



Oregon Wood Innovation Center

Connecting people, ideas, resources

JANUARY 2014

COMING OWIC EVENTS:

- March 6-7: [OWIC Innovation Days](#)
- March 11: [Improving Operations to Remain Competitive and Profitable](#) (Princeton, WV)
- April 15: [Controlling Mold & Sapstain in Logs & Lumber](#)

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WHAT'S NEW?:

Read the new **Wood-Based Entrepreneur's Toolkit—[New Product Development](#)**

What If? Part 3

It has been some time since our last "what if" newsletter entry where we explored the possibilities of 3-D printing. The idea with "what if" is that we maintain no boundaries to the audacity of ideas, there is no realism requirement, and the sky is the limit. A bit of [blue sky](#) thinking may be just the ticket to innovations that otherwise would never have been considered, let alone implemented. Our motivation for what follows comes directly from our colleague John Simonson. We were recently asked to paint a picture of what our Wood Science & Engineering Department might look like in 5-10 years. The following is part of what John wrote as part of the discussion envisioning our future:

"And since this is New Year's Eve I will make a prediction: Within 10 years someone will be constructing net zero build-

ings using click together pieces made largely, but not entirely, of renewable materials, and using robots to put the building together. Sort of like swarm cooperative 3D printing. And these buildings will not only be modular, breathable, seismically sound and durable, they will also be capable of being easily deconstructed and rebuilt to new designs. (If you're wondering about swarming cooperative robots, watch this presentation talk—["Robots that fly... and cooperate."](#)

Before you read further we encourage you to watch the video at the link above. Based on that background it will be easier to embrace the blue sky thinking that follows. What if autonomous agile aerial robots (AAERs) became an integral link in building construction?

Sure, it sounds crazy, but most futuristic technologies sounded equally crazy when they were first envisioned. Given the weight of most building products, maybe this needs to be thought of as a system where robots

do most of the heavy lifting, but the AAERs provide connectors JIT at exactly the right position, attach/tighten the connections, and other similar support roles. While we are dreaming, maybe some of the robots are [3-D printers](#) working alongside other robots that are installing pre-cut or pre-assembled components. Suddenly the "swarm" described by John above becomes a sort of network assembly operation where the individual parts are independent, yet totally integrated with all other members of the system – let's call them automated building machines (ABMs). Can you imagine a construction site without any human workers?

What if future building systems took on this sort of scenario?

1. First it will require many new wood products, a fiesta of new product development opportunities for companies ready to jump into the fray. Design for disassembly would require

brand new thinking for nearly every wood product that is currently permanently installed in buildings. Think of the current trend toward [tall wood buildings](#) and how ABMs may play a role.

2. New products and methods will require new connectors. This provides an opportunity for you to network with current companies or, better yet, identify companies that make connectors for non-building purposes. What sort of connectors might be in use in NASA's various missions that might be applicable? If 3-D printers are part of the swarm described above, maybe the parts are all held together with printed adhesive, or maybe the adhesive is applied by a host of AAERs.

3. If this system were to develop, what would happen to the value chain for wood products? Recent decades have seen a significant shift of channel power toward big box retailers. A hyper-high-tech building sector could mean entry of, let's be really blue sky here, a company like Google or Amazon. What sort of revolution in the value chain of wood products would that mean?

4. **What if** ABMs were to assess the current condition



Source: <http://inhabitat.com/michael-green-unveils-wooden-tallwood-skyscraper-for->

of a material prior to installation? You know those pesky claims you get, long after installation. This could allow you to document that your product met specification when it was installed and any deviations afterward must be due to, for example, improper use. Similarly, real-time material 'grading' or simply assessment of the condition of the materials could allow installation of the components where they were most needed, based on material properties.

5. How might this system change the dynamic of buyer/supplier interactions? Customers (let's consider a homeowner or contractor) could see real-time video of the construction process for a new home. They could stop the process at any time they saw something that didn't meet their desires rather than filing after-the-fact change or-

ders. **What if** this system operated under your brand allowing you to make a direct link with final consumers?

6. With all the on-board data these ABMS would generate, there would be an enormous digital library from which we could draw on in evaluations of building performance over time (as directly related to construction conditions and practices).

Combine this with a "smart building" that is wired to monitor real-time performance and you have all the data needed for continuous learning and building improvement.

A recent story in the Economist ([Nov 30, 2013](#)) documents efforts of the European pulp and paper sector to drastically reduce emissions through implementation of new technology. Their focus was on pre-competitive concepts and they effectively collaborated to identify potential solutions. Envisioning the future built environment and developing the technologies to support that vision is just this sort of pre-competitive concept. **What if** you became actively involved in creating the future of building systems?



Dr. Vijay Kumar, University of Pennsylvania. Image Source: J. Barkat—<http://www.phillymag.com/>



2nd Annual OWIC Innovation Days March 6-7, 2014

In previous OWIC newsletters, you have learned about our change to offering a BS degree in Renewable Materials. We are excited that at 70+ students, our undergraduate enrollment is now higher than any time in the last two decades. This means that we have a much higher need for internships for our students AND that there will be many more highly qualified people to fill your entry-level positions in the coming years. Last year, we developed a new event called OWIC Innovation Days in an effort to help connect our students with industry professionals and to share the state-of-the art in innovation in our industry.

This March 6-7 is the second annual OWIC Innovation Days. The evening of the 6th starts with a high-impact networking opportunity that allows you to interact with our Renewable Materials students. Dinner follows with students and faculty. Friday the 7th is a workshop on innovation in the forest sector and an opportunity for you to reserve a room to interview students for internships and permanent employment.

The first annual OWIC Innovation Days was a big success. We received extensive, positive feedback from industry members in attendance. Also, our students were excited about the opportunity to rub elbows with potential employers. As stated by one participant:

Becoming acquainted with industry professionals has been vital to my success thus far. Innovation Days was the perfect opportunity to revitalize relations with the old, and to connect with the new.

Camille Moyers, RM Undergraduate

If you want to compete for future employees from our program, it is important for you to be at this event! The key benefits for you attending are:

- The opportunity to network with our students, your future employees
- Learn of cutting-edge technologies that might be implemented in your business
- Learn about successful product, process, and business systems innovations

To register, go to: <http://oregonstate.edu/conferences/event/2014OWICInnovation/>



New Emphasis on Wood Machining

Due to the success, student interest, and industry support of the initial offering of a wood machining course Fall 2013, The OSU Department of Wood Science & Engineering (WSE) is planning to provide students with more opportunities to gain much needed technical and



hands-on skills necessary for careers in secondary/value-added wood products manufacturing. The need for courses in secondary wood products manufacturing has emerged based on student feedback, industry advice and expanding research interests of the College. A proposal to add a three-course series in wood machining is currently being considered by the department. These courses will address topics such as tool operation, safety, precision and accuracy, machining, joinery, CAD/CAM, basic furniture construction, CNC routers, product development in a “business laboratory” and the way these topics

relate to the value-added manufacturing industry. The format is a mix of lectures, hands-on exercises, demonstrations, and visits to a number of large and small facilities. Experience shows that when students are introduced to a topic during lecture, perform the operation or exercise by themselves, and then observe how the operation relates to the manufacturing processes, they gain a greater understanding and appreciation for the subject.

The objectives of the course series are to ensure our graduates are familiar and comfortable with common woodworking machines, to provide them with the skill to be able to design innovative wood products using CAD/CAM software, to be able to select material based on machinability/strength properties, understand joinery applications, and apply CNC router technology and applications to manufacturing in the modern world. Our graduates will be able to apply these hands-on skills, in addition to their knowledge of wood science, to supervisory positions in cabinet shops, furniture manu-



facturing, millwork and moulding production, musical instrument building, and as talented and knowledgeable entrepreneurs, just to name a few.

These courses will be taught in a small but modern woodworking shop at OSU. However, to better prepare students, it is imperative that they are exposed to “working” shops and industrial settings. This experience bridges the gap in student understanding between the instructional woodshop at OSU and high production facilities. If you or your business supports this new direction for WSE, please contact us. We are seeking collaborators for tours or demonstrations of new technology and success stories with new and novel product development. We are also looking for “guest” lecturers. If you have a specialized skill, such as finishing, CAD/CAM techniques, or feel you can bring some other wisdom to our program, please contact us.



OSU PROFESSIONAL AND NONCREDIT EDUCATION

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This online short course series provides mill operations, technical professionals and suppliers to the wood-based composites industry with a fundamental knowledge of wood as an engineering material.

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Register online at pne.oregonstate.edu/wood

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Previous issues of the OWIC newsletter are available at: <http://owic.oregonstate.edu/newsletter/>