

iQ flow control by ENGEL ensures consistent precision and lower unit costs at Blum

Temperature control, not watering

The light grey tubes, which are inconspicuous at first sight, are really critical. They enclose a sensitive mechanical system which, in kitchen furnishings, ensures that drawers close quietly and gently, no matter how forcefully the drawer is pushed. Blum, headquartered in Höchst, Austria specialises in high-quality hinge, drawer and hatch systems for the furniture sector. In order to combine maximum precision with efficiency in injection moulding production, innovative technologies are introduced at a particularly early stage at the fittings manufacturer's production plants worldwide. For example iQ flow control, the smart temperature control solution by ENGEL, which is on its way to becoming the factory standard.

"We always want to be state-of-the-art", as Philipp Schlattinger, responsible for plastics technologies in Blum's manufacturing department reveals. "This is the prerequisite for staying competitive on the furniture market battleground." The Fussach plant in Vorarlberg, Austria, relies on injection moulding to produce the sophisticated damping cylinder housings – along with many other technical precision parts for the fittings systems – on tie-bar-less injection moulding machines by ENGEL. Blum was one of the first users of tie-bar-less technology 30 years ago, and also closely follows the innovations from its Upper Austrian mechanical engineering partner in the digitalisation of production processes. Two years ago, Blum invested in its first production cell with iQ flow control, including e-temp temperature control units, which were deployed in zero series production at the time.

Due to the very high throughputs in continuous operation, the damping cylinders made of POM offer the best possible test terrain. "We were virtually on a greenfield site," reports Martin Sailer, injection mould design engineer at Blum. "Since the production cell is used exclusively for the cylinder mould, we were able to leverage temperature control with the best possible effect." For the high-cavity mould, the tie-bar-less e-victory 220 injection moulding machine is equipped with four e-flomo type electronic temperature control water manifolds and

four temperature control devices from the ENGEL e-temp series. "A large number of temperature control circuits come together in total for the cavities and mould platens, which makes things pretty complex," says Sailer. Initially, the project managers were sceptical as to whether the four temperature control devices recommended by ENGEL would actually be enough. Today, it is precisely these savings that have helped iQ flow control to make inroads into other products and become the company standard in a growing number of areas.

Maximum dimensional accuracy without rejects

"We know that we have very good moulds, but what was happening in the temperature-control channels was not transparent in the past", says Schlattinger, revealing the company's original motivation for getting involved with ENGEL temperature control technology. "When problems occur, finding the cause is extremely difficult if you are looking at a black box".

More than ten years ago, ENGEL set out on its mission to shed light on the darkness of mould temperature control. "20 percent of all reject mouldings in the injection moulding industry are caused by temperature control errors", says Klaus Tänzler, ENGEL's Product Manager Temperature Control, explaining the reason for this strategic decision. Today, ENGEL supplies integrated solutions for smart management of temperature control processes from a single source. The basis in each case is the e-flomo electronic temperature control water manifold system. Based on the measured values determined by e-flomo, iQ flow control dynamically and independently adjusts the temperature control process to keep process conditions constant. The software from ENGEL's inject 4.0 programme actively controls either the flow rates or the temperature differences in all individual circuits. Where e-temp temperature control devices are used, iQ flow control can also adjust the pump speed in the temperature control devices to reflect actual requirements. This interaction combines temperature stability with very high productivity and energy efficiency.

"In the classical temperature control process, the flow rate is static," as Tänzler explains. "If something changes in one temperature control channel, it triggers changes in the other channels, resulting in uneven water and temperature distribution. Our dynamic system, on the other hand, controls each manifold circuit individually. This means that the thermal conditions in the mould remain constant even if there are fluctuations in the system".

Strength is a critical factor in the production of damping cylinder housings. Due to their dimensions – very long and thin-walled – the cylinders are on the list of particularly challenging injection moulded parts in the Blum portfolio. On top of this, there are material-specific challenges, because shrinkage is very high with POM. "Thanks to constant temperature control, we can now control shrinkage in a very good way", says Christian Ackerl, production engineer with Blum. The tolerances are in the hundredth of a millimetre range in some areas of the component, because dimensional accuracy is decisive for the functionality and durability of Blum products. The Blum guarantee is valid for the kitchen's entire service life, which is calculated to be 20 years.

Switchover to temperature difference control

As a function of the component dimensions, the cooling channels in the long mould cores have very small diameters, which can become clogged by fine particles in the cooling water. "Only e-flomo provides us with the data to recognise whether there is a flow," says Sailer. This means that temperature control issues can be detected before rejects are produced. "Anything else is a waste of energy, raw materials and time", as Patrik Johler from ENGEL Sales emphasises.

Even flow control convinced the project managers at Blum within a very short time. And the impact is even greater after switching over to temperature difference control. Instead of flow rates, the system here keeps the return temperature of each individual circuit constant. The system only draws as much water as required for this purpose, which further reduces cooling water and energy consumption.

Six-digit electricity savings

Before investing in the new production cell, the damping cylinder housings were produced for a long time in a mould with fewer cavities. Eight temperature control devices were used for this purpose, which is why the process managers initially assumed that the scale-up would require an increase in the number of temperature control units. The opposite was the case. The number of cavities was increased, but the number of temperature control devices was reduced. This not only had a positive effect on the new investment, but the on-going operating costs also dropped.

ENGEL temperature control devices are integrated via OPC UA with the CC300 control unit on the ENGEL injection moulding machine. This enables requirements-driven pump speed control. While conventional temperature control devices operate at full power throughout, iQ flow control correlates the pump output with the valve positions in the cooling circuits and adjusts the pump output over the entire duration of the process. Not watering, but smart temperature control is key – not only to saving energy, but also to reducing maintenance costs. Wear and tear decreases rapidly if the pump is not continuously running at full load. "If we cost this for all the injection moulding machines here at the location, iQ flow control can help us achieve electricity savings in the six-digit Euro range every year," says Schlattinger.



Due to their dimensions and material, the damping cylinder housings place high demands on the injection moulding process.



Temperature control on a small footprint. The number of cavities was increased, but the number of temperature control devices was reduced.



The e-victory 220 injection moulding machine is exclusively reserved for the production of damping cylinder housings.



Tie-bar-less e-victory and victory machines make up the lion's share at the Blum plant.



Joining forces to track down efficiency potentials: Blum's Martin Sailer, ENGEL's Patrik Johler and Klaus Tänzler, Blum's Christian Ackerl and Philipp Schlattinger (from left to right).

Pictures: ENGEL