



# Clean-up operations

Popular in the food and pharmaceutical sectors, clean-in-place systems can deliver considerable operational advantages. But, as solutions specialist Wayne Morton tells Louise Davis, reaping those benefits requires a considered approach to system design and installation





Over the past few years, Wayne Morton, S4 Engineering's internal sales and service manager, has observed the rapid rise in popularity of clean-in-place (CIP) systems.

Their attraction is clear: "An effective CIP system is one of the most cost-efficient and time-saving tools for any business in the manufacturing industry. Not only can a well-designed CIP system enhance product safety and sanitation, but it can also streamline the cleaning process and minimise downtime," explains Morton.

The reason Morton emphasises "well designed" here is that over the course of his career, he has witnessed many examples of solutions that have not been carefully created and is keen to save others from making the same mistakes.

"Seeking expert guidance when considering a CIP system is crucial, as it ensures the system is tailored to the specific product, process and compliance needs," Morton advises.

"A properly designed system can significantly reduce cleaning time, resource use and contamination risk while helping meet regulatory standards. Contacting a CIP expert early when deciding on a system ensures that the design, equipment and cleaning protocols are optimised for the user's specific process. This proactive approach at the start has the beneficial knock-on effect of reducing long-term operational costs."

There is no doubt that S4 Engineering is a prime example of a CIP expert. The well-established British company is one of the biggest names in CIP systems, but Morton points out that it is not only products that serve as market

*Left: A three-channel CIP set complete consisting of one 12,000 litre rinse recovery tank, one 7,500 litre caustic tank, one 7,500 litre heating wash down tank and one 1,500 litre acid tank – the system has four cleaning channels with capacity to run all three at the same time*



differentiators; the team behind them is also important.

"As well as offering tailored solutions to best suit every application, we distinguish ourselves via a combination of deep industry knowledge and end-to-end support that ensures plants receive the most effective, efficient and compliant systems for their individual operations," he comments.

The focus on tailored solutions is important: CIP systems are an area where 'one size fits all' does not apply – in part due to the diverse applications the systems are used for.

Highlighting some popular applications, Morton says: "CIP systems are used in industries such as food and beverage, pharmaceuticals and biotechnology, where compliance to hygiene standards is critical.

"These systems are essential to allow for equipment to be cleaned without disassembly, minimising or eliminating manual interventions. Importantly, given these sectors all share a very low tolerance for wasted time, CIP systems also ensure less downtime between production runs."

#### DESIGN FOR LIFE

Morton reveals that there are several essential design considerations to tackle when planning an effective CIP system. "It is important to consider the specific sanitation needs of a facility.



Left: **Wayne Morton**,  
internal sales and  
service manager, **S4  
Engineering**

For example, a company working in food and beverage production may require a longer wash sequence if it is producing something with high levels of sweeteners and artificial colours, to comply with statutory hygiene recommendations. Identifying what sort of substance is being cleaned within a CIP system is crucial during the design stage," he details.

Balancing system design and production schedules is another key consideration: "Installing a new CIP

system can affect a facility's production schedule. It is important to consider how big the CIP system will be and what this means for the current production line."

Morton explains that the size of a CIP system includes the capacity of the tanks, the number of process lines that can be cleaned simultaneously, the frequency at which these lines need to be cleaned, and the types of chemicals needed for the job.

The pharmaceutical sector usually invests in the most sophisticated CIP systems, which Morton says is due to the industry's strict regulatory requirements for cleanliness, contamination control and product safety.

He notes: "Pharmaceutical CIP systems employ advanced technologies such as smart sensors that go beyond simply measuring – they now analyse, communicate and respond to real-time conditions in the cleaning process. They help automate decision-making and ensure optimal cleaning with minimal waste. This shifts systems from time-based cleaning to data-driven, condition-based cleaning."

#### FOOD FOR THOUGHT

And while the pharmaceutical sector tends to be the most high-end, Morton says that the most complex sector is



## CLEANING SCHEDULE

According to Morton, although different industries develop and employ their own individual CIP systems, most cycles have similar operational processes. "Firstly, a pre-rinse removes residue and large debris. Then a detergent cleans with caustic detergent, and extracts attached dirt and soiling," he explains. "Next comes another rinse, which removes dirt and detergent. Acid cleaning (optional) then removes alkaline residue and scaling. Another then removes the acidic cleaning solution. Disinfection with chemical or heat treatment then sanitises the equipment. And a final rinse fully removes chemical traces and prevents contamination."





*Left: A single-channel CIP set consisting of consisting of one 3,000 litre stainless steel water storage vessel, one 3,000 litre stainless steel rinse recovery vessel and one 3,000 litre stainless-steel detergent storage vessel. The CIP system is a stand-alone plant that is fully automatic and solely operates through a PLC/SCADA control system*



*Above: A two-channel CIP system fully integrated into the current system consisting of one 6,000 litre stainless steel water storage vessel, one 10,000 litre stainless steel rinse recovery vessel and one 6,000 litre stainless-steel detergent storage vessel*

actually that of food and dairy applications.

"Challenges in the food and dairy sectors include ensuring thorough cleaning without cross-contamination, minimising water and energy use, and meeting varying hygiene requirements for different products," he observes.

"These can be overcome by implementing optimised cleaning protocols, and adopting more energy-efficient, automated CIP systems that adjust parameters based on the specific cleaning needs of each production batch or facility. Additionally, regular validation and proper training can help maintain the effectiveness of CIP systems."

The broader food sector is currently in a state of flux, with various emerging alternative proteins and alternative dairy products being scaled up for mass production. Has Morton noticed a corresponding interest in CIP systems from these fledgling areas?

"Yes, there is an increase in CIP systems as new markets in the food industry open up," he confirms. "Often, they start with small, mobile CIP systems. These are usually a great deal smaller than fully integrated CIP systems and can be used on R&D plants before

product scale up."

Morton also points out that another big trend right now is for CIP systems being used across the chemical industries where, in the usual drive to do more with less, "production lines are having to be used for more than one product and systems need to be cleaned between runs".

#### IDEAL OPPORTUNITY

When asked what the ideal CIP system and its associated management/monitoring set-up would look like, automation is at the top of Morton's wish list.

## CASES IN POINT

When prompted for some real-world examples of S4 Engineering's CIP expertise being put to good use, Morton recalls two case studies, both from the food sector.

"Firstly, we visited a yoghurt producer's facility to assist with its expansion plans, manufacturing and installing a wide range of equipment. The company's enlarged plant was kitted out with CIP systems, fermentation vessels, pasteurisation and homogenisation equipment and more," he says.

"Our second case study involved a leading producer of convenience foods. Seeking to expand its production of sugar-free mayonnaise, the company commissioned us to supply and install two 4m<sup>3</sup> stainless steel vessels. Large enough to store an entire day's worth of mayo, the vessels were also outfitted with CIP pumps for optimal hygiene."

He comments: "The ideal CIP system would be fully automated, with sensors monitoring parameters such as temperature, pressure, flow rate and chemical concentration in real time to ensure optimal cleaning efficiency. It should be integrated with a specialist management and monitoring system that tracks cleaning cycles, provides data logging for compliance and allows remote diagnostics."

Morton feels it is important to highlight that sustainability is another key consideration – not just for the 'ideal' CIP system, but for all new deployments today. "A CIP system should be energy-efficient, water-saving and adaptable to different production lines, ensuring thorough cleaning while minimising downtime and resource usage," he concludes. 