

Energy-efficient cleaning systems

In August 2009 food industry services specialist B&G Cleaning Systems installed a complete centralised system for Tyrrells Potato Chips at the crisp manufacturer's Herefordshire plant. Designed to combine effective cleaning power with low energy consumption, the system produces hot water at a central location, using energy-efficient seal-less Hydra-Cell pumps to deliver it at pressure to trigger-operated spray guns at satellite stations around the factory. The system ensures that power consumption never exceeds the level required by the number of guns actually spraying at any moment.

Good hygiene was always a priority for the high-profile award winning factory enterprise started in 2001 by founder Will Chase on his farm near Leominster.

But until early 2009, when a full review of cleaning arrangements was carried out in consultation with system builder B&G Cleaning Systems, Tyrrells had maintained its high standards with what technical manager James Blackband characterises as 'hosepipes and a great deal of elbow grease'.

Inevitably, as the scale of production increased and facilities expanded, pressure on cleaning resources had also grown. The challenge now was to devise a system to handle the effective cleaning of a modern plant producing 50,000 cases of potato chips each week, incorporating an array of equipment that includes eight large batch fryers and hoods, a high volume peeling machine and numerous inspection tables, hoppers and conveyors.

B&G have been equipping food factories for 25 years and the system installed at Tyrrells in August 2009 is comprehensive, including all elements from hot water production plant to spray lances. Its focus reflects current concerns with energy, safety and operating efficiency.



The production environment at Leominster obliges most heavy cleaning work to be carried out during weekend shutdown by dedicated cleaning teams using trigger-operated guns. For practical purposes, full liquid pressure must be available to each operator when the trigger is operated. In many washdown systems installed in food plants this condition can only be met by running the pump continuously at full speed, while bypassing excess flow back to tank. Unfortunately, this practice results in huge waste of energy because power is consumed irrespective of whether all guns are actually spraying.

The system developed by B&G works differently. It uses modules each incorporating either one or two pumps. Each pump can deliver up to 30 l/min

and the number of pumps in the system will depend on the maximum demand for water when all outlets are in use. A typical system will be configured for between 1 and 6 pumps (serving up to six operators) though by adding modules larger-scale cleaning operations are easily planned. In principle there is no limit on size.

At Tyrrells a 2-pump installation serves four operators using six washdown stations. Each station is equipped with a set of quick-connect colour-coded lances (hot water, foam and rinse) and a 20m self-retracting hose reel.

The system is designed to maximise energy efficiency and minimise energy consumption, while holding down other operating costs such as maintenance, repairs and expenditure on spare parts. These aims are realised through B&G's control technology and by the design and sustained high efficiency of the Hydra-Cell pumps.

Controls are so arranged that as soon as set pressure is reached in the ring main no pump will run until a gun starts spraying, causing pressure

to drop. Any loss of pressure immediately switches on a pump to restore it, enabling spraying to continue without interruption. If a second gun starts, the pump will run faster to keep pace. If spraying subsequently stops for more than 20 seconds and then restarts, the next pump in the assembly takes over – a control refinement that spreads the workload evenly over all pumps in the installation.

As more guns start or stop, pumps will automatically energise, adjust speed or switch off, always matching but not exceeding demand – so cleaning efficiency is maintained without wasting energy.

The pumps themselves have an important role in this. They must perform efficiently, flexibly and reliably, delivering hot water and chemical solutions at temperatures to 80°C and pressures up to 70 bar.

Instead of conventionally choosing piston pumps (which, through time, are vulnerable to seal wear) B&G based its system on the alternative technology embodied in Wanner Hydra-Cell pumps. In these pumps

there are no dynamic seals, so the most common cause of leaks and premature wear - leading to loss of performance and high repair costs – is completely ruled out. Dynamic seal wear is a significant factor in the energy consumption of pumps because it can seriously lower normally high levels of pumping efficiency.

The simple seal-less design of Hydra-Cell pumps makes them easy and inexpensive to maintain. Three flexible hydraulically balanced diaphragms, concentrated in a single compact head, provide smooth pumping action. The pumped liquid is 100% contained within the wetted end of the pump. That feature, coupled with a wide choice of materials, means that hot, non-lubricating, acid or caustic liquids and liquids containing particles can all be pumped reliably.

The design also means that the pump can run dry indefinitely. So an operator mistake would not result in costly maintenance or rebuilding. Reviewing cleaning system performance 10 months after installation, James Blackband was positive.

“It’s doing everything we wanted. It hasn’t let us down – and it has made cleaning work a good deal easier for everyone, including the specialist weekend teams and production staff who have to keep on top of the job on production days.

“It’s also more productive. More cleaning is being done in the equivalent time, and we have been able to concentrate on the more difficult detailed cleaning tasks, while not neglecting general cleanup. And we can be more consistent, repeating the same level of cleanliness in every section week by week. From the sanitary viewpoint, we don’t have to keep going back. Our test swab results are excellent.”

