ARBURG GmbH + Co KG, Germany

Fast Injection Guaranteed

The brand-new injection unit for electrically driven injection molding machines made by ARBURG incorporates a Siemens combination drive for fast, highly dynamic injection.

ARBURG GmbH + Co KG is one of the world’s leading manufacturers of injection molding machinery with clamping forces of 125 to 5,000 kN. In addition to hydraulic, hybrid, and electrically driven ALLROUNDER injection molding machines, the portfolio of the family-owned company also includes robot systems, complex manufacturing cells, and additional peripherals. Key factors in the ARBURG success story are the central production at the parent plant in Loßburg, the high-quality and modular design of ARBURG products, and the company’s ability to innovate.

Consolidated expertise

This innovation is also reflected in joint developments with Siemens. The overall aim to manufacture a mechatronic injection unit for electrically driven injection molding machines was achieved thanks to a brand-new combination drive from Siemens that combines the linear motor for the injection axis with the rotation motor for the metering axis. “We use the new combination drive on a 370 A size electrically driven injection molding machine, which operates for this purpose with an 18-mm screw,” explains Eberhard Duffner, development manager at ARBURG. The ALLROUNDER 370 A is one of the smaller electrically driven injection molding machines, but the combination drive can also be used on the larger A-series ALLROUNDER machines.

“Both Siemens and ARBURG had been playing with the idea of using such a drive for the injection axis in electrically driven machines for a long time. By consolidating the expertise of the two companies, their shared vision was finally able to become a reality,” says Duffner enthusiastically. In a first step,
Siemens provided a prototype, which was gradually refined in accordance with ARBURG specifications. Thus, within the framework of the project, the motor concept and mechanical machine interface were designed in addition to the required load specifications for the injection molding process.

In the combination drive, the linear and rotation motors are combined in a single enclosure. Thanks to the direct drives, only a few mechanical components are required for the unit, thereby minimizing wear and maintenance costs. The same applies to the linear motor itself, which has very few moving parts, making it wear-free.

The highlight of the new injection technology principle is the linear motor, which offers distinct advantages. The high acceleration capacity is linked to the direct connection of the linear injection motor with the screw and the low inertia ratio. As a result, it is possible to reach very high speeds while maintaining full control of the motor. In addition, the drive has absolutely no play, thereby guaranteeing maximum precision and reproducibility. The positioning is accurate to less than 0.01 mm.

**Completely new possibilities**

“Thanks to the excellent acceleration capacity and the high injection speeds, it is possible to manufacture more than just very thin-wall parts. This new injection technology principle also opens up completely new areas in the thin-wall sector that have not been feasible until now,” adds the ARBURG development manager with an eye to the future. As a result of the increasing miniaturization of components, Duffner has identified sectors such as the electrical and electronic field where storage enclosures and plugs have development potential. Materials manufacturers will also play an important role in future applications in the thin-wall sector, as the plastics used must meet high specifications with respect to their flow properties. The new drive concept and the resulting application possibilities will therefore certainly impact developments in the materials sector.

After extensive trials, the design phase was completed and the machine was then tested with existing thin-wall tools under real-world conditions. It was first presented to international trade experts at K 2010. Duffner sees a bright future ahead, stating that “ARBURG would like to open up new application areas for this unique technology with customers and partners from the materials sector, for example.”