Simpson-Clough Mill improves wire cleaning and saves water

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In May 2011 speciality paper producer Union Papertech supplemented existing low-pressure wire cleaning showers at its Simpson-Clough Mill, Heywood, by adding an oscillating shower and high-pressure pump to the forming section on each of two paper machines.

Fabric cleaning efficiency has been improved, overall energy and water usage has been reduced.

Even allowing for the extra water and power directly consumed by the new equipment, the net result (as estimated by a project engineer at the mill) is that water usage for wire cleaning has been reduced by over 1 million litres per day – translating into an annual saving of some £25k in the associated costs of electric pumping.

The Simpson-Clough Mill specialises in the production of filter paper for tea bags. Historically a manufacturer of paper for Bible printing, it made its first tea bag filter in the mid-Sixties (*Figure 1*).

Figure 1: Simpson-Clough Mill products - filter paper for tea bags

It was acquired by the world-wide Purico group in 2006 and began trading as Union Papertech, sharing international exports with a sister company in China.

The wire cleaning upgrade project at Heywood was led and installed by mill engineers in consultation with Kadant UK who specified and supplied the oscillating showers. Seal-less Hydra-Cell high pressure pumps manufactured by Wanner (*Figure 2*) were recommended and supplied by Kadant, while Wanner International itself worked with the mill on refinements to the pumping system.

Saving water and energy, though not the only objectives behind the wire cleaning upgrade at the Simpson-Clough Mill, were in themselves powerful incentives. Process water for the mill is sourced from local rivers under licence, before being treated and filtered down to 100 microns. Environmental and legal restrictions on water consumption could hamper plans for future increases in production capacity. A wider scheme to raise water usage efficiency is therefore ongoing. It includes a new waste water biological treatment plant.

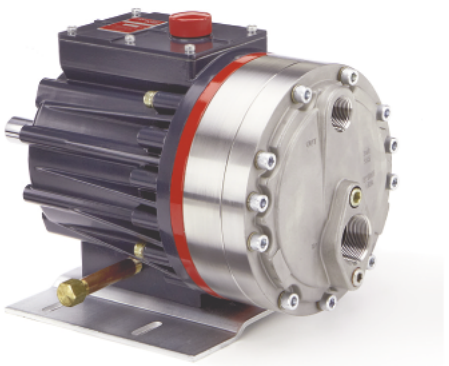

Figure 2: The Hydra-Cell G25 seal-less pump

Savings made specifically by the installation of higher pressure showers and pumps on the wire cleaning operations account for a significant one-third share of total savings. But, as confirmed by Kadant, the mill was equally interested in optimising wire cleaning efficiency in the interests of product quality and consistency.

At this mill the wire is the only forming fabric. As the sheet moves on from the forming section, residual fibres must be removed from the fabric to ensure proper drainage.

Before the upgrade all showers in the forming section (*Figure 3*) were of the fixed flat-fan type and self-purging. They were fed by centrifugal type pumps – at one time almost universally used for cleaning showers, working at low pressures and reliant on high-volume flow for cleaning effect. Flat fan sprays gave wide coverage but limited cleaning impact, especially at low pressure. For this reason the mill was obliged to compensate by increasing pump speed and flow, which in turn increased pressure and raised both water and energy consumption. In practice, the centrifugal pumps were operating inefficiently and close to their maximum pressure.

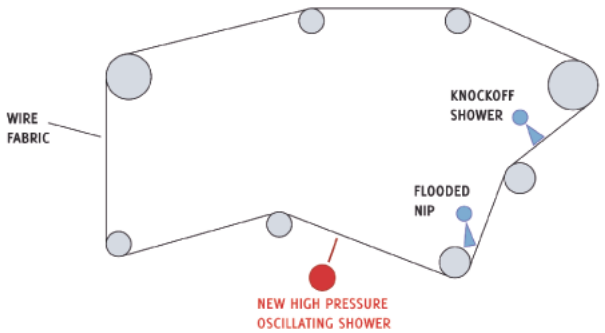

Figure 3: Schematic of forming fabric section at Simpson-Clough Mill

Kadant therefore proposed that both paper machines should be equipped with an additional shower of the oscillating type, fitted with 1mm solid-stream nozzles for maximum impact. Width coverage across the machine would be achieved by automatic oscillating movement of the header as opposed to relying on a fan pattern. The solid-stream nozzles carry their cleaning energy to the fabric surface more effectively.

Two oscillating showers were installed, one on each machine, with flows of 69 and 73 l/min at 30bar.

To deliver this flow and pressure performance reliably and economically, Kadant proposed the Hydra-Cell G25 (*Figure 4*), a positive displacement pump able to operate comfortably at any pressure up to 70bar. Kadant chose these pumps on grounds of previous experience with them internationally, also on a record of "good technical assistance" from the company.

Relevant features of the range include seal-less design and compact build – with multiple diaphragms incorporated in a single pump head, operating in sequence to provide smooth virtually pulse-free flow (*Figure 5*). Their energy efficiency (up to 90% and sustainable because of absence of seal wear) is almost double that of centrifugal pumps.

Figure 4: G25 pump on paper machine at Simpson-Clough Mill

Although the new, more efficient high pressure oscillating showers have been in operation at the Simpson-Clough Mill for more than 12 months, the original low-pressure fan showers were retained and are still in use. Despite that, total water and energy use have been drastically reduced. That has been made possible because the introduction of more efficient showers has reduced the burden on the original showers.

"By introducing more appropriate wire cleaning showers," explained one of the project team, we were able to significantly reduce the water pressure feeding the knock-off showers and the flooded nip showers. Pressure on one machine was reduced from 12 bar to 6 bar, and on the other from 8 bar to 5 bar. Pressure being proportional to water flow, both are now lower."

"Savings apart," he said, "we are now getting the all-round benefits of improved fabric cleaning at the forming stage of the papermaking process."

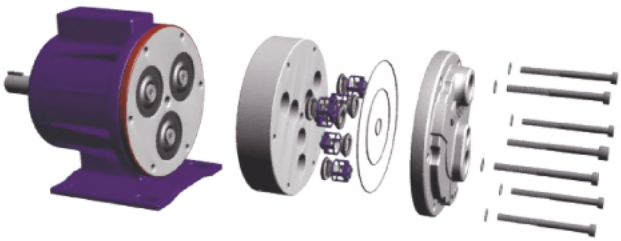

Figure 5: Hydra-Cell pump. Simple build eases maintenance