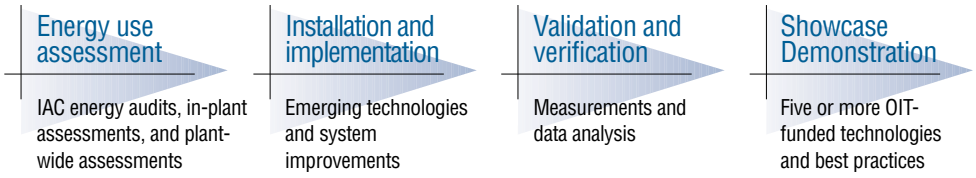
OIT'S SHOWCASE DEMONSTRATION AT AUGUSTA NEWSPRINT

A Special Supplement to *Energy Matters*

OIT Showcases Emerging Technologies and Energy Practices

A casting company realizes a 20% increase in usable time between maintenance cycles, a steel plant expects annual savings of $76,000 in repair and maintenance costs, another steel plant modifies its steam system to the tune of $3.3 million in annual savings, and now a newsprint company is anticipating annual energy savings of $1.4 million because of improved energy technologies. These are the kinds of successes that the Office of Industrial Technologies (OIT) likes to showcase.

The Road to a Showcase Demonstration



OIT Showcase Demonstrations are public events that highlight the latest energy-management practices and energy-efficient technologies emerging from OIT-sponsored research and development. These events, hosted by manufacturers and trade associations in partnership with OIT, spotlight energy- and cost-saving technologies that have been implemented at industrial facilities. Organizers invite industry representatives to tour the host plant(s), attend workshops, and watch demonstrations to see advanced energy processes and practices in action.

The Showcase process usually begins with a plant-wide assessment performed with the assistance of OIT's BestPractices program or university-based Industrial Assessment Centers. Then plants implement assessment recommendations in the form of process or system improvements. Next, an independent third party validates the technology performance and costs. Finally, the planning begins for a showcase event. OIT makes available a wide range of resources to host sites, including sharing the costs for organizing the event. OIT uses showcases to publicize and promote energy-saving technologies and practices. In turn, by showcasing leading-edge technologies that conserve energy, reduce environmental impact, and boost productivity, host plants enhance their images as leaders in their industries and local communities.

Demonstration to Replication

"Showcases provide the opportunity for participants to learn from and exchange ideas with researchers, colleagues, and OIT staff about industry programs and projects, particularly those that are ready for plant floor application," explains Denise Swink, OIT's Deputy Assistant Secretary.

In fact, the BestPractices team estimates that improvements made to a manufacturing facility based on a plant-wide assessment can be replicated on at least seven other facilities with equivalent systems and energy usage. What better way to disseminate the information to those seven other plants than with a Showcase Demonstration?

Technologies, process improvements, and implementation strategies are often similar, if not identical, across industries. Often, several Industries of the Future work together to demonstrate their energy- and cost-saving technologies. Showcases are proving grounds for the success of OIT's collaborative approach.

Showcasing Results

Recent showcases have illustrated significant energy savings and productivity increases. Bethlehem Steel hosted the first showcase event at its plant in Burns Harbor, Indiana, in April 1998. Among the technologies profiled during the event was a steam system improvement that saved approximately 40,000 megawatt-hours (MWh) of electricity, 85,000 million Btu of natural gas, and nearly $3.3 million.

Metal caster Lester Precision Die Casting, in Solon, Ohio, realized a 20% extension in usable time between maintenance cycles, reduced scrap by as much as 20%, and increased production from 50 parts per hour to 60 parts per hour by using a visualization tool to identify die design improvements. Lester showcased this and other improvements in November 1999.

At the Pittsburgh Regional Technology Showcase in May 2000, Weirton Steel, in Weirton, Pennsylvania, featured compressed air system improvements that are expected to save $76,000 in repair and maintenance costs and $60,000 in energy costs. U. S. Steel and Koppel Steel also participated in the Pittsburgh Showcase.

Most recently, the State of Utah hosted the Utah 2001 Showcase in Salt Lake City, where companies from three industries—aluminum, mining, and petroleum—demonstrated their

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latest energy technologies and management practices. The participants at the Utah event were Alcoa, Kennecott Utah Copper, Magnesium Corporation of America, Chevron, Flying J, and Silver Eagle.

Augusta Newsprint Readies to Host Showcase

Next in the line-up is a Showcase Demonstration to be hosted by Augusta Newsprint Company, in Augusta, Georgia, on March 6-7, 2002. The newsprint producer has invested in $1.7 million worth of improvements throughout the mill that will yield $1.4 million in annual energy savings. Learn more about the projects at Augusta and what to expect at the showcase in the pages that follow.

The technologies showcased at Augusta will help meet the Forest Products industry's goals set out in its *Agenda 2020* roadmap—a research plan established by the industry. Specifically, the industry is interested in improving manufacturing process efficiency, heat recovery, and the environmental impact of energy production and utilization.

NREL/PIX 10234

Vertical flotation was a new technology demonstrated at the Utah 2001 Showcase.

In addition, *Agenda 2020* lists technology demonstrations as a step toward commercial success. It states, "those facilities within the industry that act as host for… demonstrations will become a valuable and integral element of commercial success." View the *Agenda 2020* roadmap on the OIT Web site at **www.oit.doe.gov/forest**.

Showcases on the Horizon

OIT is working with industry on several upcoming showcase events. Among them is a Texas Showcase in Spring 2003 highlighting efficiency improvements at both chemical and petroleum plants. Two mining showcases—one in Nevada in August 2003 and the other in Georgia in Spring 2004—are also in the works. Check the OIT BestPractices Web site **www.oit.doe.gov/bestpractices** and future editions of *Energy Matters* for more information on upcoming showcase events. ●

A Look at What's in Store at the Augusta Showcase

The Augusta Newsprint Showcase will highlight lessons learned from process improvements that have been implemented at the paper mill. Don't miss the special sessions that focus on practical solutions to common problems, as well as state-of-the-art technology to help you improve energy efficiency and save money in your facility. Tour the Augusta Newsprint facility and learn first-hand how the mill is achieving cost and energy savings.

Who Should Attend?

Attend the Augusta Showcase to find out about state-of-the-art technologies and energy management practices that can help make your facility more competitive and energy efficient. The event is an ideal opportunity for:

- Maintenance engineers
- Operations managers
- Plant managers
- Process engineers
- Executive managers
- Financial managers
- Research directors

Augusta Newsprint Technical Presentations

Time	Track 1	Track 2	Track 3
8:00	**Compressed Air Best Practices: Technical and Financial Solutions** E-Group	**Economic Benefits from Advanced Quality Control of TMP Mills** Pacific Simulation	**Environmental Regulation Challenges for the Electric Industry** Georgia Power
9:00	**Introduction to the Energy Opportunity in Compressed Air** Goodrich Air-Science Engineering Division	**Modern Dryer Drainage & Control Systems for the Paper Machine** The Johnson Corporation	**Energy Reduction Opportunities at a Linerboard Paper Mill** Dean Oliver International
Break			
10:10	**Smart Pumping Systems: The Time is Now** Goulds Pumps	**Power and Energy Management Solutions for Today's Industry** Rockwell Automation	**Energy and Asset Performance** General Electric Company
11:10	**Pulp & Paper Industry Lighting: Whys and Why Nots** Holophane Lighting	**Tie Line-Advisory/Control Applications** Honeywell Measurex Corp.	**Paper Mill Energy Management** Emerson/Fisher Rosemount

Energy Saving Technologies for Today: Results and Lessons Learned

Choose from the technical presentations (below left) on energy management, quality control, air, water, and lighting improvements that will take place on March 7, 2002 at the Radisson Riverfront Hotel and Augusta Newsprint. For a complete schedule of the 1½-day event and registration information, please visit **www.energetics.com/AugustaShowcase/**.

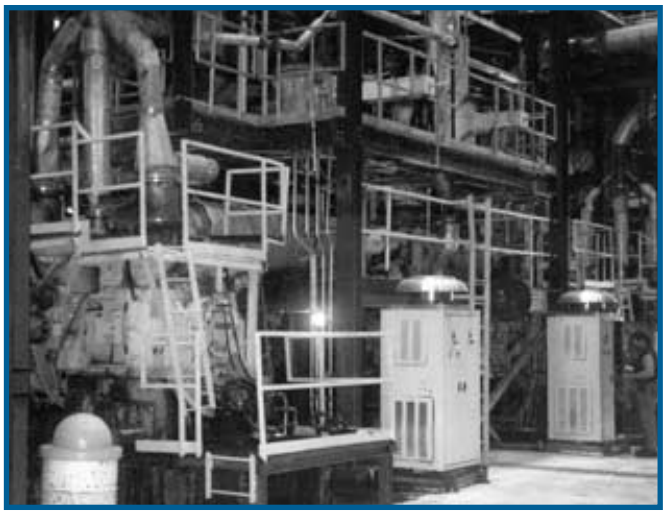
Tour and Showcase Exhibition at Augusta Newsprint Mill

Augusta Newsprint will host a tour of its facilities and an exhibition on March 7, from 1:30 to 5:00 p.m. This is your chance to:

- See technologies in practice
- Visit the Augusta Training Center for hands-on training in OIT BestPractices software tools
- Visit vendor booths
- Learn about technologies from poster sessions and detailed case studies. ●

See New Energy-Saving Technology at Augusta Newsprint

As the forest products industry faces increasing economic challenges, OIT is working in partnership with forest products companies in many ways: by facilitating and collaborating on research and development efforts, cost-sharing technology implementation, helping plants identify opportunities through plant-wide energy-use assessments, and making available technical expertise and tools to enhance manufacturing operations.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Augusta Newsprint's advanced computer modeling system controls these refiners, which are driven by 12,000-hp motors.

Augusta Newsprint Company of Augusta, Georgia, is one company that has partnered with OIT and used these resources to save $1.4 million and approximately 130 billion Btu per year. The company will be demonstrating some of the projects that are helping it achieve these savings March 6-7, 2002, during the OIT Showcase at Augusta Newsprint, presented in conjunction with the Institute of Paper Science and Technology (IPST), the Technical Association of the Pulp and Paper Industry (TAPPI), and *Agenda 2020*.

> "The showcase idea seemed like a good vehicle to improve partnerships with vendors, OIT, and IPST... We had to have the numbers to show the projects' success. You know, so many mills never optimize projects because no one checks the numbers."

Company Background

Augusta Newsprint's roots go back to 1965, when, as Cox Newsprint, it consisted of one paper machine and a groundwood mill. Today, the mill's facilities include two paper machines, a wood yard, a thermo-mechanical pulp (TMP) mill, a recycled newsprint (RNP) mill, a bark boiler, utilities, and support areas. It employs 390 people and produces 1,200 tons of newsprint per day. Abitibi-Consolidated is the managing partner that owns half of the mill, and The Woodbridge Company, a holding company for the Thomson family, owns the other half.

The mill, like all forest product businesses in the country, is continually challenged by foreign competition and other economic forces. To remain competitive, management constantly seeks ways to improve the bottom line. In May of 2000, IPST introduced Augusta Newsprint to OIT, which subsequently assisted mill management with assessing energy use and identifying energy-saving opportunities, plus sharing costs and providing technical assistance for improvements.

A Corporate Strategy on Energy Management

Augusta Newsprint has set a goal of reducing energy use by 1% each year for the next 5 years. Chuck Amos, the plant's Engineering Manager, says that the mill will be able to achieve this goal for 2002. Part of the company's strategy is working in partnership with OIT.


NREL/PIX 10714

Augusta Newsprint installed a plate-style, boiler blowdown to preheat boiler make-up water.

"Augusta Newsprint is open to new ways of doing things, taking some calculated risks, and trying new technologies," Amos says. "The showcase idea seemed like a good vehicle to improve partnerships with vendors, OIT, and IPST. We saw it as a chance to learn and grow and to focus on energy costs and savings. And, frankly, the showcase deadline helped keep the projects moving. We had to have the numbers to show the projects' success. You know, so many mills never optimize projects because no one checks the numbers."

"It turns out there were some things we could do that were very simple," according to Amos. One relatively simple project that provided "phenomenal" results was a lighting replacement project that saves the mill $46,000 per year. But there were greater opportunities to save dollars and energy in process systems.

Investments in Energy Efficiency Bring Financial Rewards

Augusta has implemented many energy-saving projects. Some of these, which will be demonstrated at the showcase, follow.

Compressed Air. After doing a compressed air survey, management decided to increase system storage capacity, tie two mill systems together with improved controls, and repair leaks. These actions, which cost $75,000, are saving the mill $60,000

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New Technology at Augusta Newsprint
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per year. Amos said that the survey results "surprised all of us. It showed us that, even though we're experienced, we were unaware of some important issues."

TMP LD Transfer Pump Upgrade. This project involved removing a 10-inch control valve and installing a variable frequency drive to control pump speed based on flow requirements. It required a $15,000 investment, but will save the mill $20,000 per year in energy costs. (See page 5 for more about this project.)

#1 Paper Machine Fan Pump Motor Replacement. Augusta Newsprint replaced a 1,250-hp (900-rpm) motor with an 800-hp (720-rpm) motor to more accurately provide only the needed stock flow for the #1 paper machine. A total of 500 hp is being saved by no longer pumping excessive flow against a closed control valve. The mill invested $123,000 on this project and will save $93,500 per year in energy costs.

Advanced Quality Control Project. The Advanced Quality Control (AQC) project is one that may reap the most impressive results. "Early on, some of us were skeptical about this project," Amos says, "But now we're really enthusiastic."

Paper Summit 2002 and TAPPI Event in Conjunction with Augusta Showcase

Take advantage of another opportunity to learn about energy-saving technologies in the paper industry. In addition to attending the Augusta Newsprint Showcase, plan to attend Paper Summit 2002, including TAPPI's "Energy Results Showcase: Meeting Today's Challenges," being held in Atlanta, Georgia, March 3-6, 2002. Transportation will be available between Atlanta and Augusta for attendees of both the Augusta Showcase and the Paper Summit. For more information on attending Paper Summit 2002 in Atlanta, please contact Erin Layton by phone at 212-268-4160 ext. 125, by fax at 212-268-4178, or by e-mail at elayton@paperloop.com. Or, visit the Paper Summit Web site at ***www.papersummit.net****. For more information on attending TAPPI's Energy Results Showcase, contact the TAPPI Member Connection at 1-800-332-8686 (USA) or 1-800-446-9431 (Canada).*

The first phase of the AQC project was installed in the TMP mill of the Augusta Newsprint facility in December of 2001. The two main goals are to minimize energy consumption and high-cost kraft pulp consumption by improving TMP quality. The project has been a joint effort between mill staff, Invensys' Pacific Simulation, and OIT. After investing $1.4 million, the AQC project is expected to save Augusta Newsprint, $1.12 million per year and reduce consumption of kraft pulp by 2,000 metric tons. Furthermore, energy use is expected to be cut by 7,200 MWh per year. (See below for more about this project.)

Get Involved!

The technologies featured in OIT showcases can be replicated throughout U.S. industry. Your company may benefit financially by applying some of the innovations that will be on display at the OIT Showcase at Augusta Newsprint. So register now. For more information, see the Calendar on the BestPractices Web site at **www.oit.doe.gov/bestpractices**. To learn more about how your company can participate in OIT's showcases, see "Acquire New Technology, Tech Support, and Savings–Host a Showcase!" on page 6. You can also log on to the BestPractices Web site and click on the "Showcase Demonstration" link. ●

Advanced Quality Control Enhances TMP Operation

When Augusta Newsprint and DOE assessed opportunities for improving energy efficiency and productivity throughout the plant, the potential in the mill's thermo-mechanical pulp (TMP) process could not be overlooked. The company took steps to improve the TMP process—among the most significant was implementing an advanced quality control (AQC) solution. Augusta will demonstrate the project at its Showcase Demonstration event in March.

TMP is the process Augusta Newsprint uses to produce pulp from wood chips. The process uses heat (thermo) and rotating plates (mechanical) to grind wood chips into individual fibers using 12,000-hp motors. The route from wood chips to pulp demands large amounts of energy and constant quality control. "Any major change in this area can dramatically improve our bottom line," explains John Green, the Project Engineer at Augusta Newsprint who oversaw this project.

The mill focused on making the TMP process more efficient, Green says, "because electrical energy accounts for 23% of the cost to produce 1 ton of paper. Of that, the TMP process *alone* accounts for 71% of electrical energy use."

Partnership Leads to Solution

To optimize the TMP process, Augusta Newsprint and Invensys' Pacific Simulation group teamed up to implement AQC. As a result, Augusta expects improved energy efficiency, reduced manufacturing costs, and improved product quality. Augusta will invest $1.4 million in the system over 4 years and estimates annual savings of $1.12 million.

The solution involved installing an advanced, model predictive multi-variant controller that works with the mill's existing distributed control system. The method provides real-time and online predictive models and modifies control actions to maximize quality and minimize costs. Using software sensors, the system can predict difficult-to-measure quality and process variables; its model predictive control algorithms also control quality.

Mill operators use AQC as a tool for maintaining product quality and reducing costs in the TMP process.

In addition to helping Augusta Newsprint reduce the energy required for manufacturing, the AQC solution allows the mill to modify its production schedule to match real-time pricing from the electrical market. A time-of-day production control forecasts the upcoming market power price using readily available data, then adjusts production rates in the pulping operation to

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State-of-the-Art Technology Boosts Pumping System Efficiency at Augusta

When OIT performed a plant-wide assessment at Augusta Newsprint in 2000, the mill ranked high in overall energy efficiency. However, the assessment revealed numerous opportunities to improve electrical energy consumption across the various mechanical systems in the mill. Among the areas that could be improved was Augusta's pumping system. DOE's *United States Industrial Electrical Motor Systems Market Opportunities Assessment*[1] report, published in 1998, revealed that centrifugal pumps were the single largest energy consumers in pulp and paper mills. At Augusta Newsprint, pumps consume 21% of the mill's energy.

After OIT's initial assessment, Augusta decided to target process pumps, in general, and its thermo-mechanical pulp (TMP) mill, in particular, for more in-depth study. Together, with project partners Dean Oliver International (DOI), an Atlanta-based consulting firm, and ITT Goulds Pumps, a supplier of process pumps to paper mills and a BestPractices Allied Partner, Augusta Newsprint analyzed and reviewed more than 150 pumping systems at the mill. This included motor and pump systems in the paper mill, the refiner mechanical pulp mill, and the TMP plant. The review also revealed areas of improvement in the process equipment and control strategies in the TMP mill.

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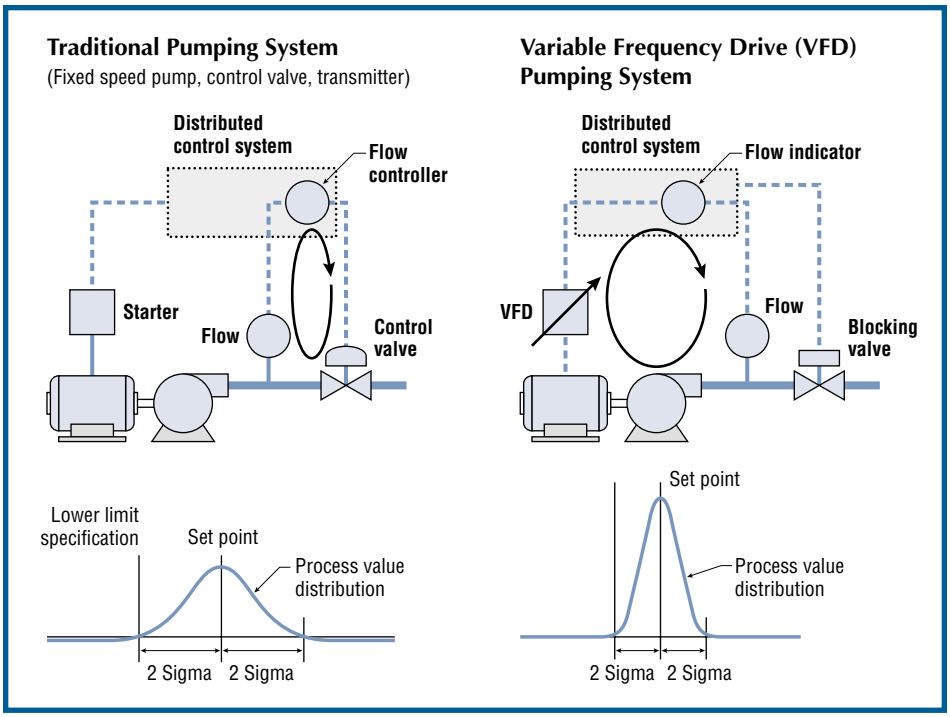
Software embedded in the controller microprocessor becomes the "brains" of a pumping system.



Augusta replaced traditional valve control with VFD technology on one of its TMP pumps.

Showcase Workshop will Highlight Smart Pump Technology

Just as an intelligent flow control system helped Augusta Newsprint improve its TMP pump system, this advanced technology could also help other plants achieve energy and cost savings. Learn more about smart pump systems at the Augusta Newsprint Showcase by attending "Smart Pumping Systems: The Time is Now," *a workshop led by OIT Allied Partner ITT Goulds Pumps. The discussion will include a more in-depth look at the implementation of intelligent flow control at Augusta Newsprint and will present the potential for wider applications.*

According to DOE, most of the motor system energy savings in the U.S. pulp and paper industry are concentrated in pump system improvements, particularly those that involve mid- to large-size pumps. Efficiency measures such as replacing throttling valves with speed controls can yield savings that range from 5% to 50% of the system's total energy use.[1]

The Finnish report Expert Systems for Diagnosis of the Condition and Performance of Centrifugal Pumps,[2] *concurs that there is plenty of room for improvement when it comes to pump system efficiency. A review of 1,760 pumps at more than 20 industrial sites showed that average pumping system efficiency was below 40%, with 10% of the pumps operating below 10% efficiency. Furthermore, these studies estimate that 70% of pumping systems are oversized and operating with throttled valves, frequently less than 50% open. Throttled valves cause significantly higher energy consumption and reduced system reliability.*

In the past, using oversized pumps has been the standard practice to ensure throughput during peak production periods or to accommodate capacity growth. However, today's variable frequency drive (VFD) technologies may offer many advantages to traditional valve-controlled fixed speed systems.

Reliability and unit costs of VFD systems have improved dramatically, and as energy costs continue to increase, VFD technology is gaining wider acceptance as a fundamentally better way to run continuous and, in some cases, batch processes. Smart pump technology involves embedding intelligence about the pumping system in a microprocessor-based VFD.

See page 2 for a schedule of the smart pumping system workshop, and plan to attend.

[1] *United States Industrial Electrical Motor Systems Market Opportunities Assessment,* 1998, page 14 and page 18 (Table E-7).

[2] Jantunen, Erkki Kirsi Vaha-Pietila, and Kimmo Personene, Technical Research Center of Finland, Manufacturing Technology. Presented at the VTT Symposium 172, COMADEM '97, 10th International Congress and Exhibit on Condition Monitoring and Diagnostic Engineering Management, Vol. 2.

Pumping System Efficiency

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Since June 2001, when DOI presented the findings of its study, Augusta Newsprint has implemented several of the recommendations. The mill will demonstrate some of the technical and economic results when it opens it doors for the OIT Showcase event this March.

Among the technologies to be demonstrated is the application of smart pump technology, which has improved control of low-density stock level in one of the mill's TMP storage towers. Before the improvement, the mill relied on a valve to control flow from the tower's 200-hp fixed-speed pump. This application consumed significantly more energy because of the high system head associated with the throttling control valve. Furthermore, throttling as a means of controlling flow caused severe cavitation across the flow control valve. Cavitation often leads to valve and piping damage, resulting in frequent valve failures.

The solution was an installation of a state-of-the-art variable frequency drive (VFD) that incorporates intelligent flow control. This new technology has significantly reduced energy usage, while eliminating the valve and its associated repairs. Augusta Newsprint could achieve a total saving of about $231,000 over the 20-year life cycle of the pump, in maintenance, operations, and other costs. The company estimates energy cost savings of $12,000 annually from installation of the new technology on one pump. ●

[1] The report is available on the OIT BestPractices Web site at www.oit.doe.gov/bestpractices.

Quality Control Enhances TMP Operation

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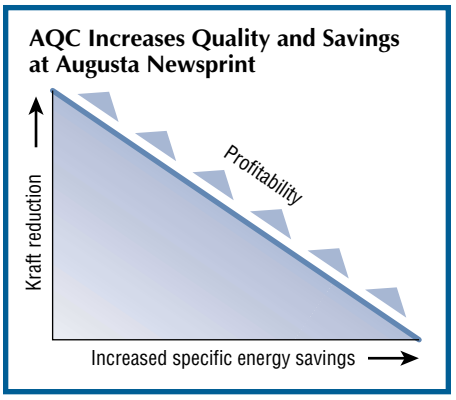
minimize average purchased energy cost. Because of this feature, Augusta can better manage energy use while maintaining quality and paper machine production rates. The figure at right illustrates how this leads to improved profitability for Augusta Newsprint.

The AQC system is not a substitute for Augusta's skilled and trained operators, but rather provides a flexible and integrated way to enhance their capabilities. Operators now have a tool that allows them respond to dynamic market and process conditions and operating costs while maintaining product quality.

Although Augusta Newsprint expects the system to begin paying off almost immediately, this is only the first phase of the AQC solution. The next phase, which involves performance monitoring and system optimization, will take place over the next 3 years. During this time Augusta will continue to work in partnership with Invensys' Pacific Simulation group to ensure long-term and sustainable results. ●



AQC helps the mill respond to variable economic conditions for purchased kraft or electricity.

AQC at Work

At the Augusta Newsprint Showcase, you will see just how the mill's AQC system works in real time. Augusta Newsprint and Invensys' Pacific Simulation group will demonstrate via a remote link how the control system interfaces with the existing distributed control system and operators, and present the system's status and benefits.

Invensys will also lead a technical session on the "Economic Benefits from Advanced Quality Control of TMP Mills." *Like Augusta Newsprint, other mills are looking for ways to remain competitive—and applying AQC technology could be a major step in that direction. Learn why Augusta and other mills are finding that while implementing such a system can provide measurable results in the short term, AQC is really a long-term solution to help improve operations and reduce costs. The presentation will cover:*

- *An overview of AQC technology*
- *Which sites should apply AQC*
- *Economic comparisons*
- *Case study examples*

Attend the session to find out how the analysis performed at Augusta Newsprint might be applied in other industries to improve operations and reduce operating costs. The discussion will also include other methods of total plant energy analysis that are similar to the AQC analysis.

See the schedule on page 2 and plan to attend this presentation.

Acquire New Technology, Tech Support, and Savings—Host a Showcase!

If you have upgraded, or are thinking about upgrading your manufacturing facility to improve its energy efficiency, consider hosting an OIT Showcase Demonstration event. Your company will:

- *Gain access to energy-efficient technologies, technical assistance, decision-support tools, and information from OIT*
- *Achieve bottom-line energy savings and productivity improvements*
- *Validate the benefits of using advanced technologies and best energy-management practices*
- *Create good public relations*
- *Become a leader in energy and resource efficiency*

OIT targets nine energy-intensive industries when selecting Showcase Demonstration companies. These Industries of the Future include agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum refining, and steel.

To get started, visit the OIT Web site at ***www.oit.doe.gov*** *and contact the team leader for your industry listed on the Industries of the Future page. Learn more about hosting a Showcase Demonstration on the BestPractices Web site at* ***www.oit.doe.gov/bestpractices/pdf/showcases.pdf****.*