

Energy-efficient plastics processing

Servomotor pump drive reduces significantly power consumption

An energy-efficient and process-reliable production is the goal of each plastics producer that has to face the international competition. A medium-sized injection moulding company in the Münsterland is on a very successful way. The choice of the drive concept for hydraulic injection moulding machines is a key issue.

Measurements of the power consumption over a period of four years clearly show that the successive replacement of existing machines by machines of the same size with servomotor pump drives leads to a considerable reduction of the electricity costs.

State-of-the-art plastic processing does not require an urban environment. This is proved by the company Greive in Ottmarsbocholt. Since its founding in 1951 by Theodor Greive, the family-run company has been operated at the same site in the community with approx. 3,400 inhabitants in the middle of the Münsterland. After its beginnings in the Duroplast processing (Bakelite), the company has been manufacturing technical parts made of thermoplastics since the 1950s. With the entry of Michael Greive into his

father's company, the company started with the production of plastic disposables for the intensive care in 1983. Several developments of Greive in the field of injection- and catheter technology have been patented. For 25 years the Westphalian company has also been an A-supplier for manufacturers of „white goods“ - a common expression for larger electrical household appliances. The company currently produces with 27 injection moulding machines in the clamping force range of 200 to 1000 kN.

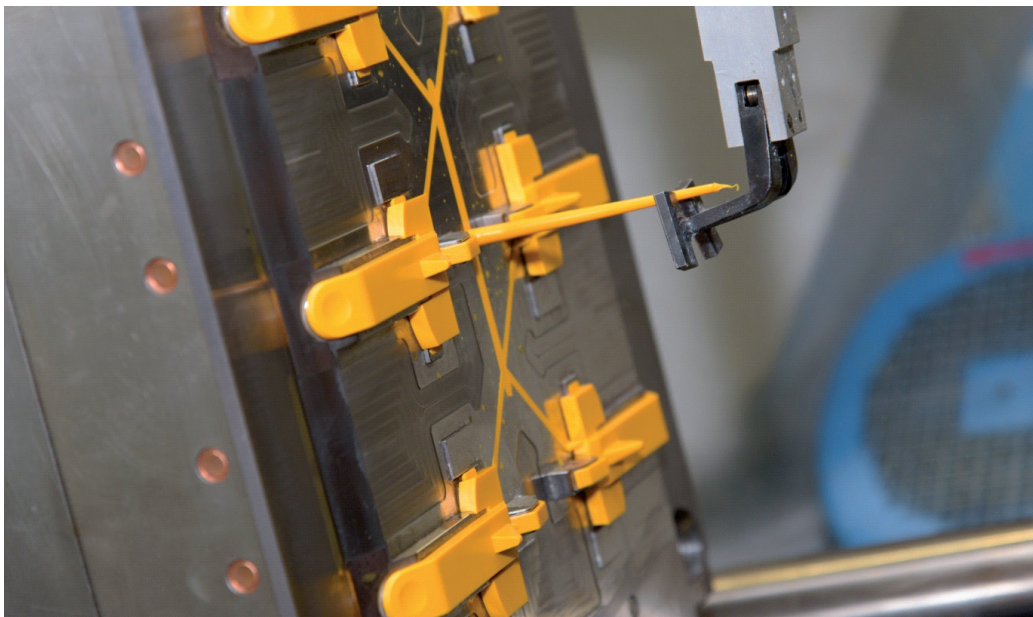


Michael Greive (right) and Marius Greive run the family business in second and third generation. (Picture source: Ralf Mayer/editorship Plastverarbeiter).

Permanent renewal of the machine park

„Always at the latest-state-of-the-art technology“, is not just a phrase for Greive, but a key element of the company's strategy: „No injection moulding machine has been with us for more than ten years,“ explains Co-Managing Director Marius Greive. Most of the machines taken out of service are fully operational and are sold. This money flows into the purchase of new machines. In addition to „having fun in new technology“, economic reasons are above all

behind the consistent modernization strategy. From a certain age of the machine the repair-and maintenance costs are increasing with a negative effect on the annual balance. In addition to the renewal of the machine park, the company has its focus on one main target for several years: the improvement of energy efficiency and the associated reduction of the electricity costs.



Automation:

Complex plastic components manufactured in multi-cavity moulds.

(Picture source: Greive)

Significant energy savings by servo drive

Significant success was achieved by the successive introduction of Boy injection moulding machines with servomotor pump drive. „In the period from 2013 to 2016 we were able to reduce our annual electricity consumption by 19.4 percent,“ says Michael Greive, „the consumption per ton of plastic dropped by 15.8 percent.“ At the final count

the electricity costs were reduced by 17.1 per cent or 31 per cent on the basis of the net electricity price. „This success is mainly due to the new Servo Technology of the Boy E-series,“ reported the Managing Directors. In 2013 three of a total of 27 injection moulding machines were equipped with the energy-saving drive. In 2016 already 14 machines

were equipped with the energy-saving drive, after eleven other machines with conventional drive had been replaced by same size injection moulding machines of the E-series.

A further machine of this type with a clamping force of 600 kN was put into operation in 2017. In the next years Greive intends to switch the entire machine park to machines with Boy servo-motorical pump drives. The goal is to reduce the power consumption by at least 30 percent compared to 2013. The energy consumption of the entire plant is determined, which includes not only all production processes, but also building technology as well as warehousing and office operation. In case of a separate monitoring of the injection moulding process, possibly even higher reduction rates would be determined. „Numerous comparative measurements have shown that servo-hydraulically driven injection moulding machines consume up to 50 percent less energy than machines with other drive concepts,” says Thomas Breiden, Head of Marketing at Dr. Boy in Neustadt-Fernthal.

In the servo drive, presented for the first time at the Fakuma 2008, power and speed are con-

trolled by a closed control circuit, which contains solely electronic sensors and controllers. A constant hydraulic oil temperature to maintain the control quality is no longer required. „We can start the machines without oil pre-heating at a temperature of 25 ° C and immediately go to full load operation,” emphasizes Marius Greive - an important advantage of the new technology. „This saves us a lot of time and energy and has the side effect that it has become much cooler in the factory,” he continues. Since 2013 Marius Greive has been part of the company management and he will continue the family business in the third generation.

In addition to switching to energy-efficient machines, the plastic processor is making further efforts to reduce the consumption of resources, for example by the installation of a peak load switch-off and other control components. Greive also successfully tested a hydraulic fluid based on sunflower oil, which should contribute to a more energy-efficient production. „Energy consumption is such an important cost factor for us that we are trying to” squeeze out” the very last reduction percentage,” explains Michael Greive.

		2013	2016	Change
Power consumption	[kWh]	930,000	750.000	- 19.4 %
Max. performance	[kW]	191	170	
Power/Material throughput	[kWh/to]	4620	3880	- 15.8 %
Electricity costs		100%		- 17.1 %
Net electricity costs		100%		- 31.0 %

The table shows the reduction of the electricity consumption of the company Greive. In 2013 three injection moulding machines with servo drive were in operation. By the year 2016 eleven other machines with conventional drive had been replaced by same size machines of the E-series.

Optimum company size achieved

The company in Ottmarsbocholt specializes in the large-scale production of components weighing from 0.01 g to 100 g. The production takes place at five days a week in three-shift operation and - if necessary - also at the weekends. The night shift is used as a "ghost shift". As a rule, for the production of a component series eight to twelve hours are required, but sometimes also several days. During this time the machines work fully automatic. Process reliability, in addition to resource efficiency, is therefore an important criterion of success for the family business.

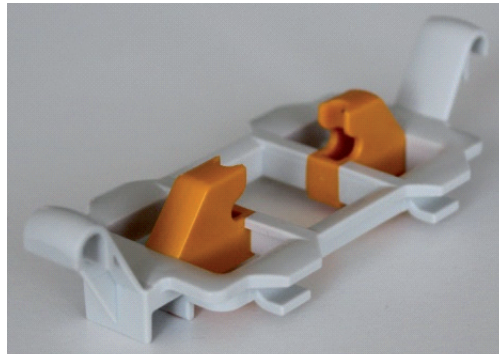
Michael Greive is convinced that the company has an optimal operating size in today's constellation. „In this size, we are flexible and can guarantee our customers high product quality and short delivery times," says the Managing Director. A further revenue growth to a greater extent is not a target. „Important is that, what is "below the line" in the annual accounts," says Michael Greive. Instead of investing in volume expansion, the company is investing in additional application technologies, such as two-component injection moulding which is in the responsibility of Marius Greive.



The plastics processor in the Münsterland operates 28 injection moulding machines. In the course of the consistent renewal of the machine park, Greive will only produce with servo-motor-driven injection moulding machines in the future.

Two-component injection moulding for complex applications

With its 2K injection moulding technology, the company carries out highly complex customer-specific applications, including in the “white goods” segment. This is, for example, an approx. 0.05 g light, 1 cm wide switching push button, which is installed in the control panel of a washing machine and that flashes during the operation. The push button consists of a transparent polycarbonate plate and an ABS housing. The company also produces a two-component suspension to fasten high household receptacles in dishwashers. A metal bracket can be lifted up in the holder for the positioning of bottles. Also in the case of these complex 2K injection moulding applications, the plastic processor benefits from the practice-oriented solutions of its premium supplier Boy, such as the flexibly positionable supplementary aggregates for the second injection component. Thus, a space-saving solution could be found in which the gripper is attached to the fixed mould plate removing the parts from the side.



Examples of Greive-produced two-component injection-moulded parts. (Picture source: Ralf Mayer/editorship Plastverarbeiter)

Process-reliable clean-room production

The room-economical, modular clean-room concepts of the injection moulding machine manufacturer located in Neustadt-Fernthal are also very well in line with the needs of Greive. „The seamlessly adaptable laminar flow enclosures enable us to achieve a reliable production under controlled clean-room conditions with different moulds,” emphasizes Marius Greive, Bachelor of Engineering. The company produces under laminar flow according to clean-room-class ISO 7 - an essential requirement for the injection moulding production of medical disposables, which will continue to play an important role at Greive in the future.



Production of medical disposables under cleanroom conditions (Picture source: Greive)

Company profile:

Dr. Boy GmbH & Co. KG

Dr. Boy GmbH & Co. KG is one of the leading worldwide manufacturers of injection moulding machines with clamping forces up to 1,000 kN. The very compact, durable machines work precise, energy-saving and therefore highly economical. BOY continually sets new standards in our industry with innovative concepts and solutions.

Since the company was founded in 1968, over 45,000 injection moulding machines have been delivered worldwide. The privately owned company continues to put special emphasis on engineered performance and high-class „made in Germany“ workmanship. For further information visit <http://www.dr-boy.de/>



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Greive GmbH & Co. KG

Greive GmbH & Co KG from Ottmarsbocholt specializes in the production of parts for the medical sector, in particular for intensive care medicine, in addition to the large series production. Products such as e.g. The medium-sized company produces single-injection or catheter tips under cleanroom conditions.



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