



2006 Forum on Energy:
Immediate Solutions,
Emerging Technologies
May 15-17
Appleton, WI

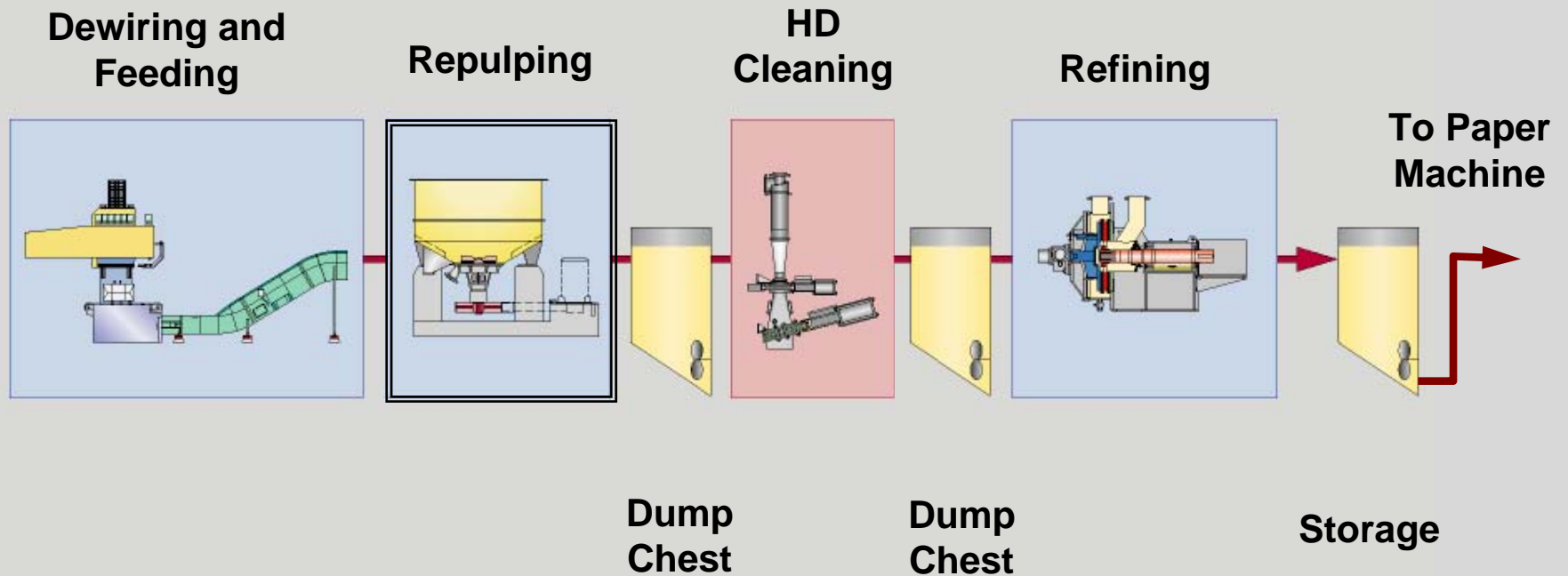
Energy Efficient Repulper Rotor Blade

Case Study At Wausau Paper –
Rhineland, WI

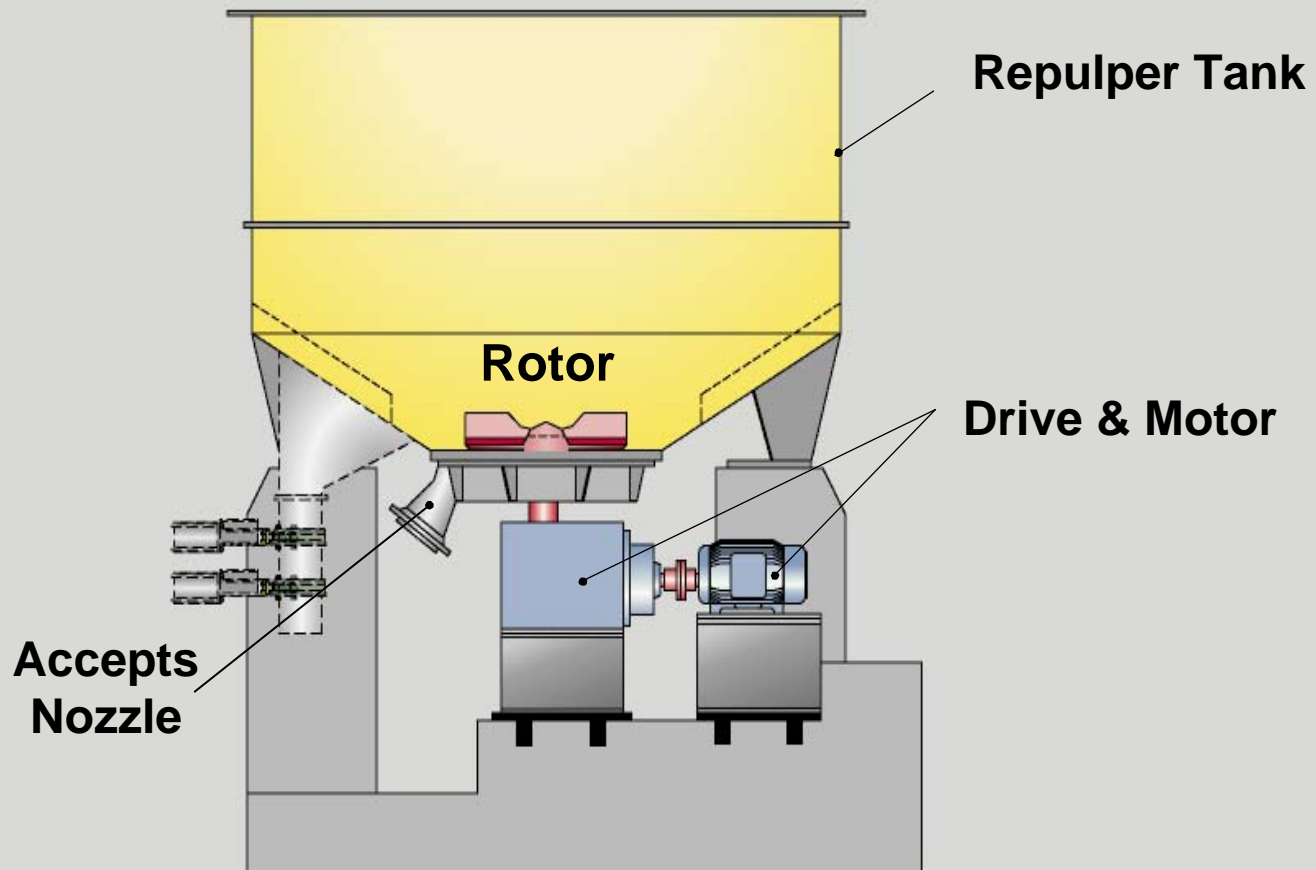
Presented by:
Bill Fineran
Manager, Business Development
Voith Paper – Appleton, WI

VOITH
Engineered reliability.

Virgin Pulp Preparation



The Repulper

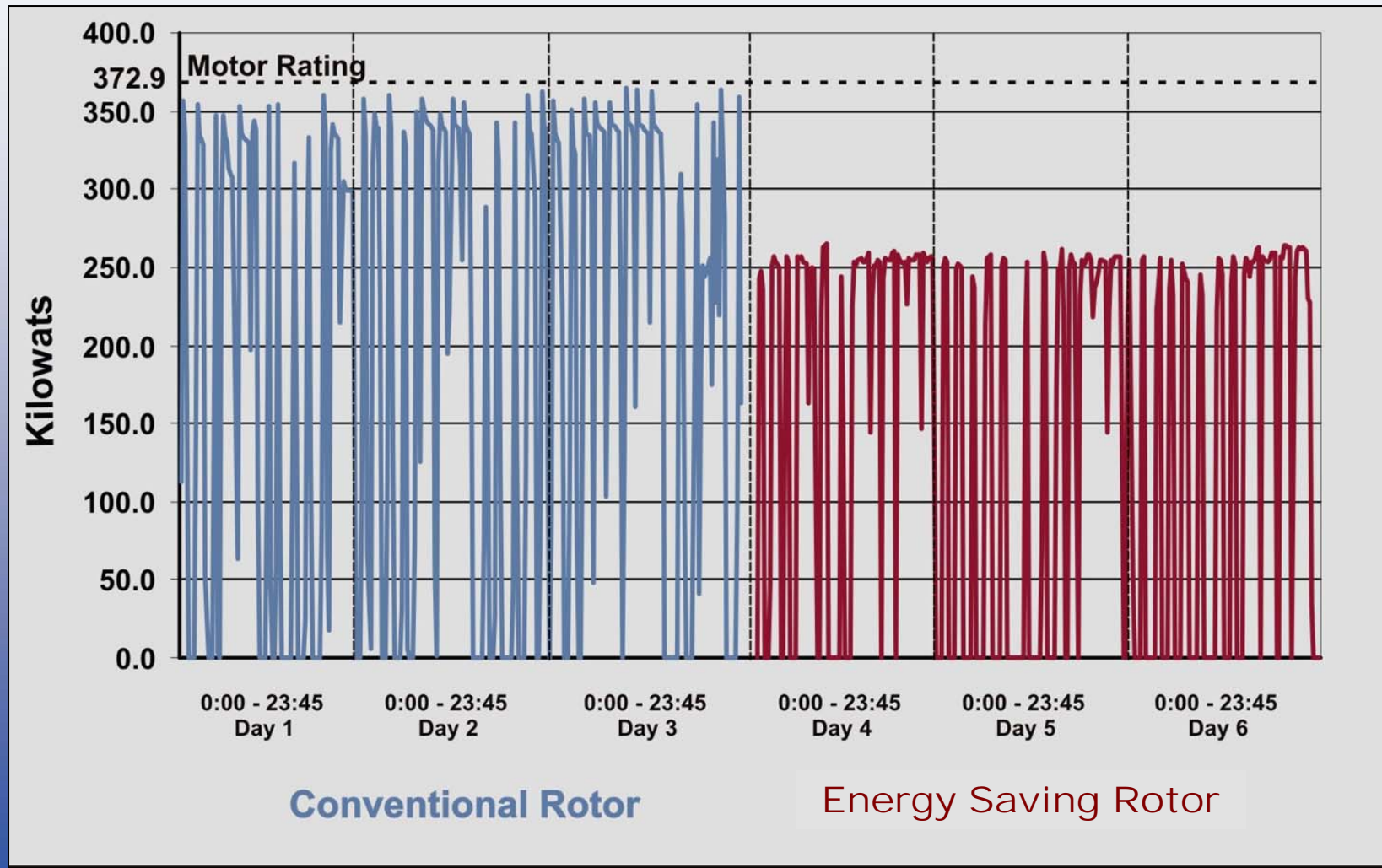


The Repulper



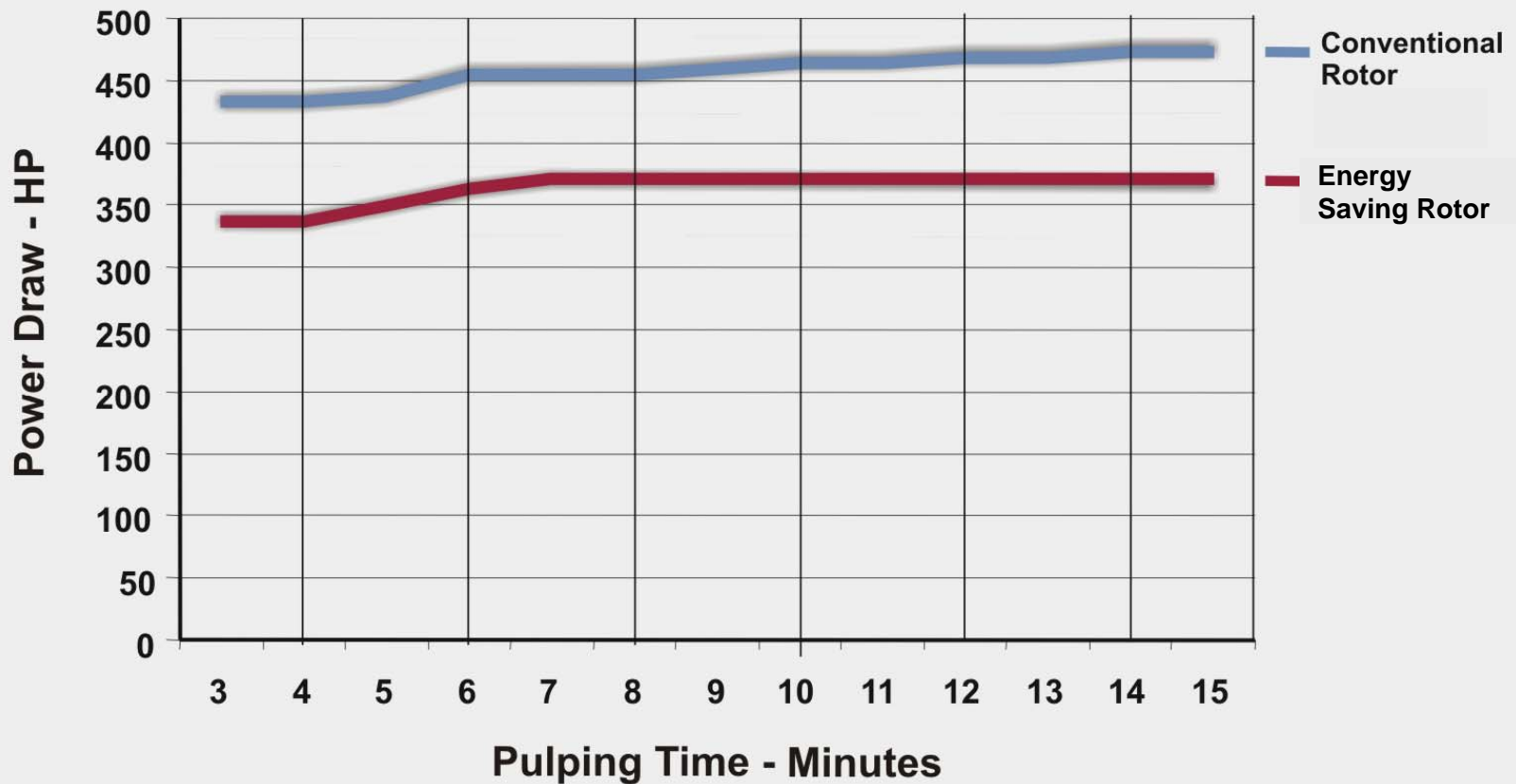
Batch Repulper Power Response

Three Day Comparison



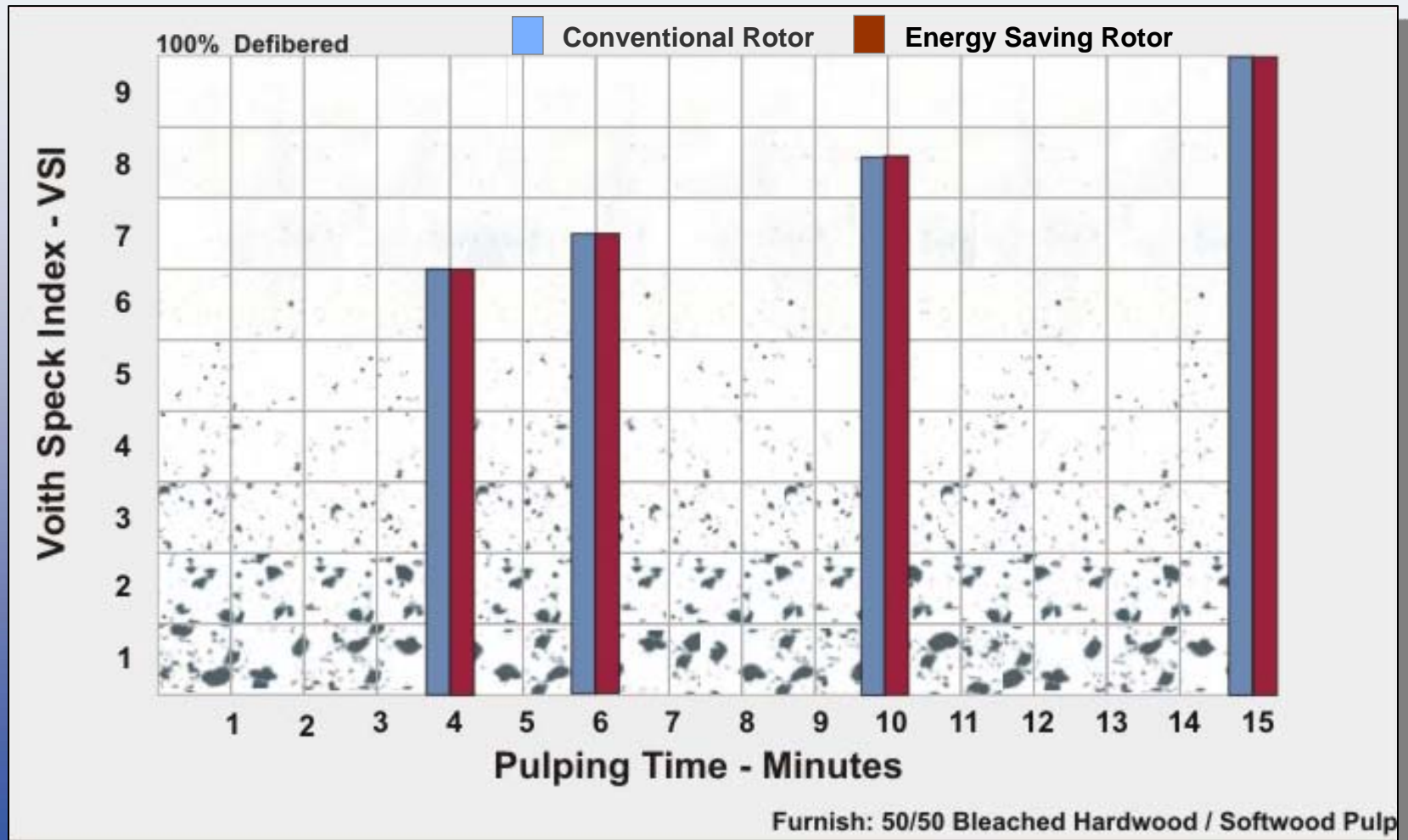
Batch Repulper Power Response

Single Batch Comparison



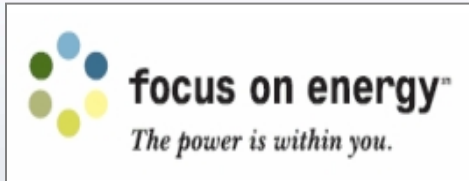
Furnish: 50/50 Bleached Hardwood / Softwood Pulp

Batch Repulper Defibering Index



Summary of Energy Savings

| | Conventional Rotor | Energy Saving Rotor |
|---|--------------------|---------------------|
| Average Consumption (kW) <i>Batch Cycle (fill, pulp, dump)</i> | 336 | 259 |
| Peak Consumption (kW) | 368 | 265 |
| Motor Operation (h / day) | 20.8 | 20.8 |
| kWh / day | 6,989 | 5387 |
| kWh / year (350 days) | 2,446,150 | 1,885,450 |
| kWh / ton _{raw} (average) | 22.3 | 17.2 |
| | | |
| kWh / year saved | | 560,700 |
| Energy Cost Savings @ USD 0.05 / kWh | | \$ 28,035 |
| kWh / ton_{raw} (average) saved | | 5.1 |



Case Study

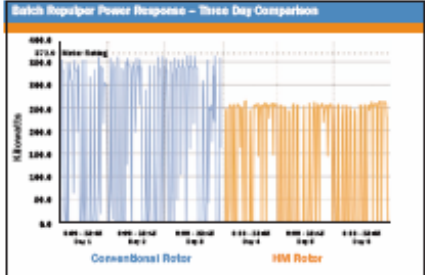
PULP & PAPER INDUSTRY CASE STUDIES

Repulper Rotor Reduces Energy Costs by 23 Percent

THE OPPORTUNITY
Wausau Paper, located in Rhinelander, uses 50 percent hardwood and 50 percent softwood in its process furnish mix. The mix consists of all virgin fiber (non-recycled) purchased in the form of dried pulp bales. The mill had a goal of trimming its repulping costs, without compromising production. The company considered installing a new energy efficient Voith HM repulper rotor, but had questions about the energy savings claims and the potential risk to product quality.

THE SOLUTION
Focus on Energy, Wisconsin's energy efficient and renewable energy program, offered a study grant of \$10,000 to verify the energy savings of the new energy efficient repulper rotor. Wausau Paper agreed to install and test the new rotor. The project was metered with the assistance of Wisconsin Public Service Corporation, the utility servicing Rhinelander, to verify energy savings. Focus on Energy also provided technical support for the study.

The new 500 hp HM rotor reduced the demand and energy by an estimated 23 percent when compared with a new conventional HOG rotor under similar process situations (see Figure 1).



Courtesy: Voith Paper and Wisconsin Public Service Corporation
Figure 1. Pulper Power Draw at Wausau Paper

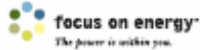
Typically, repulpers run continuously, 24 hours per day, with little or no downtime. The repulper at Wausau Paper runs an estimated 60 percent of the time. Based on the metered data of this study, a typical mill can expect similar savings that will likely result in a one to two year payback. See Figure 2 for this analysis. Savings values are extrapolated by assuming continuous batch operation at 24 hours per day.

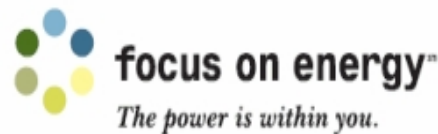
| Metered Data | | |
|---|--------------------|-----------|
| | Conventional Rotor | HM Rotor |
| Average kW* | 187 | 146 |
| Peak kW | 368 | 265 |
| Estimate for Continuous Operation (extrapolated from metered data) | | |
| Average Consumption (kW) | 336 | 250 |
| Motor Operation (hrs/day) | 20.8 | 20.8 |
| Daily Consumption (kWh) | 6,980 | 5,367 |
| kWh / year (350 days) | 2,446,150 | 1,885,450 |
| Energy Savings (MWh/Year) | - | 560,700 |
| Annual Cost Savings | - | \$28,035 |
| Payback Range (years) | - | 1 - 2 |

* Includes off-times - see Figure 1 graph.

Figure 2. Expected Energy Savings for Typical Mill

Voith and Wausau Paper also closely examined defibering time, freeness and final product attributes. The same size batch was used for both pre- and post-testing. The defibering time was the same for each test. The new energy efficient rotor defibered the pulp furnish to the same degree as the conventional rotor with no effect on fiber quality.





Best Practice

PULP & PAPER
INDUSTRY
BEST PRACTICES

Energy Efficient Repulper Rotor

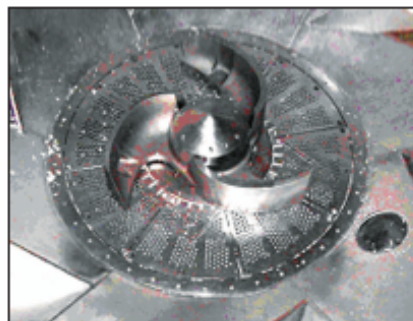
REPULPING

A repulper is a giant blender – a big tank with a mixer on the bottom. As dried pulp bales are added to water in the tank, the mixer, or rotor, agitates the material. Using a process similar to a washing machine, the rotor blades draw the dried pulp below the water's surface to defiber the pulp mix.

Non-integrated mills must purchase their raw paper-making fibers. The fibers are delivered in the form of dried pulp bales. The mills repulp the bales to prepare the pulp fibers for delivery to the paper making process.

ENERGY EFFICIENT REPULPER ROTOR

Because rotors are rebuilt or replaced periodically, facility managers have the opportunity to investigate new repulper rotors for their facility. Manufacturers of paper process equipment have recently designed new energy efficient repulper rotors to help mills offset rising energy costs (see Figure 1).



Courtesy of Voith Paper

Figure 1. Energy Saving Repulper Rotor Blade

WHERE TO USE THE REPULPER ROTORS?

The new energy efficient repulper rotors can be used for both virgin pulp and recycled pulp; in the secondary processing area and on the paper machine.

WHAT IS THE ECONOMIC RETURN?

Energy efficient repulper rotors can cut repulping energy by 20 percent to 30 percent for an estimated annual savings of \$30,000 for a 500 hp repulper.

The payback for an energy efficient repulper rotor that runs constantly is estimated to be between one and two years. The payback is even attractive for a rotor that runs 50 percent of the time. Since the technology is not considered capital intensive – a new energy efficient rotor can be installed in an existing repulper – the simple payback is often less than one year. See the Wausau Paper case study on the reverse side.

Focus on Energy can assist you in advance by performing an economic analysis to consider the effects of actual site conditions, hours of operation and process controls. Note: along with our technical support we are now offering a special incentive for a limited time.

Special Incentive \$20 per motor horsepower

For a limited time, Focus on Energy is providing a \$20 per motor hp incentive when you install an energy efficient repulper rotor in your eligible facility. (Not available for under machine applications.)

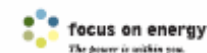
Call 608.277.2941 for more information.

Focus on Energy provides specialized Best Practice support for Wisconsin Pulp and Paper mills, including project evaluation assistance and monetary incentives for stalled projects.

To improve process efficiency at your mill, contact Focus on Energy. We can assist you with a project feasibility study grant and/or a project implementation grant. Additionally, we can help you find a trade ally for project support.

Call 800.782.7077 and ask to speak with a member of the Industrial Team.

Focus on Energy is a public-private partnership offering energy information and services to energy utility customers throughout Wisconsin. The goals of this program are to encourage energy efficiency and use of renewable energy, enhance the environment and ensure the future supply of energy for Wisconsin. 800.782.7077 focusonenergy.com
©2005 Wisconsin Focus on Energy 09-3185-4205

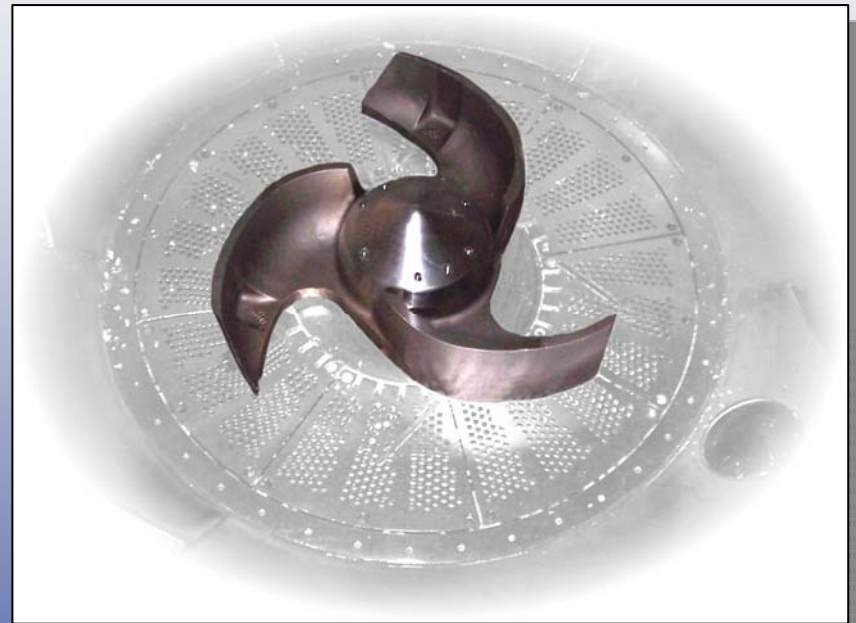


Special Thanks to Wausau Papers

- Especially to the Management and Operation teams of their Rhinelander, WI mill.
- Wausau Paper manufactures and converts a broad line of premium printing, writing, imaging and offset papers in a wide selection of weights, sizes, grades and colors.
- In addition to their use of recycled fiber in many of their paper grades, Wausau Paper is working hard to minimize their environmental impact throughout the manufacturing process – and conserve water and energy so that they'll be there for future generations.

Energy Efficient HM Repulper Rotor Blade

Energy is a
Controllable
Operating Expense !



Thank You

PRESENTED BY

Bill Fineran

Manager, Business Development

Voith Paper – Appleton, WI

bill.fineran@voith.com