



An ideal use for the linear-rotary motors is in bottle-capping machinery

By using electric drives for both the linear and the rotary motion, users can adapt flexibly not only the torque and the number of turns, but also the stroke, to the process requirements – even during the closing process, if necessary.

The machine operator also has flexibility when it comes to the press force. It is possible, for example, to change the type of closure (turning to torque, turning to angle, pressing or hammering) at the push of a button. Linear actuators can also be used for larger strokes without a problem, so that it is even possible to implement closing machines for large-volume bottles or aerosols with pump or spray closures, where the long suction tube must be inserted vertically, together with the cap.

The linear and rotary motions are thus decoupled from both the carousel motion and from each other, and can be programmed freely. This can ensure

consistent process quality in all of a machine's operating modes. In addition, critical process parameters such as the tightening torque, the press force, and the vertical cap position, can all be derived directly from the data in the drive system and used again for documentation and as a control variable.

Adjustments that have been tested once can be saved and called up later using recipes. This means that machine operators can change formats much more quickly. This electric system also does not need any moving cables.

For these reasons, some machine-builders have switched to purely electric systems. But, without a standard design, they previously needed to come up with their own designs – with all of the associated disadvantages.

### Combined approach

Now there is an alternative. The Swiss linear motion specialist Linmot has developed a compact device that combines a linear motor with a rotary servomotor. This overcomes many of the limitations of mechanical systems, such as speed, limited monitoring information, and the lack of flexibility in selecting process variables.

LinMot's PRO1 family of linear-rotary motors is aimed at applications such as handling and pick-and-place, as well as for closing boxes and aligning printer marks. They consist of a powerful linear motor and an attached rotary motor that can be actuated independently of each other. The motors provide forces of up to 1,024N, a peak torque of 7.5Nm, and speeds of up to 2,000 rpm. They can also perform strokes up to 300mm long.

There are currently two sizes available, which differ in the maximum available torques for the rotary motors, and the linear forces for the linear motors. Variants are available with axial through-holes for passing through a mechanical cap ejector, or for supplying pneumatic grippers on the closing head. For hygienic applications, there is an Inox variant.

The linear-rotary motors are particularly

attractive for reducing the size, and improving the performance, of multi-axis carousel closure systems. They allow the linear and rotary motions to be decoupled from the carousel motion for the first time. Any combination of linear and rotary motions can be implemented. Motion profiles, speeds, turns, and press forces or tightening torques can be specified independently of one another. And the cap position at the end of the closure process can be read to detect misaligned seating.

Multi-axis closure systems like this allow product changes at the click of a mouse. The user receives all critical parameter feedback on a continuous basis, so that the amount of downtime due to faults is reduced significantly. Compared with mechanical closure systems, the linear-rotary motors save up to 60% of the time for a closure process. ■

\* LinMot's linear-rotary motors are available in the UK and Ireland from Quin Systems.



In multi-axis carousel-type closers, the integrated motors can save space and decouple the linear and rotary motions from the carousel motion

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