IT'S A DIRTY JOB

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PUMPS AND VALVES DO SOME OF THE NASTIEST WORK IN PULP AND PAPER MILLS. WHICH APPLICATION GETS YOUR VOTE FOR WORST OF THE WORST?

THE LIFE OF ANY PUMP OR VALVE IN A PULP MILL OR paper mill would never be called easy. They work hard, never get any time off, and their reward is often a life-span measured in days. But even in these mostly thankless applications there's tough and then there's TOUGH.

VALVES

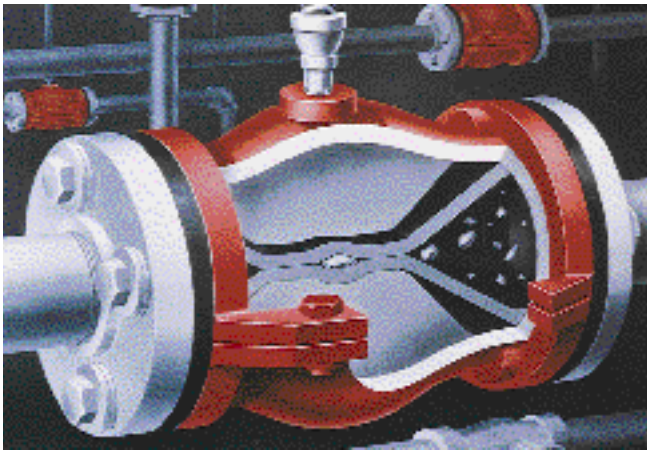
When the going gets tough,the toughest valves are found in batch digester blowdown applications. The chips inside the digester are under tremendous pressure,and at some point that pressure will be released ... all at once ... through a small opening.A virtual explosion of chips will blast its way into the batch digester valve, and that valve had better be ready to take the punishment.

Continuous digester applications are no picnic either. Because the digester is cooking and releasing chips all the time there's always the danger of overflowing the valve. The key here is control. With a batch digester, the trick is to open the door as wide as possible and as fast as possible and then get out of the way! For a continuous digester, the valve needs to be a little more selective about what gets through the door, and when.

By-products and waste from the pulping process also present tremendous challenges for valve manufacturers and mills. Black liquor, green liquor, and white liquor must be transported through the system as well as the lime mud slurry created when lime is used in the digesters.

Valves that can handle frequent, rapid cycling, that can resist talc and clay abrasion,and that will not be subject to scaling from lime are critical in these applications. Pinch valves are particularly well-suited for these services because their flexible elastomer sleeves are abrasion-resistant and cannot freeze or scale from solidified lime.Each time the sleeve flexes,lime breaks away. There is no packing to maintain with pinch valves, which reduces maintenance.

Perhaps the greatest future challenge will be in dealing with recycled paper. First there are the technical and environmental problems associated with deinking and removing adhesives. Then comes the practical issue of turning all this recycled paper and old corrugated clippings into usable pulp that won't plug your valves or pumps. This is a relatively new challenge that mills and suppliers are beginning to tackle.



Pumps discharging sludge from the decant canal are located at the end of a pier jutting out into the decant canal. For cleaning, the "cage" containing the pump is raised from the decant canal several feet above deck level to permit personnel to clean out the pump inlet. The entire cleaning operation takes less than one hour. (Photo courtesy ITT Flygt Corp.)

Pinch valves, again, are an example of a design that seems to be working well in recycling applications. Pinch valve sleeves are not only abrasion-resistant, but close drop-tight around impurities such as staples, nails and wood chips found in recycling lines. This feature of pinch valves ensures complete shutoff.

PUMPS

Supplying raw water or removing wastewater seems to be the toughest assignment for pumps: handling drainage for woodyards, barking drums, and chipping machines, pulp and papermaking machines, waste han-

dling from the pulpers, various mill effluents, and any types of floor drainage.

As an example, one southern mill was having problems with its extended shaft pumps located in a decant canal that was the overflow from a sludge lagoon. This was flow from the primary clarifiers, and in the decant canal pumps were turning the sludge to the blend pit and then back to the clarifiers in a recycling process. Unfortunately, the pumps clogged over and over again, and the mill was investing a lot of costly man-hours removing them for repair. The solution was submersible pumps. They don't seem to break down as often as the original pumps,and when they do require repair it takes hours to remove them versus days to remove the extended shaft pumps.

Innovations are important, but one company has been updating a product it introduced in the 1960s, which acts as both a macerator and a pump.* This device is used in several problem areas of the mill: broke, clarifier underflow, knot rejects, and black liquor applications.According to the company this product can shred fibrous material ranging from clumped pulp in the broke chest, to junk and debris that appear in the clarifier, to knot rejects, to black liquor into much smaller particles without damaging the fiber.

In the broke chest the fiber is supposed to be suspended into a nice slurry. However, in the real world the fiber often clumps together. This pump is reported to shred the fiber without damaging it and then pumps the shredded fiber to a pulp pond for transport to the broke chest as a clump-free slurry.

*The Gorator™ by Dorr-Oliver.

An air-actuated pinch valve. (Photo courtesy Red Valve Company.)

The ODS pump is a single-action reciprocating pump used in green liquor applications in the plant and also in the wastewater treatment area for sludge handling. (Photo courtesy Dorr-Oliver.)

This same pump claims to shred debris from the clarifier, such as rags, scrap wood, and leather gloves, into a homogenous slurry. Reportedly this shredding of the solids helps eliminate clogging of pumps, valves, and other machinery along the way.

In the old days,knot rejects would simply be thrown away. Today, mills want to get something useful out of every bit of material they bring to the process, so knot rejects are usually sent to a chemical tank where time and chemicals are spent to break them down into something useable in the papermaking process.According to the manufacturer, this combination macerator/pump can in some cases eliminate the chemical treatment altogether or greatly reduce the time and chemicals expended for treatment.

Finally, the company says that black liquor applications are the most popular for its macerator/pump. The material is shredded by the macerator and then pumped into a high-pressure pump. The pressure pump then pressurizes the firing guns in the boiler, and the black liquor is atomized through the guns into the boiler and burned as fuel.In fact,according to the pump's manufacturer, some boiler manufacturers recommend that this product be included as part of the system when they sell a boiler because it reduces clogging of the atomizing nozzles and helps the boiler burn fuel more efficiently.

WHAT CAN MILLS DO?

Here are a few suggestions for selecting and maintaining pumps and valves to maximize product life and efficiency.

Follow the money

Where is it going? How much are you spending on what? How often are you having to spend it? By answering these questions you'll be able to identify the problem.

Evaluate your options

How are you going to solve this problem? What products are out there that might offer a solution?

Check out as many suppliers as you can. Many process engineers are well educated but haven't graduated from the school of hard knocks. That seems to be the best place to learn about applications.

When you think you have a solution,take the pump or valve for a test drive.Rent a valve if you can.Buy one pump.Kick the tires.Look under the hood.Compare it to its competition. Make it a contest, and may the best pump or valve for your situation win.

Maintain the equipment

Read the manual! Let me say that again.When all else fails, including your pump or your valve, *read the manual*! Better yet, read the manual before your equipment fails. Educate the people who handle the equipment; make *them* read the manual.

More times than they'd care to remember, suppliers are told that the pump or valve that was working so well right after installation now is "no good," "doesn't work," or "has a problem." Guess what? Someone fiddled with something.They figured if this much is good,more must surely be better. Never mind that the manual says more is definitely *not* better.

CONCLUSION

The pulp and paper industry presents a variety of challenges to the mills that use pumps and valves and the suppliers who manufacture them. No solutions come easy in this industry, least of all the solutions to the applications discussed here. Informed mill personnel who take the time to discover their problems will always find suppliers willing to help solve them. **TJ**

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The author is indebted to all the pump and valve suppliers who took the time to provide a crash course on this "dirty"subject.