

Pneumatic upgrade improves bulk tube **packing efficiency**

When specialist manufacturer of tube packing solutions Cerulean decided it was time to overhaul the design of its popular FPS-1 tube packer, it called upon Festo to help simplify the design and deliver an improved, future-proof packing solution

The personal care market is a rapidly evolving environment and companies in the supply chain need to be responsive, reliable and efficient. For Cerulean this entails a programme of continuous improvement and innovation: not only to introduce new products, but also to adapt existing equipment to meet changing customer requirements.

“Cerulean was an existing customer for Festo pneumatic components,” says Josh Roberts, Festo business development consultant. “When they enquired about our latest components and capabilities, we took the opportunity to ask what they were trying to achieve, and what they wanted their packing machines to be capable of in the medium to long term. It quickly became clear that we could work in partnership to make significant improvements to the FPS-1 system: not only in terms of pneumatic efficiency, but also to make it Industry 4.0 ready.”

Design drivers

The FPS-1 is used to bulk-pack tubes used for packaging cosmetics, toothpaste, skin cream and sun care products. The tube packing machine is typically positioned downstream from the tube maker, which supplies the empty products ready-capped. The Cerulean system can process a range of tube sizes, from 10-60mm in diameter and 50-300mm in length. The tubes can be made of materials ranging from aluminium to plastic or laminate, depending on the final application.

It is a continuous production, high speed environment, but the interface between batches of tubes being completed and then entering the packing stage is challenging. The transition usually requires either a large scale, bespoke automation solution or hand

packing into cartons by multiple production workers, which is both labour intensive and less hygienic. However, as the tube products are light weight and cap heavy, they can be difficult to stack or hold temporarily while packing takes place. Pausing production inevitably leads to inefficiencies and disruption for the rest of the production line.

In discussion with Festo, Cerulean identified a number of deliverables that would optimise benefits for end-users of its tube packing technology:

- Improve capacity
- Reduce energy consumption and running costs
- Reduce noise
- Make servicing easier
- Introduce better communications capabilities to support flexible manufacturing
- Offer continued compliance with the latest safety standards
- Be Industry 4.0 ready / future-proofed

Shaun Toms, portfolio manager at Cerulean, explains: “Cerulean invests heavily in developing new products and adapting existing equipment to meet customer requirements. Packaging equipment is a critical investment and needs to last for many years to deliver a true return on investment. Reducing outages can have a major impact on the bottom



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line. So, in addition to developing a new, future-proof version of the FPS-1 tube packer, we wanted the ability to offer customers a simple but effective way of upgrading their existing system. It was a big ask, but Festo rose to the occasion.”

Practical solutions

Festo worked proactively with Cerulean to develop a new design concept for the FPS-1 system, conducting an air analysis of the existing and concept machines to prove the



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theoretical design. This project was also Cerulean’s first utilisation of a new third-party PLC and Festo provided integration support.

The existing design comprised multiple valve terminals positioned around the tube packer and connected with long pipe runs. By applying its pneumatics expertise, Festo was able to replace these multiple terminals with a single valve terminal, simplifying the design. A key feature is the use of sealing technology within the valve panel to create multiple pressure zones, which reduces design complexity and the physical number of valves required. Festo also conducted pneumatic sizing checks to ensure optimum valve specification. With all the valves in one place, access for servicing and maintenance is much easier and new diagnostics on the valve terminals enable fault reporting and energy usage monitoring.

Another Festo contribution is the addition of automatic cushioning so that the tube packer can run faster without damaging the product. This feature removes the need for manual set-up when cylinders are replaced, saving time and eliminating errors. In addition, the Festo safety valves are supplied with bespoke Sistema information files for each component, allowing the customer to check that everything is compliant with the relevant safety standards.

Incorporation of Festo’s CPX controller over EtherCat ensures that the tube packer has a platform which can accommodate I4.0 enabled products in future, so the upgraded system is fully forwards compatible. This provides reassurance to end-users that the tube packer represents a good long-term investment.

The automation and pneumatic upgrades to the tube packer are designed as two kits: a valve

control kit and an actuator kit. Each kit has the same footprint as the equipment it is intended to replace. Each kit has its own unique order number – eliminating the need to order multiple components – and is supplied fully assembled and ready to install.

Says Roberts: “The Cerulean solution is based on proven, standard Festo components – including VOFA Performance Level D safety valves, MS air preparation and the CPX controller – which makes it particularly reliable. The simple kit design makes upgrading and servicing as simple as possible for Cerulean and its customers.”

Practical benefits

The new version of the tube packer is known as the FPS-300s. The upgrades have broadened the range of tube sizes that can be packed at the machine’s maximum capability of 300 units/min. So, for these tube sizes, a customer using an upgraded system could pack up to 28,800 more tubes over a 24 hour period than was previously possible. In addition, the improved system uses 5% less energy than its predecessor.

The packing process is now fully automated. The Festo pneumatics allow the FPS-300s to introduce the correctly sized standard carton and to push a layer of tubes into place without any human intervention. The length of the ‘push’ is determined by the length of the tube product: parameters which are pre-programmed into the machine. Once the first layer of tubes is in place, pneumatic grippers release the carton and allow it to fall to the next level so filling and packing can continue uninterrupted. When the carton is full, it is lifted onto an overhead conveyor and taken on for palletizing. This results in less time and less cost.

In conclusion, Toms says: “Festo demonstrated its expertise from the outset by asking pertinent questions, demonstrating it was more than just a supplier of quality components. As a leading exponent of Industry 4.0 and high performance pneumatics, Festo brought together the expertise that Cerulean needed to inform the new design. The resulting improvements in capacity, efficiency and simplicity will deliver genuine benefits to anyone using our FPS-300s tube packing system.”

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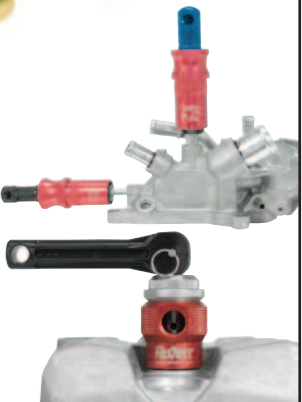
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