



# Center Focus

Spring 2012

Published by the Center for Forest Products Business  
An Alfred P. Sloan Affiliated Industry Center

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## Director's Message

After one of the nicest winters on record in Blacksburg, we graduated approximately 5000 students this week from Virginia Tech. It is amazing how fast the semesters go by and new groups of students enter our college. Our programs continue to evolve to meet the needs of our students and to serve our industry partners. To better reflect what our faculty are doing and to broaden our appeal to students, the department's name has been changed to the Department of Sustainable Biomaterials. New degree programs are being developed to reflect our changing needs of students and industry. We had several companies on campus this spring interviewing our students for summer internships and full time positions, which hopefully reflects an up-tick in our industry.

I have visited with many center members recently and there is a general feeling that our industry is slowly improving, but we will need to adjust to a smaller total domestic market for wood. I just taught our sales course at Oregon State University, and the class was fairly optimistic about the economy improving and companies are seeing an increase in export activity from the West coast. Those in the export market continue to see opportunities overseas. The market reports indicate now that over one-third of upper grade hardwoods are now exported, and there is an increase in exports of softwood lumber. The housing predictors now say that it will be late in this decade before we get back to normal housing starts and recent statistics show that houses are getting smaller.



All of this indicates that we need to work smarter, not necessarily harder. We need to get closer to our customers and determine how we can serve them better, we need to be able to capture market opportunities when they arise, and to fine-tune our operations to be as efficient as possible. That is what our changes in the department are training our students to do. In this newsletter you will read about a project on energy auditing that is being led by Dr. Henry Quesada. Every dollar saved in energy or the elimination of any waste is a dollar right to the bottom line of the company. Dr. Earl Kline describes the efforts of the Wood Enterprise Institute (WEI), which is a student-run enterprise from market development to product manufacturing. It is a one-year program that allows our students to experience running a company, as well as dealing with company issues on a daily basis. The WEI is one way in which we are training our students to be better prepared to meet your needs.

I wish you a great summer and thank you for your continued support of our center. I hope you will visit us at our new web address ([www.cfpb.vt.edu](http://www.cfpb.vt.edu)). If you have any questions, please contact me at [rsmith4@vt.edu](mailto:rsmith4@vt.edu) or 540-231-7679.

*Bob Smith*

## FOREST PRODUCTS BUSINESS NEWS

- Because of the recent earthquakes in Christchurch, New Zealand, the use of laminated veneer lumber and glulam beams made from pine has increased. Previously, pine logs were exported, but now are considered a substitute for steel in commercial building construction. *Waikato Times*
- American Hardwood Export Council (AHEC) has been promoting American hardwoods to India as an eco-friendly alternative with a low carbon footprint. They observed American hardwoods exported to India are preferred for their aesthetic quality and performance over the eco-friendly attribute. *Sourcing Hardware*
- The Middle East and North Africa (MENA) region has surfaced as an important export market for American hardwood lumber. In 2011, the USDA Foreign Agricultural Service recorded more than \$96.2 million of American hardwood lumber was exported to the region. *Middle East Interiors*
- In the first quarter of 2012, US and Canadian softwood log exports to China increased while softwood log exports from Russia and New Zealand to China has decreased. Previously, New Zealand has been a top supplier of softwood logs to the Asian Pacific market. *Timaru Herald*
- The mountain pine beetle has caused a new concern for the forest products industry in British Columbia. Dust buildup associated with sawing dead timber from mountain pine beetle infestations may have caused sawmill explosions recently. *Postmedia News*
- Wood biomass pellet production and other renewable energy sources have increased in Cuba since a government decision to modernize the economy by making it more efficient. Over 600 stoves have been built in the country to produce wood biomass pellets. *Inter Press Service*
- Rehrig Pacific Logistics, a Wisconsin based firm, is opening a pallet recycling plant in Glendon, Pennsylvania. This new facility will recycle unusable pallets and convert them into fiberboard used in furniture and building products. *The Morning Call*
- Furniture companies that are adapting to these advances provide customers with options such as built in docking stations to charge e-readers. Not only does this design allow customers to be organized, but customers also find the design aesthetically pleasing. Some furniture companies that are adapting to these advances provide customers with options such as built in docking stations to charge e-readers. Not only does this design allow customers to be organized, but customers also find the design aesthetically pleasing. *The New York Times*

Forest Products Business News has been designed for educational and engagement purposes only. The intention is to report news that affects various business segments of the forest products industry. Any comments or questions should be referred to: [swlyon@vt.edu](mailto:swlyon@vt.edu)

## Center Focus



Published by  
The  
Center for Forest  
Products Business

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Biomaterials  
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Blacksburg, VA 24061

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VT/0023/0801/1.7M/220696





# Center Focus

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## Reducing Energy Inefficiencies in the Forest Products Industry Using Value Stream Mapping

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Henry Quesada, Assistant Professor

Energy inefficiencies are a significant factor associated with manufacturing cost. There is a large gap of available knowledge on how improving manufacturing processes ties into the reduction of energy consumption. “Lean” manufacturing is a production practice, developed by Toyota, focused on value added processes within the production process. Value is defined by the customer revealing waste, non-value added, within a process or system. Dr. Henry Quesada, assistant professor, and Shawn Crawford, graduate research assistant, will visit three separate forest products companies within Virginia. Through the use of energy management system (EMS), energy consumption will be measured, recorded, and incorporated into the value stream map of the manufacturing process. Energy consumption will then be broken down and allocated to the individual products and processes. Energy saving recommendations will be made in the form of an ideal state value stream map. The goal is to provide a detailed energy consumption analysis of the manufacturing process and make energy consumption improvements based on the current analysis. Each energy saving recommendation will be followed by a detailed financial analysis explaining cost/savings as well as payback period. The research suggests that the application of lean principles in the forest products industry will have significant energy savings as well as a positive impact on process efficiencies and the environment.

### Background and Current Issues

Petroleum (oil) is the largest U.S. primary energy consumption followed by natural gas, coal, nuclear electric power, and renewable energy (EIA, 2011). Electricity is a secondary energy source produced by these sources. Some of the main energy consumers in the U.S. are residential, commercial, industrial, and transportation. Industry accounts for one-third of the energy used in the country, 28% of that energy comes from natural gas and 14 % comes from electricity (EIA, 2009). Electrical demand growth is projected to increase at about 1% per year through 2035, while from 2005 to 2009 cents per kilowatt hour increased by 1.24 (EIA, 2009). Due to a continually increasing demand for energy sources and a limited supply of those sources, energy prices are expected to increase.



In the U.S., industrial energy demand accounts for 26% of total energy consumption supporting the statement that the U.S. is a highly industrialized country (EIA, 2010). The forest products industry makes up a small portion of the U.S. industry however; with increasing prices on electrical demand, electricity is a contemporary topic for savings correlated with manufacturing cost. Coal accounts for 45% of total sources used for electricity however; coal stocks have decreased between May 2010 and May 2011 by 8.6 % which is a higher percentage than expected (EIA, 2010). In order for the forest products industry to combat growing energy costs, it is essential that the industry record, manage, and reduce energy consumption.



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## Reducing Energy Inefficiencies in the Forest Products Industry Using Value Stream Mapping (cont.)

### Application of Lean in the Forest Products Industry

The application of lean in the wood products and furniture industry is a relatively well known concept, especially in the Virginia area. Recent surveys suggest that Virginia wood products and furniture industries have heard of terms like lean management, lean manufacturing, and lean thinking however, are unfamiliar with the tools that make up these terms (Fricke, 2010). The segments of the sector with the highest amount of lean awareness and implementation were engineered wood, manufactured homes, household furniture manufacturing as opposed to sawmills and wood container and pallets with the lowest amount of awareness and implementation (Fricke, 2010).

In an attempt to assess energy consumption of the industrial sector within the U.S. to promote clean energy, the EPA evaluated major sectors including forest products. Each sector was assessed based on five major criteria for potential energy efficiency and clean energy. Table 1 shows the potential for the forest products industry to implement process improvements. The forest products industry is relatively high for potential energy efficiency, mainly for process improvements and research development. Focusing on energy efficiency potential in the areas of process improvement and research & development, Table 1 shows a significantly high potential or need for advancement.

**Table 1.** Sector Opportunity Assessment Summary Table (EPA, 2007)

Sector	Opportunity				
	Cleaner Fuels	Combined Heat and Power	Equipment Retrofit/ Replacement	Process Improvement	Research and Development
Cement	Medium	Low	High	High	Medium
Chemical Manufacturing	Medium	High	Medium	Medium	Medium
Food Manufacturing	Medium	High	Medium	High	Medium
Forest Products	Medium	Low	Medium	High	High
Integrated Steelmaking	Low	Medium	Low	Medium	High
EAF Steelmaking	Low	Low	Low	Medium	High
Motor Vehicle Manufacturing	Low	Low	Medium	High	Medium
Petroleum Refining	Low	High	Medium	Medium	Medium



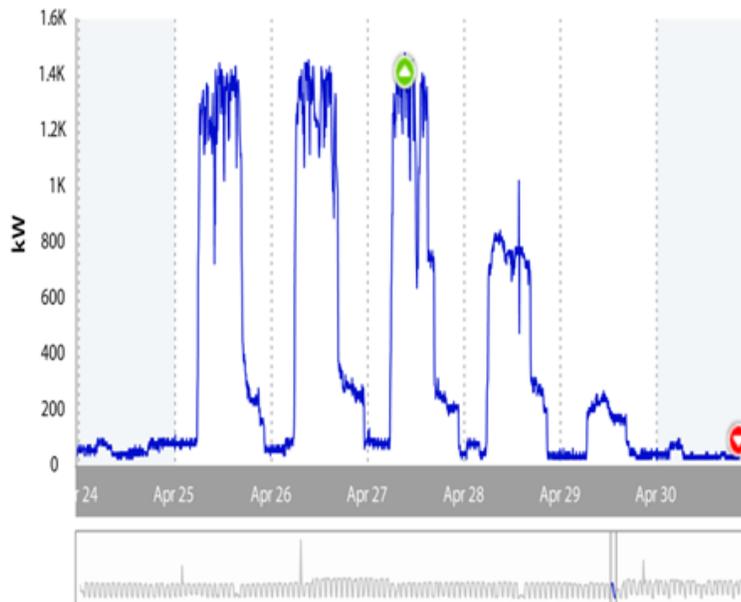
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## Reducing Energy Inefficiencies in the Forest Products Industry Using Value Stream Mapping (cont.)

### Energy Management System (EMS)

An Energy Management System or EMS provides a company constant data feedback on their energy consumption. Depending on the type of EMS, energy consumption can be tracked all the way down to 5 min intervals as shown in Figure 1. The more detailed the EMS the greater potential for improvements. Imagine an EMS that provides a company's natural gas consumption every hour as opposed to a power company providing the information monthly. Some benefits of an EMS include; separation of consumption rates, identification of high consuming areas, the ability to make daily adjustments to improve monthly bill, automated system automatically manages/adjust to improve energy inefficiencies, and create new process improvements to increase efficient energy use.



**Figure 1.** Kilowatt Consumed Over Five Minute Intervals (EnerNoc, 2011)

### Managing Energy and Process

An EMS provides the tools for a manager to take employee innovation and put it to the test. Innovative employees provide solutions to ongoing problems associated with the business, finances, process, and product, because they are the experts at their job/task. Providing employees with real time feedback showing how their improvements have helped to save money motivates employees to continually improve. A value stream map (VSM) is crucial in sustaining an atmosphere of continuous improvement because it shows the employees the flow of information and material through the process (Rother and Shook, 2003). A VSM is a visual tool that can be used to show the impacts of employee suggested improvements.



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## Reducing Energy Inefficiencies in the Forest Products Industry Using Value Stream Mapping (cont.)

### Conclusion

The goal of this research is to understand the influence of forest products industry value stream processes, both value-added and non-value added, on overall energy consumption. In doing so, the goal will provide a company's business, finance, process, and product rewards and savings.

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This research project is funded by the USDA Forest Service's Wood Education Resource Center.



# Center Focus

## *Announcements*

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### **Update from the Wood Enterprise Institute (WEI) by Earl Kline–**

Congratulations to the WEI 2011-2012 student team for concluding a successful year at learning how to organize and run their business! This year, the team designed, manufactured and sold a wooden napkin holder to complement last year's drink coaster set. The design focus was to create a beautiful and sustainably produced wood product to be used and displayed as a home centerpiece. During the Fall Semester, the WEI team worked diligently to develop a business plan to outline how their product could sustain the business. This plan carefully described all of the market research, product design specifications, operations, cost assumptions, and various contingencies necessary to market and sell the product. Then, the challenge began in the Spring Semester when the student team learned that no matter how carefully detailed their plan was, there were many "little" things that got in the way of delivering according to the plan. How the team responded and then adjusted to these challenges is where the true entrepreneurial learning occurs! The right answer is not found in a book or from a lecture; students must problem solve and learn from experience. In essence, the WEI business acts as a laboratory that provides many learning opportunities whereby students can practice a scientific problem-solving discipline to find and apply knowledge in ways to adapt and improve their business.

This year's WEI team had to solve anticipated problems concerning maintaining the highest wood machining quality standards while creating a safe work environment that led to high worker productivity. But when unforeseen events happen like working out bugs in the product design, waiting for suppliers, dealing with personnel issues, and keeping the business up and running, the students gain "hands-on" experience on how to make proper adjustments. One considerable challenge for this year's group was losing a key team member who was in charge of the business' information technology (IT). The team had to adapt quickly to this loss during a critical time when the business depended on IT to market and sell products while collecting money. By keeping score in terms of the operational and financial health of the business, the students saw the impact of their actions and adjustments on the business' bottom line.





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## *Announcements*

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The bottom line? Compared to previous WEI business cycles, this year's team generated record earnings considering all operating costs such as materials, labor, facilities, and services. However, the business startup expenses still exceeded these record earnings. The unique challenge with the WEI business is that every year there is 100% turnover, and the business must start with a new team. To get the new team up to a level that matches the previous year's performance has historically taken at least a full semester. WEI's target is to be able to speed up the training cycle so that a new team is up and running sooner. The sooner the new team is up and running, the sooner business problem solving skills can be practiced to help drive the business toward a positive and sustainable cash flow.

The Wood Enterprise Institute is a student-run, faculty-supported organization at Virginia Tech that is recognized and respected as a leading learning environment for creativity, innovation, and entrepreneurship. The learning goal of the WEI is to gain hands-on experience on how a business is run from the ground up; a "concept-to-market" principle. In meeting this goal, leadership opportunities are provided to coordinate the all business activities such as design, marketing, procurement, production, sales, and finance. Please visit [www.vtwei.com](http://www.vtwei.com) for more information.





# Center Focus

## *Calendar of Events*

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### **Workshop: Drying Lumber with a Solar Kiln**

Blacksburg, Va. May 25, 2012. This course is designed for the small scale woodworking facility or hobby woodworker. Information about how to design, modify, build and operate a solar based on the Virginia Tech design will be presented. Solar lumber drying provides a safe and economical way to dry lumber given limited knowledge and experience. For registration, visit: <http://sbio.vt.edu/workshops/solar-drying/>. For more information, please contact Brian Bond at (540) 231-8752 or email [bbond@vt.edu](mailto:bbond@vt.edu).

### **Workshop: Energy Savings through Lean Thinking**

Roanoke, Va. September 27, 2012. The purpose of this workshop is to inspire new visions and strategies which address the most pressing energy challenges for contemporary society; it will create new ideas for usage of Lean Principles in reducing energy use and costs. This course will provide attendees with the best practices for energy savings, ways to save energy through lean thinking, and information on energy management systems. We will examine case studies on energy savings on a specific industry and saving energy consumption through Kaizen events. For registration visit, <http://www.cfpb.vt.edu/?p=519>. For more information, please contact Henry Quesada at (540) 231-0978 or email [quesada@vt.edu](mailto:quesada@vt.edu).

### **Workshop: Quantitative Methods for Management**

Roanoke, Va. October 18-19, 2012. Decision making techniques can be defined as a collection of qualitative and quantitative analytical tools that allows business and process managers to outline and analyze potential scenarios when searching for solutions given a specific problem or situation. Participants in this two-day workshop will learn how to use different quantitative tools to build models and integrate computer applications to solve current business and manufacturing problems. This course will provide attendees with basics of decision making, statistical concepts, spreadsheet basics, data generation using Montecarlo methods, inventory control models, linear programming, Queue and Markov analysis, and design of experiments. For registration, visit: <http://www.cfpb.vt.edu/?p=517>. For more information, please contact Henry Quesada at (540) 231-0978 or email [quesada@vt.edu](mailto:quesada@vt.edu).

### **Workshop: Third Innovation-based Manufacturing Workshop**

Blacksburg, Va. November 15, 2012. This course is designed for anyone who would like to learn about the innovation process and how to use it to increase business competitiveness and achieve long term sustainability. Innovation is not just the creation of a new product but also the strategic improvement of internal processes such as manufacturing. This workshop will give attendees an understanding of entrepreneurship and innovation, why innovation based manufacturing is critical to achieve economic development, and how it can be pursued. For registration, visit: <http://www.cfpb.vt.edu/?p=515>. For more information, please contact Henry Quesada at (540) 231-0978 or email [quesada@vt.edu](mailto:quesada@vt.edu).