

Filling and packing toothpaste tubes

At jaw-dropping speed

The record holder breaks his own record: OYSTAR IWK increases production from 510 to 750 toothpaste tubes a minute with the fastest tube line in the world. The pneumatic drives of the machine are controlled by valve terminals CPX/MPA from Festo. The safety soft-start/quick exhaust valve MS6-SV protects man and machine.

Cleaning your teeth is one of the basics of daily personal hygiene and is one of the product segments in the cosmetic market that is growing all over the world. Modern machines for filling toothpaste tubes produce a large number of dental care products. Near Karlsruhe in south-west Germany OYSTAR IWK has now developed the ultimate in filling machines. The 8 part TFS 80-8 fills and closes 750 28 mm diameter tubes a minute with a pulse frequency of 94. This corresponds to 45,000 tubes an hour. The next cartoning machine, the SC 3-800, packs the 750 tubes into decorative boxes.

50% more output

The TFS 80-8 has a similar footprint to the previous model, the TFS 80-6. The major difference is in the increased output of nearly 50%. The new machine reduces overfilling of the tubes by precisely checking its weight. All in all, this may mean a saving of 83,000 kg of toothpaste in a year. The machine has two synchronised robots. State-of-the-art



control electronics work together with safety soft-start/quick exhaust valve MS6-SV from Festo. Connected upstream to a traditional 5/3-way directional control valve, it easily meets the new Machinery Directive and guarantees correct exhausting in emergency or non-emergency situations. The dual circuit pneumatic design of the TFS 80-8 sees to it that tubes are fed in accurately. The robot hand and the box feed operate independently of each other. The valve terminal MPA controls all the pneumatic drives of the machine while the input modules of the CPX process all the sensor signals. Both the valve terminal CPX/MPA as well as the MS-6 series have been defined as the standard by the OYSTAR Group for a very long time.

Correctly positioned and filled

In the first step of the process that leads to a perfect tube of toothpaste, a robot feeds the empty tubes, which are open at the bottom, to the tube holder. In the next step it transports them safely through the machine. A high resolution camera checks the edge of the tube →



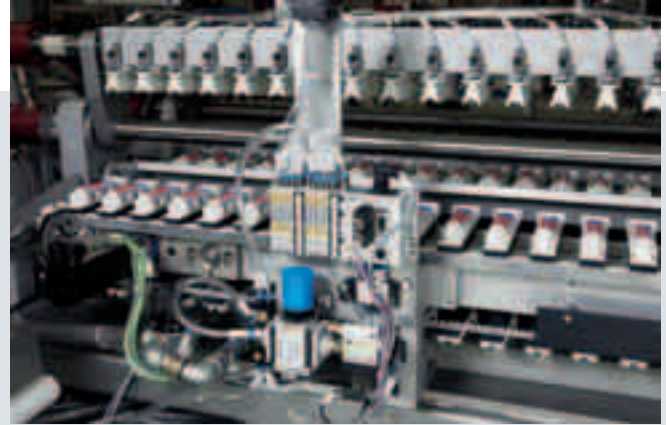
Only one of 45,000 an hour: The TFS 80-8 fills Colgate toothpaste tubes in record time.



Dr.-Ing. Marco Lanza and Dipl.-Ing. Andreas Siegele, Product Manager and Head Designer of the fastest toothpaste tube filling machine in the world demonstrate the necessary precision processing of the filling system.



Overall view of the TFS 80-8 with the internal machine transport system in the foreground.



After the tubes are filled they are placed on the control scales and transferred to the cartoning machine in the next work step.

→ for possible defects. Then the tube is opened up using compressed air under the watchful eye of another camera.

Using a printed mark the TFS 80-8 precisely aligns the tubes. It ensures that the tube remains in the correct position during the work process and keeps a stable shape when it is filled. If the alignment is not right the printed design may be askew or shifted when the tube is closed later. So that each tube is allocated to the correct product batch the machine reads the code again at the same station. This enables customers to clearly see where a tube delivery came from or on which day it was filled.

If a production error occurs, i.e. a predefined number of errors in a specific period, the machine stops and the operators look into the source of the error. Reject tubes are clearly identified and do not impair the overall quality of the batch.



Neatly closed

The filling module distributes the toothpaste inside the tube. A 3/2-way directional control valve sucks in the correct volume, redirects it and discharges it. A plunger opens the filling pipe, the toothpaste flows into the tube, the filling pipe closes again and the plunger cuts off the toothpaste. Each filling point has a pair of scales that supply data reliably to the machine controls. Thus the precise amount of toothpaste in each tube can be precisely specified and the machine avoids overfilling the tubes.

After it has been accurately filled the open edge of the tube is heated with hot air. The hot air must not come into direct contact with the toothpaste or have a negative thermal effect on the aluminium separating layer because otherwise the tube could leak. When the material temperature reaches the right range a press closes the tube and embosses the tube seam. At the



The valve terminal block MPA controls all the machine's pneumatic drives. The input modules of the CPX module process the sensor signals.



The MS-6 service unit including the safety soft-start/quick exhaust valve MS6-SV ensures that the OYSTAR IWK machine is provided with compressed air reliably and safely.

cutting station the end of the tube is neatly cut.

Packed in a flash

At a station further down the line TFS 80-8 discards the reject tubes. The good tubes travel on to the discharge point where they are ejected from the holder and rotated 180°. After they have been weighed again the machine places the finished toothpaste tubes onto the continuously running product chain of the next machine in the line, the cartoning machine. This is a critical point in the manufacturing process because the machine changes from a cyclical mode to a continuous one. Particularly critical is the design of the mechanical components because at this point very high acceleration rates occur and high masses are moved.

At the end of the line folding boxes are automatically opened up, aligned and brought up to the same speed as the tubes that are running in parallel.

A special pusher finger pushes them gently into the packaging. Now the tubes are ready for their journey to the shelves of supermarkets, chemist shops and pharmacies. Safely and hygienically packed and with an appealing look, they ensure that people all over the world are ready for a bite the next day too.

- www.festo.com/catalog/cpx
- www.festo.com/catalog/ms6

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Electrical terminal CPX

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Area of activity:
Production and sales of cartoning,
tube filling and closing machines as
well as complete packaging lines

