Why a globally successful Upper Austrian complete system provider relies on automation technology from Salzburg for liquid silicone injection molding.

Perfect Dosing

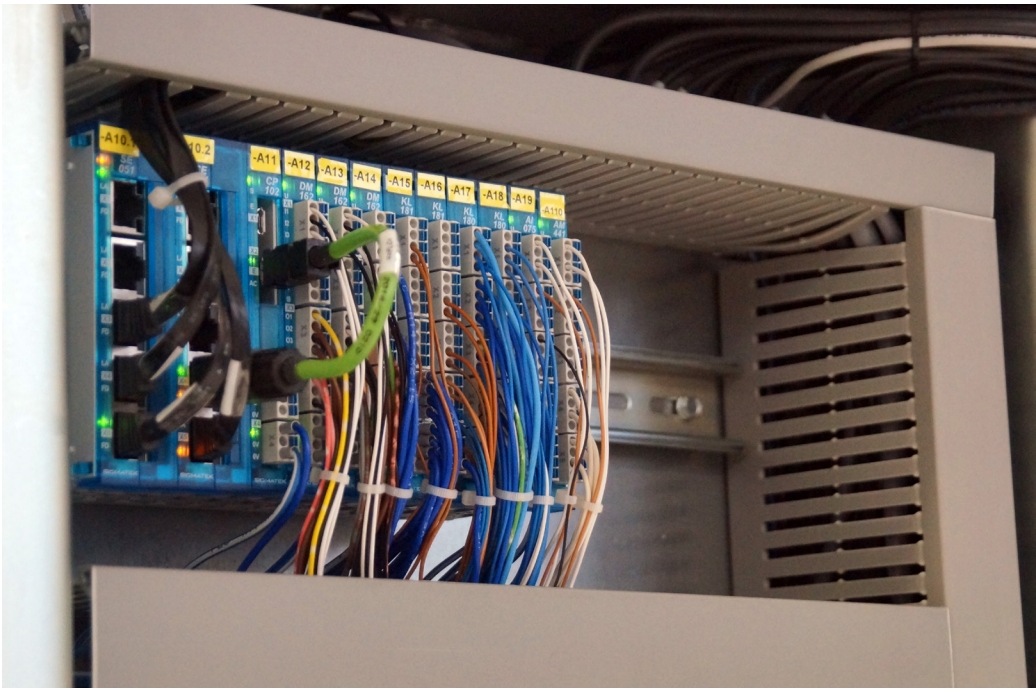
Not all injection molding is equal – the manufacturers in the booming market for silicon injection molded components know this all too well. Since in comparison to classic thermoplastics, processing elastomers places significantly higher demands on tool manufacture, as well as the entire process cycle. The company Elmet, located in Oftering near Linz, has specialized in this niche for plastic injection molding and provides all relevant elements for so-called LIM production cells or complete, manufacturer-specific turnkey systems optimized for silicon products. The local tool and machine manufacturer thereby meets the highest demands on quality from customers throughout the world. A secret of their success lies in the highly precise dosing system, which ensures the exact mixture of both silicon components and incorporated additive flows. For the control of complex regulating technology, Elmet trusts the hard and software from SIGMATEK – specifically, the components of the »S-DIAS« family of controls including the »LASAL« engineering and visualization system, as well as the brilliant glass multi-touch panel "ETT 1233" as an optically appealing operator interface. And Elmet knows that in the Lamprechtshausen automation provider, they have an innovative, solution-oriented and reliable partner whose company philosophy largely corresponds to their own.

Seals for pacemakers, nipples for baby bottles and optical lenses for modern Matrix LED headlights in the automotive sector are only three examples of the rapidly growing variety of products manufactured via silicon injection molding. "A current trend concerns highly transparent silicon, which is resistant to UV light and therefore does not yellow like thermoplastics", explains Karl Adlesgruber, Partner and General Manager at Elmet.

"In conjunction with the introduction of LED technology in the automobile industry, the requirements as well as the quantities for optical lenses of high transparency silicon increase enormously. The automotive industry to date however, already utilizes injection molded silicon products over a wide range of applications. In modern vehicles, countless seals are produced from elastic material that is temperature-resistant from -40° to 200° C." Apropos material: Only a few manufacturers worldwide provide this, and most of it goes regularly through Elmet to test new silicon recipes. The Upper Austrian company has after all, made a name for itself in liquid injection molding (LIM) such as technology for manufacturing elastomer form components made of liquid silicon rubber (LSR) as it is called in technical jargon. "We serve customers in 42 countries around the world. In Austria, we have around 190 employees. In addition to the main office in Austria, there

is also a sales and service office in the USA and Taiwan", says Karl Adlesgruber outlining the size of the privately-owned company. As they fulfilled their dream of self-employment and founded Elmet in 1996, the four owners brought a great deal of experience in tool manufacturing and the automation of the LIM process with them. Just four years later, they opened their newly constructed factory in Oftering. Which in the meantime, has already been expanded twice – most recently in the previous year.

Today Elmet is a globally demanded developer and manufacturer of LSR dosing systems, fully automatic injection molding tools, cold runner valve gate systems and turnkey installations for processing silicon and rubbers – and they also produce silicon injection molding components themselves. "On one side, we offer to immediately start a pilot production series with the tools and production cells that we develop and build – with the elimination of transport and start-up at the customer, valuable time can be saved. On the other side, we act as an extended workbench with our own machine park. That of course, has many advantages for us", explains Karl Adlesgruber. "It is not uncommon for a customer to come to us with a sample of the component they wish to produce and we provide them with a perfectly tailored one-stop shopping solution for it. We are highly experienced in integrating our own range of products with the ideal injection molding machine and other automation components into a complete work."



The compact »S-DIAS« control system from SIGMATEK operates the entire regulating technology of the dosing system, as well as recipe management.

"At SIGMATEK, I recognize the parallels with our own philosophy – above all, the innovative potential and love of perfection."

Karl Adlesgruber, Partner and General Manager at Elmet.

The Crux of Dosing

To achieve the highest component quality and process stability in liquid silicone injection molding, precision is the top priority. The exact mixture of the two silicon components and the incorporated additive flows thereby play a central role. "The so-called A and B components are basically the same polymer, one however contains the catalyst and the other the inhibitor. And the liquids have different viscosities", explains Karl Adlesgruber the LIM process. "As soon as the two components mix, they react with one another and vulcanize in the heated tool within seconds – at room temperature, depending on the component, the process would take several hours to days."

The gentle and efficient handling of the compressible and viscosity-fluctuating fluid is the central requirement of every professional LSR processor. It is important to get a handle on the difficult to control processing properties of liquid silicon and thereby keep the economic efficiency in sight. "The perfect dosing system supplies an exact mixture of the best product quality and at the same time, ensures that the A as well as the B component are virtually free of residual material at the end of each lot", says Wolfgang Leitner, pointing out the ideal case. "That was the founding idea with our early dosing systems, which we have continuously developed over the years." Elmet has therefore developed a regulating system that

"In the »S-DIAS« control system, we especially appreciate the variability with regard tot he I/0 cards and the compact construction. Even the CPU fits in the 12.5 mm wide housing."

Kurt Mitzka, head of dosing technology and automation at Elmet.

continuously monitors the material streams of the LIM components and permanently adjusts them. Even materials with relatively large differences in viscosity can thereby be mixed within the specified tolerances, without leaving significant residual quantities in the containers. "We work with two closed control loops, measure the flow rates and fill levels, and optimize them within the permissible mixture tolerances", reveals Karl Adlesgruber the basics of the patented system. "Everything is fully automated – there is no manual readjusting. We thereby achieve the highest quality."

The New Generation of Dosing Systems

With the »Top 5000 P«, Elmet launched its newest dosing system generation at last year's »K« trade fair. With the goal to make the customer even more successful and focusing on process safety, minimal dosing time fluctuations, efficiency and usability, the developers redesigned all components. The result is a machine concept that offers even more efficiency than the previous version and at the same time achieves technical peak values at the same time. Through the new, open construction of the system, the containers can now be exchanged from the front and side. "The dosing system can for example, be located in a corner or between two machines without having to be moved with each container change", says Karl Adlesgruber pointing out the concrete advantage. "In addition, we have implemented several ideas that make it easier for employees running the machine on-site to operate the dosing system correctly and prevent possible error sources from the start. Every undesired machine still stand has enormous economic effects with silicon injection molding. There are products for which the start-up is extremely complex and time consuming – until the process runs stably and the first goods are produced, hours have passed. For this reason, the machine runs non-stop in many production runs – 24 hours, seven days a week. That is not uncommon in silicone injection molding."

The New Automation Technology

A successful partnership has long connected Elmet with the local automation manufacturer SIGMATEK from Lamprechtshausen in Salzburg. "The first contact was at an exhibition", remembers Kurt Mitzka, Head of dosing technology and automation at Elmet. "The robust technology and above all, the solution-oriented commitment in regard to our specific needs had an immediate appeal. After we completed a relatively small initial project together – then based on the earlier »C-DIAS« control series – and had a very good experience thereby, we then continued developing our predecessor dosing system »Top 3000 S« using SIGMATEK technology. We were already partially using components of the current »S-DIAS« control system. There were never any notable problems – the quality of SIGMATEK products is simply top. It was therefore no question, as to whether we would also want to use »S-DIAS« in the new »Top 5000 P« system."

An optical "looker" of the dosing system is a 12" panel with a glass front imbedded in an anodized aluminum housing – the ETT 1233-EL from SIGMATEK provides projective capacitive multi-touch in IP65 protection. The intuitive operating surface is based on the visualization tool »LASAL Screen« – the integration into end-customer process control systems via OPC UA will also be possible in the future, as is remote maintenance via tablets or smart phones. "When changing containers, the individual steps for the entire process are displayed in sequence so that the operator cannot actually make a mistake", describes Kurt Mitzka this unique feature. The whole process is automatically logged in the panel's internal 512 MB data memory. The communication between the panel and the »S-DIAS« components installed on the rear of the control cabinet runs via standard TCP/IP. The entire regulating technology of the dosing system, as well as recipe management is controlled by the »S-DIAS« CPU. Various I/0 cards complete the module. "The fast counting inputs that the »DM 162« digital mix module regularly provides are very practical for our applications", says Kurt Mitzka commending this feature. "We

Operating station with style: The »ETT 1233-EL« 12" multi-touch panel with glass front from SIGMATEK imbedded in an anodized aluminum housing. The visualization was created with the HMI tool »LASAL Screen«.

Through the new, open construction of the »Top 5000 P« dosing system, the containers can now be comfortably exchanged from the front and side.

really appreciate the variability of the I/0 cards – as well as the thin construction." Even the CPU, with considerable power, fits in the 12.5 mm wide housing." The application technicians from Elmet programmed the »S-DIAS« control with the object oriented »LASAL« engineering system themselves. For this purpose, Kurt Mitzka and several of his colleagues took part in a LASAL training course in Lamprechtshausen. His summary of the all-in-one engineering tool: "At first glance, it looks relatively complex. However, you should not let that scare you away. Compared to other systems, »LASAL« provides significantly more freedom and almost no limitations. The direct integration of the visualization tool »LASAL Screen« into the engineering system is also very advantageous."

Automation Partner with Similar Genes

The compactness, robustness and reliability of the control components are for Elmet just as decisive as the support and geographical vicinity to SIGMATEK. "We are absolutely satisfied, the partnership works very well", commended Kurt Mitzka. "I appreciated the direct, uncomplicated contact with the manufacturer – I was on-site in Lamprechtshausen, saw the engineering and production processes and therefore know how precisely they work. The open communication, the extensive know-how and the tireless drive to expand existing knowledge and try new things are the attributes that have driven Elmet since their beginning. Karl Adlesgruber explains: "At SIGMATEK, I recognize the parallels with our own philosophy – above all, the innovative potential and love of perfection."

INFOLINKs: www.sigmatek-automation.com | www.elmet.com