



# Center Focus

Spring 2013

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## Director's Message

Hello Center Members and Friends:

As we get close to spring break on campus (in two weeks) it is impressive to see the growth of our program and the energy of the students this semester. We have 80 students now in our department and many are majoring in Forest Products Business. Firms are already on campus interviewing for summer internships and full-time positions. I think this is a great indicator of our economy's and the industry's resurgence. We will graduate around 25 students in the spring, so if your companies are looking for full time employees, please contact us to set up interviews.



On a personal note, last fall our department head in Sustainable Biomaterials stepped down and the dean has asked me to take it on for a while, so I am currently acting as interim department head of our program. It is nice to be working regularly with my colleagues in the department again and seeing students on a more regular basis. Students are busy with the Wood Enterprise Institute where they will be designing, manufacturing and marketing 3 different products this year. The packaging science program continues to grow and students are learning to efficiently design and build packaging for the products we ship around the world.

Currently our faculty are working on such items as energy savings in mills, international marketing efforts, lumber use in the pallet industry, secondary manufacturing issues, and a variety of topics in the area dealing with cellulosic chemistry. It always amazes me the breadth of our research areas in the department. But, they all have one common theme: Assisting the forest products industry in the sustainable development and use of our natural resources. Whether it is new products using cellulose, increasing manufacturing efficiencies in your mills, or developing new markets, our research efforts try to assist our industry in increasing its competitiveness.

In this newsletter is a listing of upcoming continual education classes, some industry news and a short article on energy savings research that Dr. Quesada and his students are doing in a secondary mill. There still remain a lot of areas in which mills can reduce their energy costs and this research shows another way to tackle the problem. If you have any questions regarding this newsletter or the Center, please feel free to contact me at 540-231-7679 or [rsmith4@vt.edu](mailto:rsmith4@vt.edu).

*Bob Smith*

## *FOREST PRODUCTS BUSINESS NEWS*

- Boise Cascade, an engineered wood product and plywood manufacturer and building product distributor with facilities in the U.S. and Canada, announced their initial public offering of about 11.8 million common shares that will be priced at \$16-\$18 a share. *Dow Jones News Service*
- The Middle East and North Africa (MENA) region was found to be the top export region for U.S. hardwood lumber and veneer in 2012. From January to September 2012, over \$18 million of U.S. hardwood veneers and more than \$48 million of U.S. hardwood lumber was shipped to the MENA region. During this time frame, the top importing country in this region for U.S. hardwood lumber was United Arab Emirates. Demand for U.S. hardwood lumber and veneer in the MENA region is a result of increasing construction and economic development. *Islamic Finance News*
- Softwood pulp prices (\$1,000 per ton) peaked in the summer of 2011; however, in the first three quarters of 2012, prices have decreased to between \$750-850 per ton in Europe and the United States. In the last quarter of 2012, pulp producers negotiated high prices in order to bring the price up to \$820-870 for products delivered to Europe or the U.S. *Commodity Online*
- *Miscanthus*, a perennial biofuel crop, may be an alternative to corn as an ethanol-producing crop. A four year study from University of Illinois found that *miscanthus* has a greater yield and reduced the amount of nitrogen lost into the environment as compared to other biofuel crops. *Agriculture Week*
- United Pallet Services, Inc., has developed a new innovative plastic pallet protector they call PointGUARD. This product attaches to wood pallets to help reduce damage to the pallet from forklifts. PointGUARD allows wood pallets to be as durable as plastic pallets at a wood pallet cost. *Material Handling and Logistics*
- Increase of demand for torrefied wood pellets in Europe caused New Biomass Energy, a U.S. based wood pellet manufacturer, to expand its operation base. New Biomass Energy is looking to start producing up to 150,000 and 250,000 tons of pellets, depending on the increasing demand. *Biofuels International Daily*
- Domestic hardwood lumber demand is increasing, specifically with flooring and cabinet manufacturers. However, some of the supplying sawmills are reducing production because of shortages of logs due to wet weather in the North and South in the previous weeks. *Woodworking Network*

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)

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# Center Focus

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## Reducing Energy Consumption in Your Mill Utilizing Lean Management Techniques

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### Introduction

Manufacturing in the U.S. has become extremely competitive, primarily due to the growth of foreign production capability in the global marketplace. Competitive markets in today's global economy are displacing manufacturers who are not able to reduce their labor and manufacturing costs enough to compete effectively. While some U.S. companies are continually improving their products, processes, finances, and business practices to better compete with global marketplaces, some are using inefficient energy consumption practices. Energy consumption composes a large portion of manufacturing cost in various industries; sometimes energy consumption may account for up to 40 percent of total operating expenses (Fontelera 2009). Electrical costs in the U.S. increased by 1.47 cents per kilowatt-hour resulting in a 12% overall increase since 2006; however, industrial electrical costs have leveled off since 2009 because fewer manufacturing plants operate in the U.S. (EIA 2013). Because of increasing costs of infrastructure upgrades, the price of electricity for the industrial sector is projected to increase by 1.9% 2014 (EIA 2013).

Increasing manufacturing costs have contributed significantly to the decline of the forest products (NAICS 321) and wood manufacturing (NAICS 3219) industries in the U.S. Increasing costs limit the ability of manufacturers to compete with global competitors (Fricke 2010). The increase in global competition has triggered a decline in domestic markets for U.S. furniture, severely impacting the Appalachian hardwood lumber industry in particular (Bowe et al. 2001). The continued competitiveness and growth of the forest products and furniture industries depends on their ability to effectively manage manufacturing costs, including energy (EPA 2007).

### Case Study Design

Virginia Tech researchers from the Department of Sustainable Biomaterials assessed energy efficiency issues at a secondary wood products manufacturer. The researchers used an A3 report to evaluate energy savings at this mill. An A3 report (designed to fit on one side of an A3 [11"x17"] sheet of paper) is an adaptable tool used to solve process problems and implement solutions (Shook 2008; Sobek and Smalley 2008). Figure 1 shows the layout and seven sections of this type of analysis. The title or the theme of the problem addressed is shown at the top of the report.

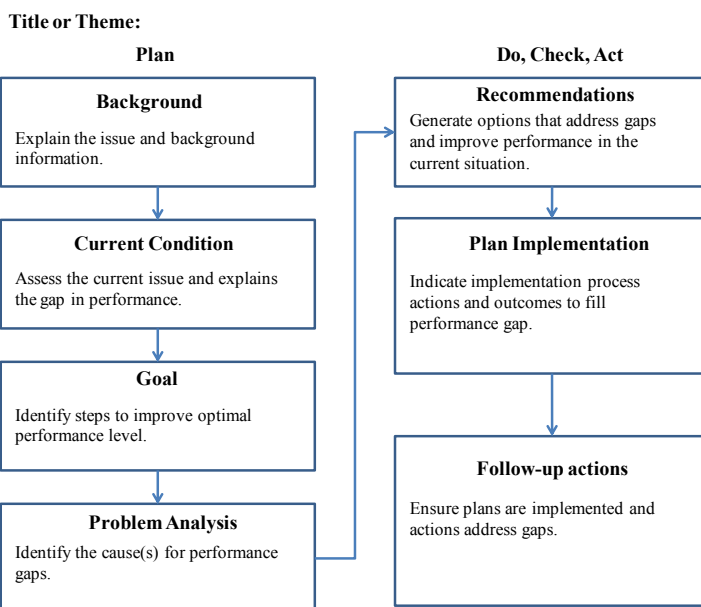


Figure 1. Basic layout (Sobek and Smalley 2008)



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## Reducing Energy Consumption in Your Mill Utilizing Lean Management Techniques (cont.)

When conducting an energy audit with the goal of reducing energy consumption, the following steps should be taken (Ross and Associates 2007):

- *Initial Assessment*- Perform an analysis considering the opportunities, risks, and costs of energy management.
- *Design Process*- Assess the company energy needs and how those needs should be addressed.
- *Evaluate Opportunities*- Identify and prioritize alternative energy saving improvement opportunities, such as energy intensive processes, unreliable grids, energy-supply options, and energy-saving products and services.
- *Implementation*- Use a well-organized and effective energy management system. For example, Energy Star's *Guidelines for Energy Management* may help the manufacturer to identify energy saving opportunities.

The researchers used value and energy stream mapping to assess the production line of a secondary wood products manufacturer. Value stream mapping creates a visual representation of product creation, including information and materials flow (Ross and Associates, 2007). Lean metrics that may be included in a value stream map are: cycle time, change over time, time available, and travel time (Ross and Associates 2007). When conducting an energy assessment, it is important to include average energy consumption information in the value stream map metrics (Ross and Associates 2007). Identifying energy-saving opportunities is the next step after completing a value stream map. The researchers and managers used ideas from the employees that work daily in the production process to help identify energy saving activities and put them into action. As part of the initial assessment, researchers at Virginia Tech developed an energy assessment tool based on the most effective and implemented energy saving practices documented by the Industrial Energy Assessment Center (Quesada-Pineda and Bond 2012). The energy assessment tool developed by Ross and Associates (2007) identified some common energy-saving practices for application in the wood products industry, focusing on those that result in payback in less than one year, including:

- Utilize higher efficiency lamps and/or ballasts
- Eliminate leaks in inert gas and compressed air lines/valves
- Utilize energy-efficient belts and other improved mechanisms
- Utilize controls to operate equipment only when needed
- Establish a predictive maintenance program

## Results

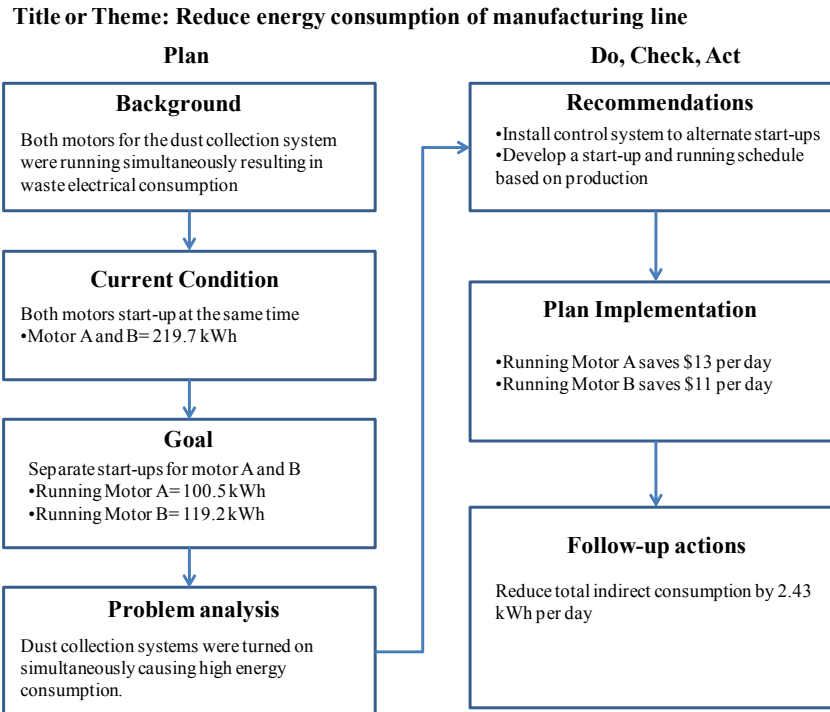
A current-state value stream map was developed to quantify valued-added versus non valued-added activities. The researchers used an energy management system and allocation techniques to measure and assign direct and indirect electrical consumption to the processes included in the value stream map. After the overall process was documented using the value stream mapping technique, the energy assessment tool was applied to identify potential energy improvements. Figure 2 shows a completed A3 report used to examine the production process line and identify lean principles to reduce electric consumption.



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## Reducing Energy Consumption in Your Mill Utilizing Lean Management Techniques (cont.)



**Figure 2.** A3 report from secondary wood products manufacturer (Adapted from Sobek and Smalley 2008)

Through employee suggestions for improved efficiency and the results of the energy assessment tool, the most critical energy inefficiency (i.e., savings opportunity) occurred because of the inability to turn on and off different dust collectors within the plant. Further analysis indicated that the dust collection system was not properly retrofitted and maintained for the plant which caused inefficient use of energy. Retrofitting the equipment to allow alternate start-up for each motor and creating a total productive maintenance schedule for the dust collection system may result in savings of over \$11 per day.

### Conclusion

Implementing lean tools and principles over the span of a month (22 working days) has the potential to save \$913 a year at this one location. Incorporating electrical consumption into the value stream map presents a clear way to measure and estimate energy savings. The A3 was an effective tool to identify energy saving recommendations. Utilizing an A3 report to address electrical waste is an effective tool for assessing and guiding the manager through the implementation process.

Manufacturers may use an A3 to organize and evaluate electrical consumption as well as provide valuable feedback on energy waste. Lean tools such as value stream mapping can be incorporated to identify and assess current electrical consumption during all stages of the production process. Managers should include current energy consumption in the value stream map to identify both energy and process waste. However, the A3 should include recommendations in order to address energy and process waste. An A3 is an effective tool for identifying and implementing energy-saving recommendations in a wood products manufacturing setting.



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## Reducing Energy Consumption in Your Mill Utilizing Lean Management Techniques (cont.)

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## *Calendar of Events*

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### **Short-course: Category-12, Wood Preservation and Wood Product Treatment Re-certification**

There will be two recertification programs this year for pesticide applicators, Category-12, Wood Preservation and Wood Product Treatment on (1) Thursday, March 21, 2013 in Madison, Virginia and (2) Friday, March 22, 2013 in Lexington, Virginia. Both programs will start at 9:00 a.m. and end at approximately 12:00 p.m. The registration fee is \$8.00 per person. Please contact Brian Bond, [bbond@vt.edu](mailto:bbond@vt.edu), 540-231-8752 for more information and to pre-register.

### **Conference: Innovation in Manufacturing**

Roanoke, Va. April 22-23, 2013. The two-day event in Roanoke, Virginia will bring together industry leaders, researchers, students and professionals to exchange ideas around innovative practices and approaches to meet the needs of the manufacturing industry. Through discussion of industry needs and experiences and emergent research in a variety of fields such as hard sciences and engineering, the event will accelerate idea-sharing among leaders in Virginia's manufacturing sector and promote the growth and stability of manufacturing in the Commonwealth and Mid-Atlantic region. For registration, <http://www.cpe.vt.edu/innovation/index.html>. For more information contact Jennifer Shand, [shandj@vt.edu](mailto:shandj@vt.edu).

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

Blacksburg, Va. May 24, 2013. The course focuses on the VT Solar Kiln design, which is inexpensive to build and simple to operate. The course is designed for the wood working hobbyist and the small woodworking company. Course will cover solar kiln design, construction, and operation. More course information and registration information can be found at <http://sbio.vt.edu/workshops/solar-drying/>. For more information, please contact Brian Bond, [bbond@vt.edu](mailto:bbond@vt.edu), 540-231-8752.

### **Conference: National Conference on Diversity in Nature Resources**

Blacksburg, Va. June 19-21, 2013. One of the pressing issues we face in the disciplines of natural resources and the environment is the development of our future workforce and leaders with diverse backgrounds who can prepare our diverse population to deal with pressing natural resources and environmental issues. Our goal is to have national leaders share their thoughts and recommendations for increasing diversity in our fields and to offer workshops that highlight best practices in increasing diversity in our disciplines across the nation. We expect to have federal, tribal, state, university, and private sector organizations participate in this discussion. For registration, visit: <http://www.cpe.vt.edu/ndc/>. For more information, please contact Henry Quesada, [quesada@vt.edu](mailto:quesada@vt.edu), (540) 231-0978.