig was the fourth most read article in 2010 on woodworkingnetwork.com attracting 4273 readers. Additionally, the article was also printed in *Wood&Wood Products*, a leading trade magazine with a circulation of 33,464.

The article is the result of a research series conducted every year by Virginia Tech, the USDA Forest Service, and *Wood&Wood Products* on the impact of the housing market on the US wood products industry. Starting in 2008, this research surveys wood industry executives once a year and asks questions relating to the US housing market, the impact of housing on the wood products business, and other industry-related questions. Given the depressed state of the U.S. housing market (with new single family housing starts below 500,000 in 2010 as compared to close to 2 million in 2006; Figure 1), wood products manufacturers did not paint a positive picture about the state of their businesses. In fact, 81 percent of respondents reported a reduction of sales in 2009 compared to 2008.



Figure 1. Single family housing starts 1959 to 2009 (Source: U.S. Census Bureau)

However, the survey also demonstrated the innovativeness of wood products businesses when it comes to finding new opportunities. Ideas pursued ranged from “hiring new talent” such as salespeople or designers to networking with other shops and reconnecting with previous customers. The industry executives also expressed mild optimism about the future of housing and their businesses while at the same time acknowledging that challenges will remain some time longer.

View a copy of the [article online](#) or be obtained from Urs (540.231.9759; buehlmann@gmail.com)

Updates from the Self-Assembled-Wood-Macromolecule-Interface-Laboratory (SAWMIL)

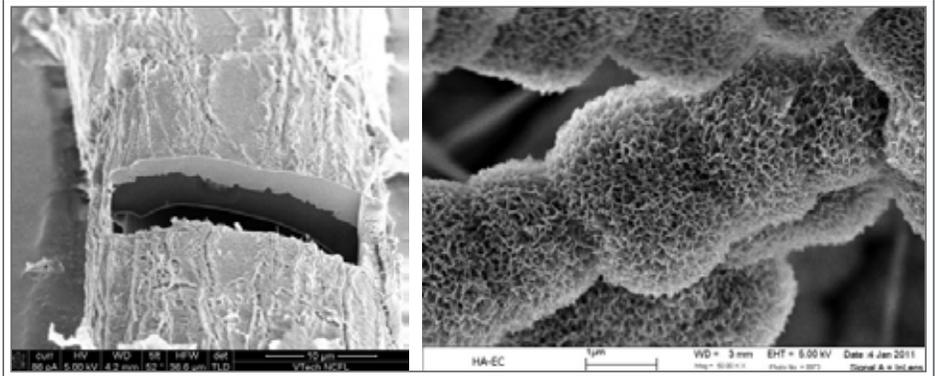
Scott Rennekar has been a faculty member in the Department now for almost 6 years, and he is part way through the Promotion and Tenure process. He has come up with some fascinating findings that will help to upgrade the surface chemistry of woody materials, which ultimately could lead to commodity-based nanocomposites with enhanced functionality.” Rennekar’s research group just published their fifth report on nanoscale coatings on woody substrates. The research is available online in the journal *Cellulose*. The work has centered on the formation of nanoscale films on wood and fiber surfaces that are one billionth of a meter in thickness. The research from Rennekar’s laboratory has provided fundamental knowledge on how to decorate the surface of wood and mechanically isolated lignocellulosic fibers with polyelectrolytes or nanoparticles. These materials have served as fiber modifiers for adhesion, enhanced durability, or opened the path for wood surfaces with a more uniform surface chemistry. The SAWMIL is indebted for the support from Sustainable Engineered Materials Institute and the Wood-based Composite Center for this research. The outcome of this work is that woody fibers can be systematically upgraded with layered films that can serve as a platform technology to incorporate a wide range of functionality.

Additionally, work related to cellulose structure and cellulose scaffolds for biomedical applications are in press for two journals published by the American Chemical Society. The first paper to be published in *Biomacromolecules* is on the deconstruction of cellulose microfibrils into fragments that have dimensions of molecular thickness. The second paper is on the production of electrospun cellulose fibers to be used as scaffolds for bone healing.

The electrospun nanofibers are modified with a nanoscale film and mineralized with a solution that mimics blood plasma. The modification of the fibers with a nanoscale film enhances the uniformity of the mineralization process. In turn, the mineralization process has shown to enhance adhesion of osteoprogenitor cells to the scaffold. The USDA, Institute for Critical Technology and Applied Science, and the Wallenberg Wood Science Center of Sweden have supported these research efforts.

For more information please contact Dr. Scott Rennekar, 540-231-7100 and visit his [SAWMIL website](#) for full citations of the research reports

View an [open access article](#) about the nanoscale films on woody materials.



Left: Wood fiber “cut” open using focus ion beam technology to locate and measure nanoscale coatings. Right: Electrospun cellulose nanofibers mineralized with calcium and phosphate that mimics hydroxyapatite found in bone.

Packaging Program Engages Companies and Universities

Young Teck Kim met with several people from Samsung fine chemical (2 of the largest HPMC & Cellulose suppliers), Capsugel (1st largest capsule producer), and Gaia Herbs (Organic Nutraceutical company) along with Clemson University introduced the VT packaging program and research ability to them. The meeting was held to seek collaboration opportunities through consortium projects between the companies and the University in the area of organic certified packaging material systems. The group agreed on many things and concluded that further discussions would be highly valuable. Dr. Kim will be visiting these industries through the spring to further the above project but also explore the potential development of summer internship program opportunity for our Packaging Systems and Design students in the Department.

The Department has long had a strong focus on Packaging with Pallets and the Center for Unit Load Design, and the recent hiring of Dr. Kim and Dr. Lazlo Horvath help build upon, and expand, the broader aspects of packaging in the Department. The InsideVTwood newsletter will present more about these faculty in future editions.

UPCOMING Workshops



Why Lean Administration?

2-day Workshop on Lean Administration
March 29-30, 2011

\$600 \$300 per person
(Lunch and coffee breaks included)
Free for Lean Club Members

Holiday Inn RDU
930 Airport Boulevard
Morrisville, NC 27560
Room reservation code: VTL

Contact Information

Web: www.vtlean.org/club/workshops/
E-mail: info@vtlean.org
Phone: (540) 443 6688



Day 1 – 9:00 am – 6:30 pm

- Welcome and introduction
- Expert speaker
- What keeps you awake at night?
- Simulation and value-stream mapping – current state
- Lean principles in administration
- Reception

Day 2 – 9:00 am – 4:00 pm

- Lean methods
- Simulation and value-stream mapping – future state
- Role of leadership
- What keeps you awake at night? – problem solving
- Lean transformation example

Outcome

- Understanding of lean administration
- Ideas how to improve your administrative processes
- Access to lean community

Learn to be Lean!