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Electrical Drives in Injection Molds

Real-Time Process Monitoring in Cleanroom Environments

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Due to the increasing requirements regarding cleanroom environment in the production of plastic parts for the medical and pharmaceutical industry, the demand for fully electric injection molding machines is growing. In this context, the implementation of mold movements with electric drives, which meet the high requirements on cleanliness and reliability comes into focus.

Compared to hydraulic or pneumatic systems, electric drives offer high cleanliness and virtually maintenance-free operation over millions of cycles. In cooperation with Husky Injection Molding Systems, SCHÖTTLI AG, a Husky Company, offers fully integrated complete solutions for electric mold movements and valve gate actuation in high-cavity injection molds.

Electrical Actuators

The operational performance of electric drives is constantly developing and opens up new areas of application and uses. In combination with efficient control technology, the actuators offer great advantages over alternative systems from the hydraulic sector in terms of cleanliness and energy efficiency. In addition, individually programmable motion profiles, e.g. for the actuation of valve gate systems, can increase part quality and the durability of the injection mold.

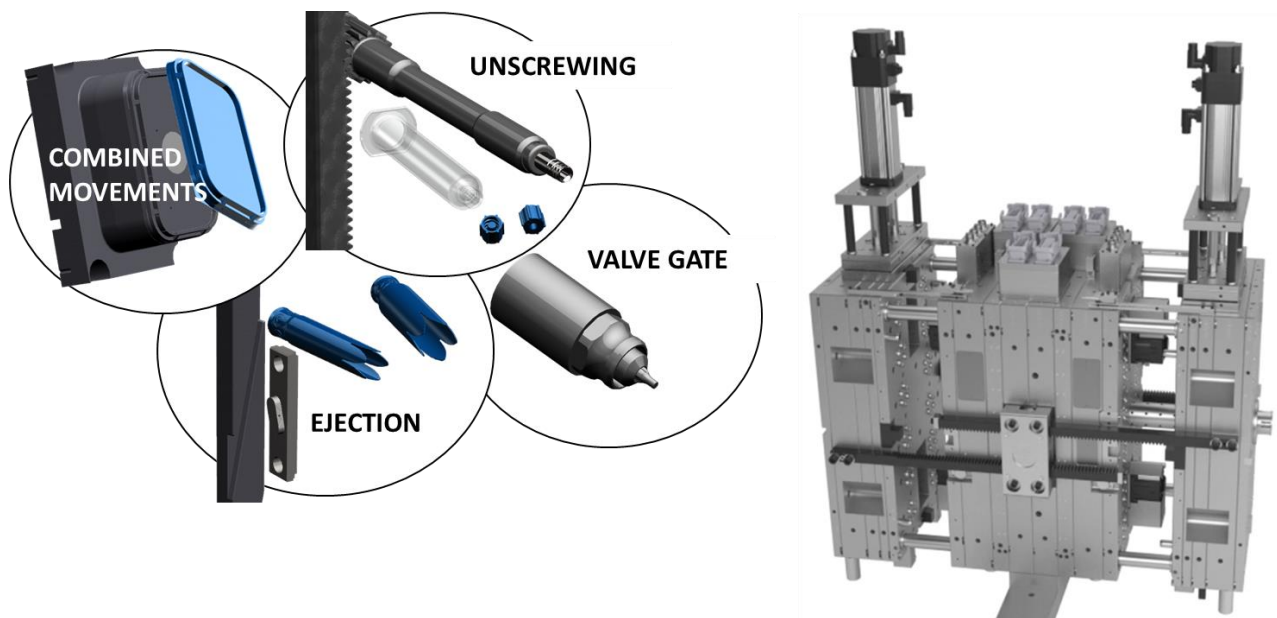


Figure 1: Solutions for electrical mold movements / 72+72 cavity stack tool for locking cone

The vast experience of SCHÖTTLI AG, a Husky Company, in the design of electric actuators ensures that the ideal actuator is selected for every injection mold and every application. In addition to the maximum force, the acceleration of the movement is also taken into account in order to achieve shortest cycle times. The applications are varied and include unscrewing and ejection movements as well as combined movements, which are realized in compression molds and electric valve gate systems.

For example, SCHÖTTLI has created a 72+72 cavity stack mold for a medical locking cone, which ensures the unscrewing movement of the thread cores and demolding through ejection sleeves via four individually controlled electric drives.

Control Technology

Dynamic mold movements impose high demands on the regulation and control technology of the actuators. The acceleration of the mold components in combination with the demolding of the plastic part results effect a high moving force, which has to be provided by the actuator. This force is generated by a servo motor and is transmitted over a gearbox into the core puller.

At this point, high torque means extensive power consumption, which must be supplied by the controller and the power electronics. The high current consumption of the servo actuator within short time intervals represents a demanding task in the dimensioning of the electronic components.

SCHÖTTLI already includes the control manufacturer during the development period of the injection mold and defines the expected requirements on the actuator, which allows a perfect adjustment of the power electronic components. This close coordination between mold- and control supplier guarantees, that the complete system works fail-safe in operation and a competent assistance in case of incidents.

Commissioning and Securing Production

After the development and production phase of the injection mold, it is now time for the injection molding machine, controller and injection mold to work together, in order to enable a stable process. Communication between the devices takes place via predefined interfaces. SCHÖTTLI provides preconfigured interface cables which can be used for commissioning according to the plug-and-play principle. Furthermore, the operation with HUSKY ASC-controllers offers the customer the possibility of a continuous process monitoring and process interruption, when significant process parameters are out of tolerance.

SCHÖTTLI - HUSKY ASC System

The efficient Husky ASC controller in combination with a highly dynamic servo motor offers a large variety of advantages. The exact control of up to 6 drives in combination with the path and force detection by the controller offers extensive possibilities to optimize the process.

The HUSKY system also offers the possibility of continuous process monitoring and can be integrated into the safety chain of the injection molding machine.

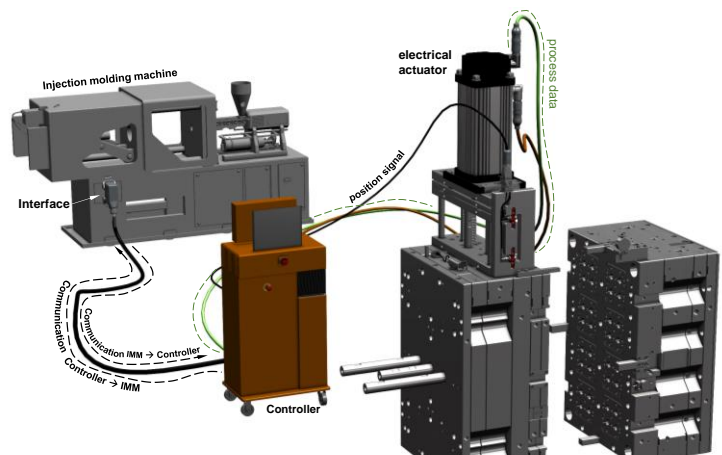


Figure 2: HUSKY ASC System

Next Generation Husky Controller

The new generation of Husky controllers also enables the customer to evaluate the process data in real time and thus carry out process optimization. This is particularly necessary for sensitive processes where the individual tool and machine movements must be coordinated.

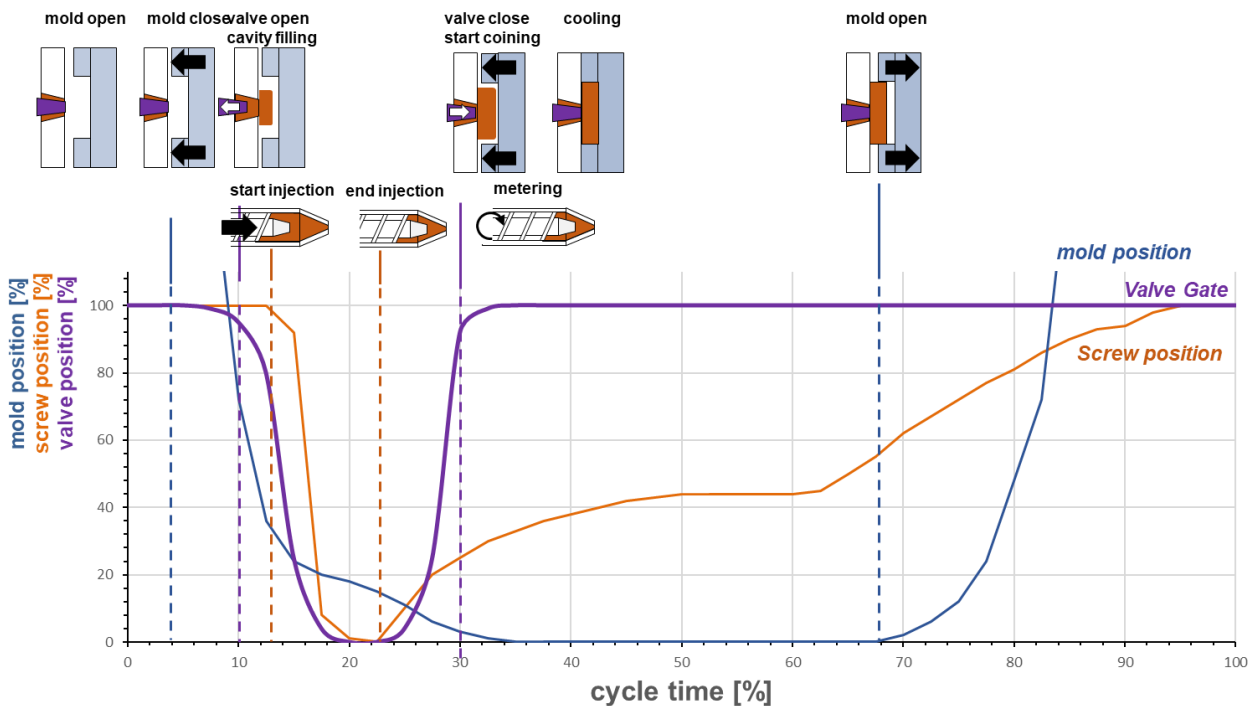


Figure 3: Signal sequence combined mold movement

In cooperation with Husky, an injection compression mold with UltraSync-E™ valve gate system was realized, in which the interaction of injecting the melt, closing the gate by needle movement and compression via the mold movement can be perfectly coordinated. The precise positioning of the mold components by the electric drives ensures that production is continuously within a stable process window and a maximum output with minimum cycle time.

SCHÖTTLI E-Drive System

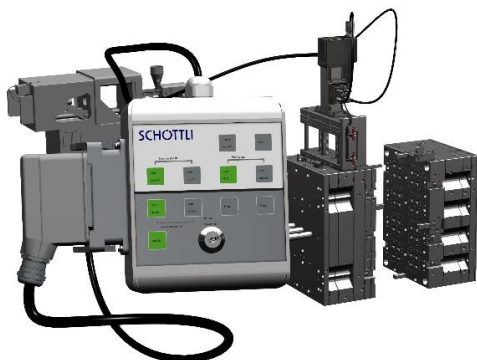


Figure 4: Schöttli E-Drive System

A cost- saving solution is guaranteed by the SCHÖTTLI E-Drive system. The simple operation combined with a reliable actuator makes this system attractive for prototype molds and unscrewing molds up to 64 cavities. Due to the integration of the controller into the actuator housing, this system can also be used as a direct replacement for a hydraulic solution. Existing production tools with hydraulic cylinders can easily be converted to an electric drive without additional investments in complex control technology.

Electric mold movement “Made by SCHÖTTLI”

SCHÖTTLI AG, a Husky Company, can draw on a wealth of experience especially in the field of unscrewing molds. With 10 years of experience, the company can help define the ideal solution for users and ensure reliable operation. SCHÖTTLI offers safe and efficient solutions for complex applications in the medical and pharmaceutical industry with combined movements, including the conversion of existing molds to electric drives. SCHÖTTLI molds provide you with a mold solution that stands out in terms of quality and efficiency.