Center Focus

Fall 2010

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Director's Message

Greetings from Blacksburg:

It's hard to believe that another semester has went by and we are approaching the Christmas holiday season. It has been a busy year at our College and in the Department. After the first of next year, the Department will have a new head, Dr. Barry Goodell. Barry comes to us from the University of Maine where he led the program in Wood Utilization Research. We held our annual awards banquet in November where the Center awarded 15 scholarships for over $18,000 to students in the business and marketing program. As I mentioned in our last newsletter, as of July 1 of this year we became the Center for Forest Products Business and we will be holding our next annual planning meeting the end of March. I hope you will mark your calendars and plan to join us then. More detailed information will be coming after the first of the year. Attach is a flyer that we have been using recently that depicts how we perceive the Center. It is an integrated partnership that includes our marketing program, the Wood Enterprise Institute, and student/faculty innovation efforts.

Dr. Henry Quesada, assistant director of the Center, and I had the opportunity to visit a number of member mills and organizations the first week of November. It is always nice to visit members, hear how we can serve you better, and how the forest products industry is doing. The good news is that many people were optimistic about their future and they plan on hiring students in the coming years. Most of those we visited believe that the worst of the downturn is behind us and things will slowly improve. We discussed how companies have improved efficiencies, learned how many have introduced labor and/or energy saving programs and are looking for new markets. And that is exactly what we are teaching our students. It is by having individuals trained in the latest business practices, whether it is marketing, business management, innovativeness or lean manufacturing. The leader of tomorrow will need to be able to have a good understanding on how all of these business practices impact the competitiveness of the industry. Our goal is to provide you with those individuals who can make your company successful.

I would be remiss if I did not thank you for all your support during these difficult times. We know the challenges each of you face with the current economic slowdown and we greatly appreciate your support of our programs and its students. The scholarships we give away are made possible by your donations and they attract good students to our programs. Your investment today hopefully helps develop that leader in your company tomorrow. I hope when you see our annual donation request this year, you will continue to support our program and its students.

We want to wish you a very Merry Christmas and a Happy New Year. It is a pleasure to be able to work with each of you and if I can be of any assistance please feel free to contact me at 540-231-7679 or rsmith4@vt.edu.

Merry Christmas

Bob Smith

Center for Forest Products Business

Our mission is to help prepare students to manage a forest products enterprise. This is accomplished by the study of marketing and business management, the operation of a wood enterprise, and the comprehension of innovation-based manufacturing.

Forest Products Marketing

The study of forest products marketing has grown rapidly as forest products firms increase their emphasis on marketing to remain competitive. The center was established to help firms improve the management of their operations and the marketing of their products. These goals are accomplished through educating students for employment in the forest products industry, providing research results relative to the current market, and offering continuing education for forest products industry professionals.

Wood Enterprise Institute

The Wood Enterprise Institute (WEI) provides an efficient, adaptable, and quality learning environment geared towards growing and showcasing our students' "entrepreneurial" skills. By combining technological capability with entrepreneurial application, WEI establishes a unique hands-on learning environment to test new business models. Students develop leadership skills that will drive change toward more effective and sustainable business in today's constantly changing global marketplace.

Innovation-Based Manufacturing

The center focuses on the development of innovative methods and their application to manufacturing challenges in the forest products industry. It works with other research centers at Virginia Tech on developing the future of system-based manufacturing as it applies to our industry. The goal is to assist companies to implement ideas and concepts that can lead to new manufacturing techniques and products.

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Alfred P. Sloan Foundation Industry Studies Center

Energy Management System for Wood Products Manufacturers

Omar Espinoza and Brian Bond

Increasing energy prices have motivated many companies in the U.S. to make efforts to reduce energy consumption and improve energy efficiency. The wood products industry has been affected by this trend, which adds to an already challenging business climate. The increased energy costs clearly threaten profitability and indicate the need to reduce energy consumption and improve energy efficiency. Improving energy efficiency not only reduces production costs, but it also improves environmental performance (i.e., the impact of an industrial operation on the environment), reduces exposure to increasing energy prices, and allows the company to reach customers who consider the environment in purchasing decisions. The best way to control energy costs is by a sustained energy management effort. This entails the highest degree of management commitment and is the only strategy that allows maximizing savings and obtaining sustained improvements in energy efficiency.

Energy Management System

The effective control of energy costs requires a systematic approach, instead of many one-dimensional efforts. A system is needed to identify the areas that need improvement, select and implement those projects that will have the biggest impact, and to insure that any gains are sustained. Such a system is known as an Energy Management System (EMS). An EMS can be defined as a system to make sure all users in the organization get their energy needs fulfilled, timely and in the amounts required, at the lowest cost for the company. The objective of an EMS is "*the continuous improvement of energy performance, to reduce costs and minimize waste*" (Morvay and Gvozdenac, 2008). The steps to plan and implement an EMS are outlined below.

Planning

In the planning stage, top management commits to improving energy performance, formulates energy policy and goals, and creates awareness of the need to improve energy efficiency. In most successful energy management programs, a dedicated energy manager is named, and supervisors are made responsible for the energy management efforts in their own areas.

Establish Current Performance

In this step of the energy management process, the company's current status is established by conducting an energy audit. An energy audit is conducted to determine the current energy performance and to identify energy conservation opportunities, and can be carried out in-house or with external support (e.g., private consultants, utilities, Department of Energy). Depending on the time and resources committed, an energy audit can go from a simple walkthrough, to visually-inspect the facilities and find the most obvious opportunities for improvement, or "low hanging fruit," to an in-depth study of energy balances for all processes and facilities. The latter type requires establishing an accounting system for energy and economic/financial analysis of improvement, and allows for the highest return on investment. Table 1 summarizes the steps of an energy audit.

Table 1. Energy audit process.

Data gathering	Review of historical patterns of energy use Interviews with key personnel Facility walk-through, check metering equipment
Establish baseline	Establish real demand Energy balance for each process or facility
Benchmark	Compare with designed performance or best available practice. Variation represents potential for savings Identify all opportunities
Audit report	Recommendations based on technical feasibility and economic impact Selection based on economic and financial analysis

Implementation and Operation

In the implementation step, the plans established in the previous phases are put into practice. Energy management activities have to be made part of the company's everyday activities. Responsibilities for energy management are assigned, a measurement system for energy performance is established, and personnel are trained in aspects of energy policy and plan implementation. This training must ensure that employees can carry out monitoring and improvement activities.

Establishing an energy performance measurement system (EPMS) is probably the most important part of this phase. An EPMS provides a common language to measure performance and progress towards goals. Metrics should be selected in three areas: energy consumption, material productivity, and quality, since they all contribute to energy efficiency. Some challenges when designing a performance measurement system are: to align metrics with strategic goals, avoid metrics that drive the wrong behaviors, and to ensure that information to calculate measures is readily available when needed.

For the successful operation of the EMS, a method is needed to sustain and improve energy savings. One method to achieve this is through the use of Six-Sigma, which principles and tools are suggested as a specific methodology to achieve continuous energy performance improvements.

Six-Sigma for Energy Performance Improvement

Six-Sigma is a problem-solving methodology for improving business performance (Gygi, 2005); it relies on extensive data collection and statistical tools to eliminate defects and minimize costs, and provides specific process for problem solving. The numerical target for Six-Sigma is to have a process that produces only 3.4 defects per million opportunities. Six-Sigma improvement projects are directed by trained leaders and follow a standardized five-step method (Figure 1), including Define, Measure, Analyze, Improve, and Control (DMAIC). Typical DMAIC projects involve cross-functional teams and take several months to complete. This proven problem-solving method can be used to improve energy efficiency at your plant. Following, each step of the DMAIC process is explained.

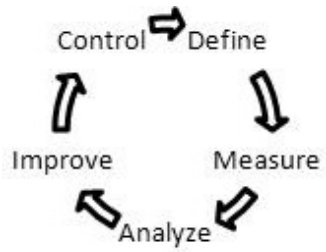

Figure 1. DMAIC problem-solving process.

Define. In the Define phase, the project team is formed, the problem is identified, the objective of the improvement project is stated, and a schedule and specific tasks are assigned. The team has to be very specific when defining the problem and the improvement goals. A DMAIC project in a wood processing plant could, for example, have as objective the reduction in air leaks, power factor correction, reduce energy consumption in plant illumination, or improve lumber drying energy-efficiency. A business case should be made about how solving the problem will benefit the company. This can be expressed in terms of payback period (ratio between total investment and the annual cost savings), impact on earnings or costs, return on investment or increased performance (e.g., decrease in specific energy consumption).

In sawmills, for example, the most common improvement opportunities are, in order of decreasing impact on costs, increasing the frequency of boiler tune-ups, insulation upgrades, installing variable speed motor drives, solving air leaks, and upgrading lighting, and power factor correction. Typical payback periods go from less than a year for air leaks to two years for installing variable speed drives (Energy Management Solutions, 2005).

Measure. In this stage, the process is understood and the primary metric of performance is determined and computed. For example, energy consumption could be measured in terms of energy consumed per unit of product produced, known and specific energy consumption. In the case of a lumber manufacturer, for example, energy consumption could be measured in kilowatts-hour (kWh), and product units in thousand of board feet (MBF) of green lumber produced. A mill could, for example, determine that its specific consumption of electric energy is 150 kWh/MBF of green lumber. Similarly, a solid hardwood flooring producer could determine that its electric energy consumption is 32 kWh/MBF.

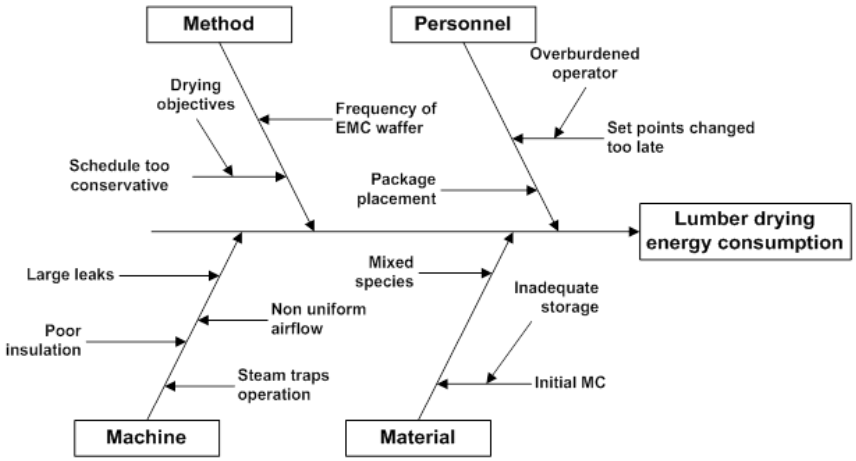

Figure 2. Cause-and-effect diagram.

Analyze/Improve. In this phase, the current energy performance determined in the "measure" step is compared against a standard. This standard could be an industry benchmark (from comparable operations or companies), a company standard (if the company operates more than one facility, and the best performing facility is set as the standard), or a historical standard (based on past performance data for the same process/facility) (Peterson and Belt, 2009). After the benchmarking process, the potential causes for variation between goals and actual performance are identified. Six-Sigma provides a powerful tool for this purpose. In a cause-and-effect diagram, or fishbone diagram (Figure 2), causes are classified and cause-and-effect relationships are shown with arrows. Categories commonly used are materials, machinery and equipment, methods, and operators. All personnel involved participate, providing their ideas and opinions. After the causes are brainstormed and categorized, a few causes are selected based on how strongly they affect the problem.

After the analysis, specific processes are selected for improvement. Several approaches exist for this selection, like choosing those with the biggest impact on energy savings, or the greatest return on investment (ROI).

Control. In the last step of the DMAIC project, a method to monitor process performance is established to make the improvements sustainable. It is also important to document and report the savings achieved and communicating the results to all personnel involved.

Summary

As energy prices rise and environmental regulation become stricter, pressure will grow on companies to reduce their energy consumption and improve energy efficiency. The only way to achieve sustained improvements in this field is the implementation of an Energy Management System (EMS). As any improvement initiative, an EMS requires top management commitment and needs careful planning, personnel should be assigned specific responsibilities for its implementation, and a control mechanism needs to be in place to sustain its results. Six-Sigma provides demonstrated problem-solving techniques that could be used in energy-saving projects. Successfully implemented, an energy management system cannot only help reduce total production costs, but also be a driver for overall company performance.

Calendar of Events & Announcements

Supply Chain Management.

Jasper, IN. December 14, 2010. Speakers: Earl Kline (VT), Henry Quesada (VT), and Edie Schmidt (Purdue University). For more information please contact Henry Quesada at (540) 231-0978 or quesada@vt.edu

Energy Savings Through Lean Thinking.

Lafayette, LA. January 24, 2011. Speakers: Henry Quesada (VT), Brian Bond (VT), Tyler Gill (Enernoc Inc), and Shannon Walls (Merrillat). For more information please contact Henry Quesada at (540) 231-0978 or quesada@vt.edu

Business Process Management.

ONLINE COURSE. Includes asynchronous and synchronous sessions. Open enrollment. Instructor: Henry Quesada (VT). For more information go to http://www.vto.vt.edu/course_noncredit.php?cid=1895 or contact Henry Quesada at quesada@vt.edu or (540) 231-0978

Cost Management for Wood Products Industries.

ONLINE COURSE. Includes asynchronous and synchronous sessions. Open enrollment. Instructor: Henry Quesada (VT). For more information go to http://www.vto.vt.edu/course_noncredit.php?cid=1710 or contact Henry Quesada at quesada@vt.edu or (540) 231-0978

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