



PumpLines

Innovation...Technology...Leadership

WINTER 2002

Investments in Energy Efficiency Result in Operational Cost Avoidance

Augusta Newsprint teams with DOE to implement many energy-saving projects.

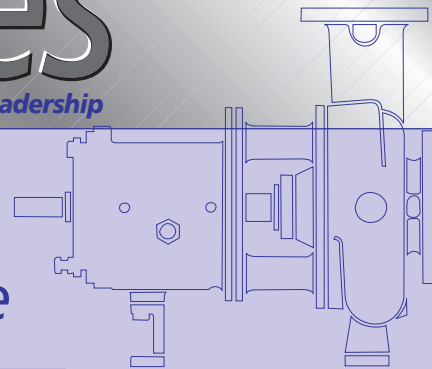
Donald G. Meadows, Senior Editor *Solutions*
Mike Pemberton, Marketing Manager, PumpSmart Control Solutions

A Department of Energy sponsored showcase was held at Augusta Newsprint's Mill in Georgia recently. Several energy saving technologies have been installed for demonstration. One of the new technologies being highlighted is a PumpSmart system from ITT Industries' Goulds Pumps / PumpSmart Control Solutions business unit. This variable speed control system, with embedded intelligence, has allowed the removal of a cavitating control valve, reduced energy usage, and increased the MTBF of a 200 horse-power centrifugal pump.

Augusta Newsprint's roots go back to 1965, when, as Cox Newsprint, it consisted of one paper machine and a ground-wood 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. Augusta Newsprint employs 390 people and produces 1,200 tons of newsprint per day. The raw material for the newsprint is 65% southern pine and 35% recycled content consisting of old newspapers and magazines.

Economic forces continually challenge the mill, like all forest product businesses in the country. To remain competitive, management is constantly seeking new ways to improve the bottom line. In May of 2000, Augusta Newsprint consulted with the Department of Energy's Office of Industrial Technology (OIT), which subsequently assisted mill management with assessing energy use and identifying energy-saving opportunities - all of this leading to an industry showcase.

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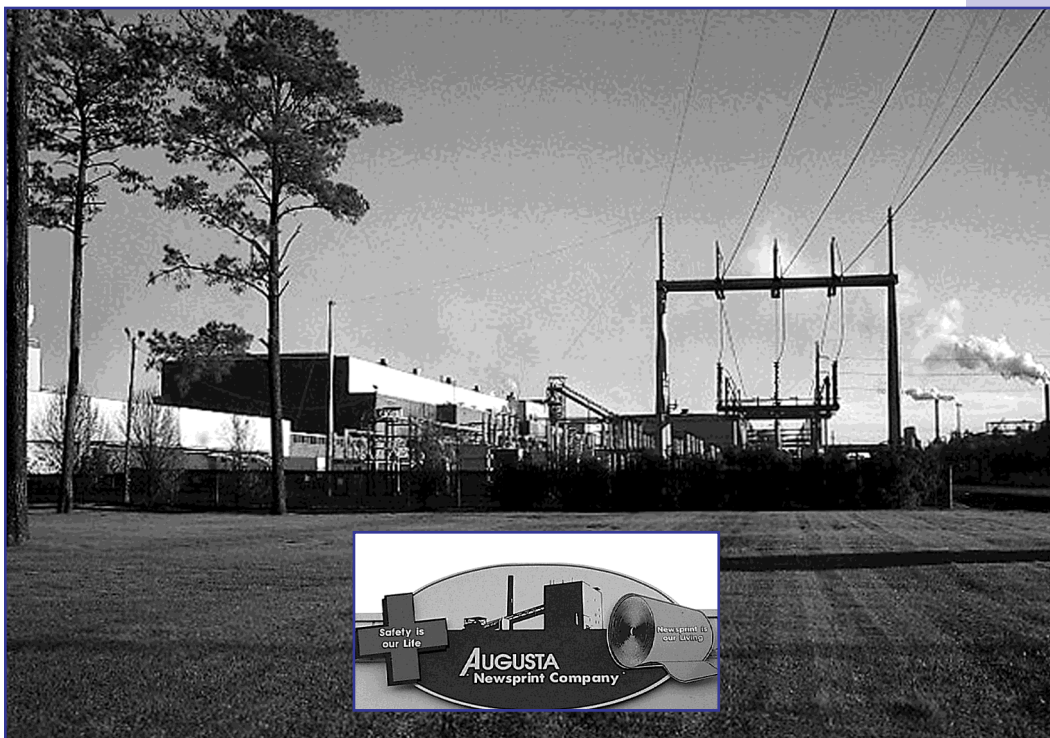
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Investments In Energy...

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Mill Showcases New Energy-Saving Technologies

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 spotlight energy and cost-saving technologies that have been implemented at industrial facilities.

The Showcase process usually begins with a plant-wide assessment performed with the assistance of OIT's Best Practices 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.

"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.

"Augusta Newsprint is open to new ways of doing things, taking some calculated risks, and trying new technologies," said Chuck Amos, the plant's Engineering Manager. "We saw it as a chance to learn and grow and to focus on energy costs and savings."



Figure 1. Inefficient valve throttling controlled flow from 200 HP fixed-speed pump.

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

When OIT performed the plant-wide assessment at Augusta Newsprint, 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* report, published in 1998, revealed centrifugal pumps, as a group, 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 thermomechanical pulp mill (TMP), in particular, for more in-depth study. Together, with project partners Dean Oliver International (DOI), an Atlanta-based consulting firm, and ITT Industries' Goulds Pumps unit, a major supplier of process pumps to paper mills and a Best Practices Allied Partner, Augusta Newsprint analyzed and reviewed more than 150 pumping systems at the mill. This review included motor and pump systems in the 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 plant.



Figure 2. Flow tube replaces inefficient control valve.

PumpSmart® Control System

Among the technologies demonstrated at the showcase was the application of Goulds PumpSmart control system, which has improved control of the low-density stock level in one of the mill's TMP storage towers. Before the PumpSmart installation, the mill relied on a valve to control flow from the tower's 200-hp fixed-speed pump (Figure 1 & 2). 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 the installation of a PumpSmart (on an Ahlstrom pump) a state-of-the-art variable frequency drive (VFD) that incorporates intelligent flow control (Figure 2). This new technology has significantly reduced energy usage and motor speed (reduced from 1150 RPM to around 450 RPM), while eliminating the control valve and its associated repairs. Augusta Newsprint will achieve **a total saving of about \$720,000**, over the 20-year life cycle of the pump, in maintenance, operation, and other life cycle costs. The company estimates **energy cost savings of over \$30,000 annually** from installation of this new technology on just one pump.

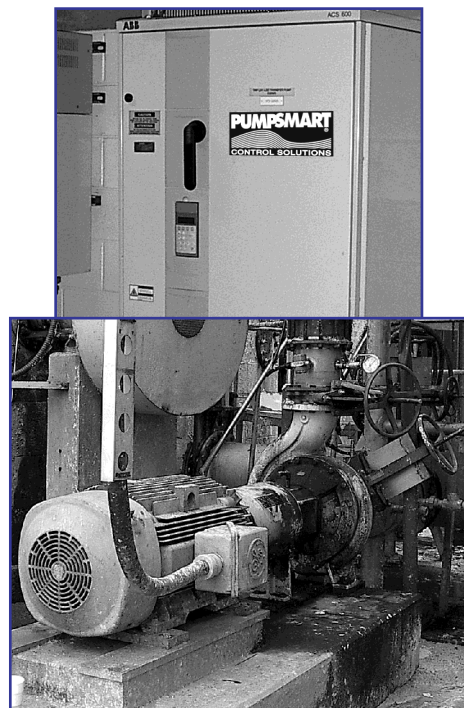


Figure 3. PumpSmart intelligent flow control system will save \$30,000.

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PumpSmart Benefits

Gooulds PumpSmart system uses any standard centrifugal process pump in conjunction with ITT Industries' unique and patented PumpSmart Control System and Software. Intelligent flow control protects the pump from catastrophic damage caused by cavitation, closed valves, and low flow conditions.

The software, which resides in the controller microprocessor, is the brain of the system, allowing the pump to monitor and react to any system condition (Figure 3). The result is lower total lifecycle cost, better process control, and improved asset management. According to Mike Pemberton, Marketing Manager for PumpSmart Control Solutions, "In a market place that is relentless on cost, PumpSmart offers mills a powerful tool to lower operating cost while optimizing asset utilization."

That reduced life cycle cost includes reduced installation costs because the wiring and piping of valves, flow meters and recirculation lines are eliminated. Operating costs are reduced with PumpSmart because the pump operation matches the system requirements without control valves. The variable speed control operates the pump at the best efficiency point (BEP) and at a slower RPM. Energy consuming control valves, flow meters and recirculation lines are eliminated. The energy savings are calculated and displayed at the DCS or on the PumpSmart keypad. PumpSmart also provides customers with reduced maintenance costs and increases MTBF.

Showcase Workshop Highlights Smart Pump Technology

Just as an intelligent flow control system helped Augusta Newsprint improve its TMP pump system, PumpSmart's advanced technology can also help other plants achieve energy and cost savings.

According to the DOE *Motor Market Assessment* report, 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.

The Finnish Technical Research Center (for Manufacturing Technology) Report: *Expert Systems for Diagnosis of the Condition and Performance of Centrifugal Pumps*, 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 result in significantly higher energy consumption and reduced system reliability (Figure 3).

In the past, using oversized pumps has been the standard practice to ensure throughput during peak production periods or to accommodate capacity growth. However, smart VFD technologies such as PumpSmart 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.

Augusta Newsprint has set a goal of reducing energy use by 1% each year for the next 5 years. Thanks in part to the energy savings supplied by one PumpSmart-equipped centrifugal pump, the mill will be able to achieve this goal for 2002. ■

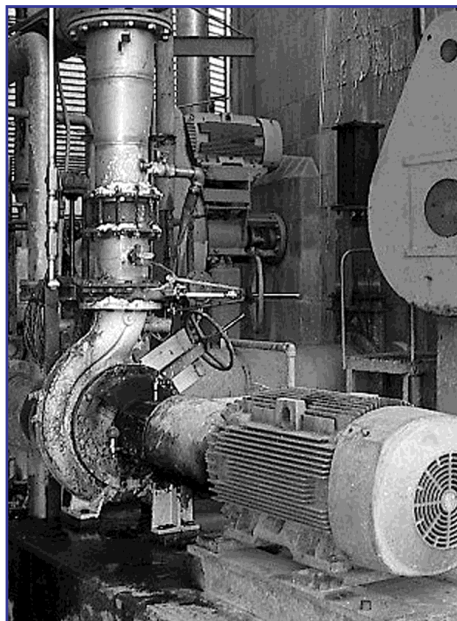


Figure 4. Fixed-speed pump with throttling valve results in higher energy consumption and reduced system reliability.

Tech Talk

Improving Pump Reliability Through Robust Designs and Pump Selections

Stan Knecht

Global Market Manager - Chemical Products

Over the course of the past ten years, pump users have made much progress towards improving pump reliability. These activities started in the late 80's and early 90's mostly stemming from Total Quality initiatives where-by tools like root-cause failure analysis, statistical analysis techniques and a heightened awareness. Education through "Best Practice" forums have allowed users to identify some of the elementary issues which accounted for a significant portion of pump failures and downtime. Since that time most users have implemented or are implementing some form of Reliability Improvement programs. These typically involve some or all of the following activities which allow them to identify and implement corrective actions long before equipment failure occurs. Result, increased Mean-Time-Between-Failure (MTBF) intervals:

Typical Reliability Improvement Initiatives

1. Vibration monitoring and trending
2. Lubrication oil analysis and sampling
3. Improved pump alignment and pump installation practices
4. Improved rotor balance

The collective result of these initiatives have been impressive. Surveys of pump user in the North American chemical industry have shown typical improvements in MTBF from 15 months to 24 months.

While improvements like these have helped many companies to improve profitability and to maintain their competitiveness, the ever-increasing pressures of today's marketplace has many users now looking for additional measures to further increase MTBF to maintain their competitive edge.

When you analyze the actions taken to date one can see that the focus has been primarily on improving mechanical aspects of equipment reliability. In essence we likely have harvested the low hanging fruit, yet to begin to harvest the higher level fruit, one will need to take a more holistic approach and begin to

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