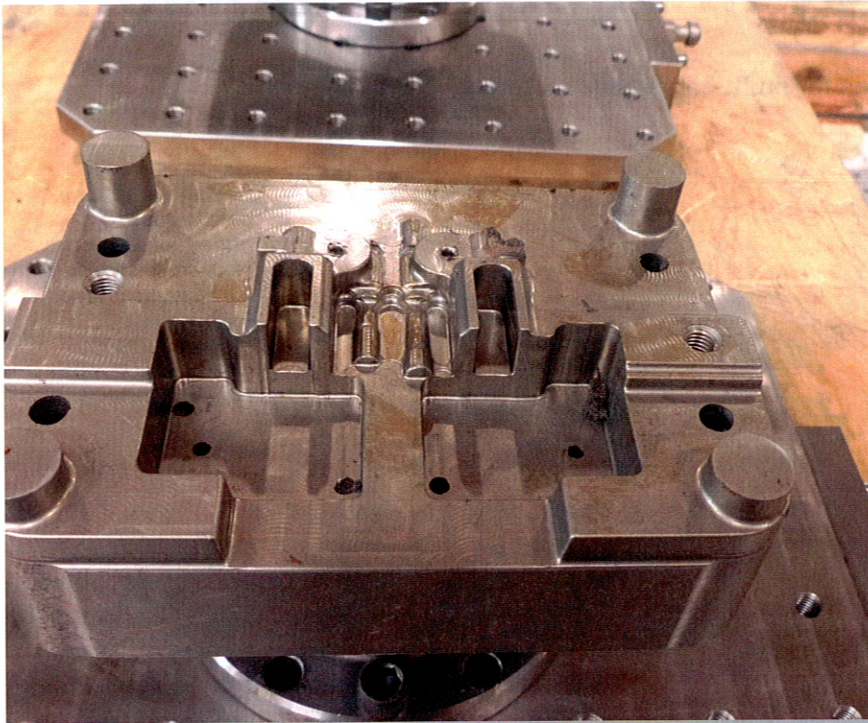


# Automation solutions for the mold and die making sector



1/  
*Maier Formenbau does not specialize, but serves an extremely wide product range with weights between 15 kg and 26 tons, from standard to high-end.*

Today, automation solutions in the mold and die making sector are not really a big deal. If cycle times and deadlines urge for time and cost savings, companies will not be able to do without such solutions. This was also true for Maier Formenbau, domiciled in Bissingen/Teck, Germany, although the company has been performing unmanned milling for more than 14 years. At night and over the weekend, however, the machines were not used to full capacity and the possible potential in terms of quality and throughput times were far from being exhausted. Hence, Managing Director Wilfried Maier and Alfred Sindlinger, Deputy Managing Director, started to occupy themselves with automation solutions, in particular with the milling of graphite electrodes and steel as well as with die sinking. But there was one big problem: Maier Formenbau does not specialize, but serves an extremely wide product range. Dimensions from 156 mm x 156 mm up to more than two meters, weights between 15 kg and 26 tons, from 1C to 3C tools, from standard to high end, required the automation system to provide the maximum possible degree of flexibility. Therefore, the demands on the

About three years ago, the responsible persons at Maier Formenbau felt that they did not yet take full advantage of possible resources with respect to throughput times and quality, and for that reason decided to invest in automation. This was not an easy task as the standards available on the market did neither meet the product portfolio nor the own demands. Finally however, OPS-INGERSOLL managed to impress the company with a completely new concept.



2/  
*The milling machine Eagle V9 clearly shows the difference to conventional HSC machines. It serves for milling graphite and steel in alternating order, as required.*

system were scrutinized, and it was determined which of the products should pass the system in the future. Alfred Sindlinger comments: "Automation for such a wide portfolio is difficult to implement, we had to set limits. To fully utilize the system, we had to define the workpiece range accordingly. So, we excluded extremely large tools, but kept a still high weight. On the other hand, it doesn't make sense to mill 240 filigree graphite electrodes per day, if merely 60 ones are needed the next day. We also had to take into account, that a further task, in addition to the nearly 24 hours machining time per day, was to machine numerous complex and highly precise components such as mould inserts, slides, inclined slides etc. in a process-reliable way. That was the reason why, in the future, we wanted to perform the time-consuming set-up operations in parallel to machining work wherever technically reasonable. These requirements met with little understanding on the market, not least due to the standard solutions offered."

The suppliers were not able to satisfy the requirements neither in

terms of the envisaged flexibility nor with respect to the price/performance ratio for the robot which was deemed to be unacceptable by the persons in charge. After intensive in-depth discussions and a revision of the ideas and expectations, OPS-INGERSOLL managed to find a solution. Milling machine Eagle V9 and die sinking machine Eagle 1200 were linked via a MultiChange Flex-Robot and, superordinated, a measuring machine. The system is controlled by the MultiCellPro Jobmanager.

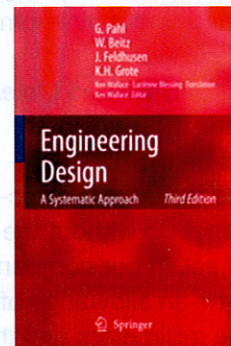
### Investment within reasonable financial limit

Due to its experience, OPS-INGERSOLL was already represented in the Bissingen shop with machinery for die sinking. With respect to the change from the originally planned HSC milling machine for graphite electrodes to the Eagle V9 milling machine, however, the Bissingen mold-makers were somewhat sceptical since, at the time of the first discussions, the Eagle V9 was still under development. The milling of steel and graphite in alternating order was deemed to be problem



3/ Eagle V9 and die sinking machine Eagle 1200 are loaded and unloaded by a MultiChange Flex-Robot - a new concept that primarily impresses with its high degree of flexibility.

## TECHNICAL BOOK



Pahl, G., Beitz, W., Feldhusen, J., Grote, K.-H. 3rd ed. 2007, XXI, 617 p. Available formats: eBook € 63.06 Hardcover € 80,20 Softcover € 80.20

### Engineering Design A Systematic Approach

Engineering design must be carefully planned and systematically executed. In particular, engineering design methods must integrate the many different aspects of designing and the priorities of the end-user. Engineering Design (3rd edition) describes a systematic approach to engineering design.

The authors argue that such an approach, applied flexibly and adapted to a particular task, is essential for successful product development. The design process is first broken down into phases and then into distinct steps, each with its own working methods.

The third edition of this internationally-recognised text is enhanced with new perspectives and the latest thinking. These include extended treatment of product planning; new sections on organisation structures, simultaneous engineering, leadership and team behaviour; and updated chapters on quality methods and estimating costs.

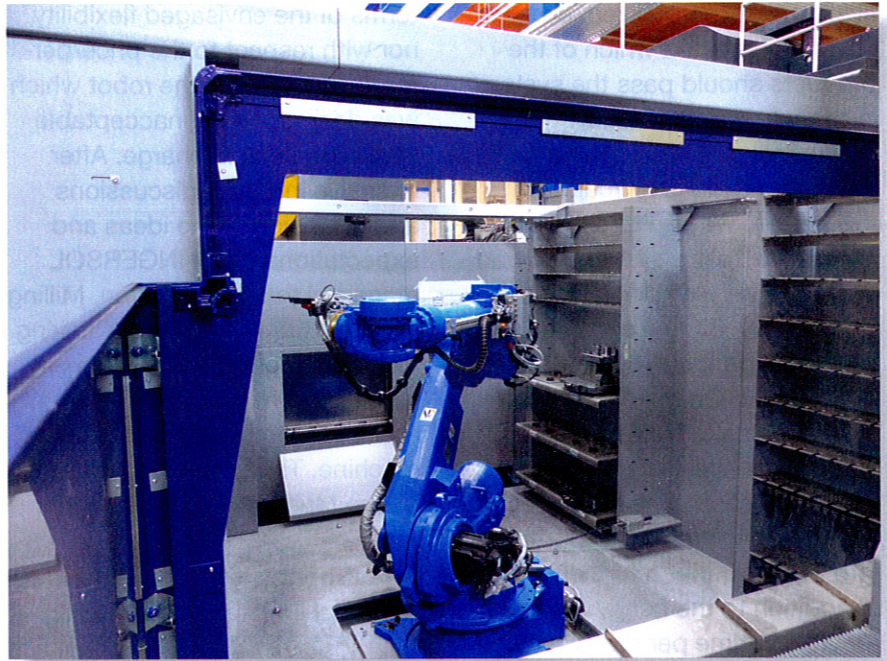
New examples have been added and existing ones extended, with additions on design to minimise wear, design for recycling, mechanical connections, mechatronics, and adaptronics.



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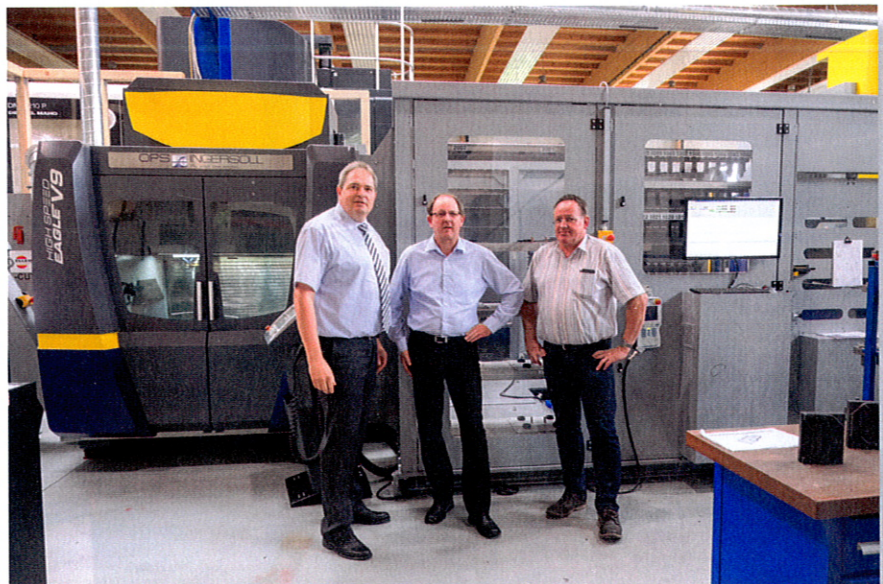
as the company had very negative experience with minimum-quantity lubrication. Today, however, Wilfried Maier considers the investment in Eagle V9 to be the right decision: "In the moldmaking sector you cannot do without the milling of steel. In our company this concerns an allowance of two to three millimeters and the corners. Such a precision in both HSC and steel milling is only possible on a robust machine. The Eagle V9 is such a machine, and it offers the additional advantage of full capacity utilization by processing steel and graphite. That makes a clear difference to conventional HSC machines." After all, it was the Eagle V9 combined with the large-size Gantry Eagle 1200 including robot that impressed Maier Formenbau. Irrespective of the fact that this concept was completely new ground to both, OPS-INGERSOLL and Maier Formenbau, the tailor-made solution seems to convince. Matthias Schmidt, Sales Manager at OPS-INGERSOLL, believes that this concept is offering sufficient potential for the tool and mold making sector. "Whenever we start tackling new developments it is important for us to see the future success of the product. The solution found for Maier Formenbau quickly revealed that this would come true, as the range of workpieces requires a maximum of flexibility. And we proved to be right. In the meantime, the toolmaking division of a reputed German automotive manufacturer made an investment in this type of plant configuration, too." The equipment in Bissingen has now been in operation for nine months. Cycle times have tremendously reduced, precision and quality have clearly increased. Wilfried Maier and Alfred Sindlinger, too, put this



4/ In Bissingen, the investment for the MultiChange Flex-Roboter had to be in an acceptable relation to the 5-axis milling or the die sinking machine operating in the  $\mu\text{m}$  range.

productivity in relation to costs which are, in contrast to conventional standard solutions, on an acceptable level: "The robot is able to handle a weight of up to 165 kg. It knows how to remove an insert from a die sinking machine and swings away the residual dielectric liquid. That is all

it does. Hence, the investment for it had to be in an acceptable relation to the 5-axis milling or the die sinking machine operating in the  $\mu\text{m}$  range." The upcoming integration of a third machine, a Gantry Eagle 500, clearly demonstrates that flexibility continues to be a factor in the future.



5/ Matthias Schmidt, Alfred Sindlinger and Wilfried Maier (from left to right): "To obtain a logical automation, you first have to define the workpiece range, work flows and processes. Here, individual automation was much more efficient than a standard solution." (Pictures: Maier Formenbau GmbH, Bissingen, and OPS-INGERSOLL GmbH, Burbach, both Germany)