THE TIGHTEST BOND BETWEEN TECHNOLOGY AND EXPERTISE.

SILICONE PROCESSING WITH SILCOSET



KraussMaffei

Pioneering Plastics

FACTS AND FIGURES REGARDING **THE SILCOSET TECHNOLOGY**



Medical technology/ baby care



Consumer goods



Multi-component parts



Electrical/ electronics



Automotive

Overview of the LSR plasticizing units

		Type										
		SP 55				SP 100		SP 180		SP 250	SP 380	SP 750
Diameter	[mm]	12	15	18	20	22	25	25	30	35	40	50

Overview of the HTV plasticizing units

		Type											
		SP 380	SP 750	SP 1000		SP 1400		SP 2000			SP 3000		SP 4300
Diameter	[mm]	45	50	55	60	60	70	60	75	80	80	90	90	100

LSR/HTV technologies are available for various machines of the PX/CX and CX-MK series







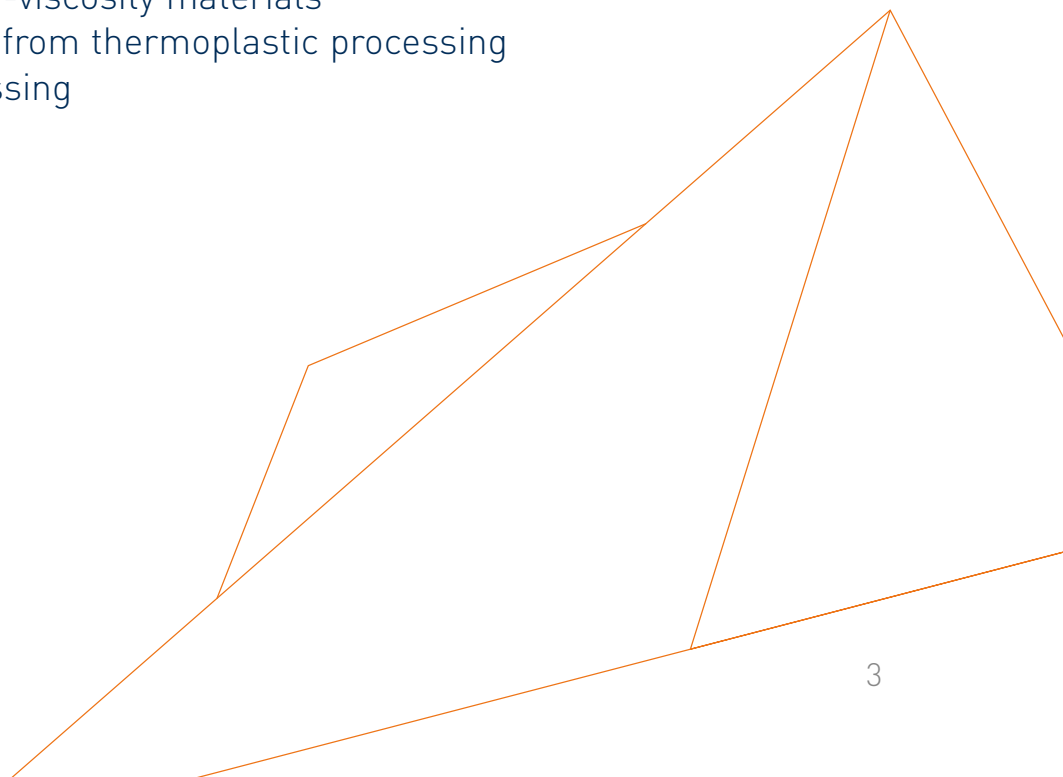
Complete technical data can be found in the catalog of hydraulic and electrical model series.

SILICONE PROCESSING WITH SILCOSET
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Thanks to new, improved material characteristics, silicones are being used in ever more applications in modern plastics processing. Silicones are highly transparent, easy to fit, temper-free and antibacterial. Furthermore, the number of self-adhesive systems is also continuously growing. New industries, such as the consumer goods industry, also recognize the added value achieved with the improved look and feel of their products. SilcoSet technology makes KraussMaffei's hydraulic, electric and hybrid machines with clamping forces of 25 to 420 metric tons suitable for silicone processing—even as a retrofit. Turnkey solutions even provide a complete system, including the injection mold and peripherals.

The highlights of SilcoSet technology at a glance:

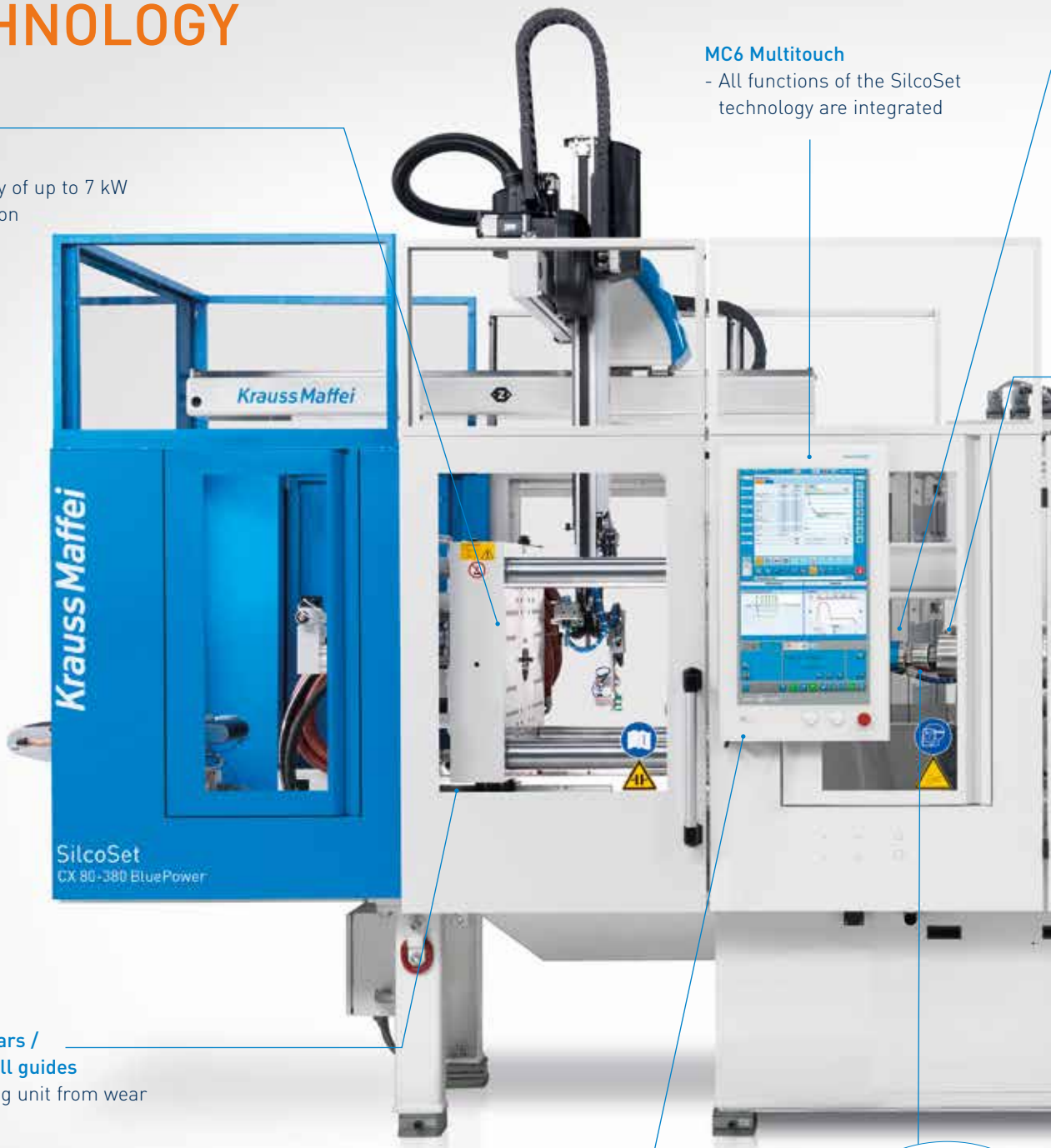
– Exact shot weight consistency even with 256 cavities
– Absolute platen parallelism guarantees reliable processing of low-viscosity materials
– Easy changeover from thermoplastic processing to silicone processing



TRANSPARENT TECHNOLOGY
THE FASCINATION OF SILCOSET TECHNOLOGY

Mold heating
- High heating capacity of up to 7 kW in the standard version
- Heating circuit monitoring

MC6 Multitouch
- All functions of the SilcoSet technology are integrated



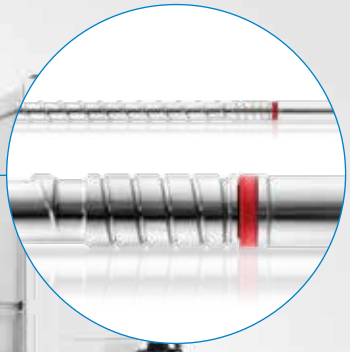
Viton stripper for tiebars / on all recirculating ball guides
- Protects the clamping unit from wear

APC plus for SilcoSet
- Compensates for viscosity fluctuations
- Makes start-up with LSR and HTV easier thanks to special material database





Water-cooled needle shut-off nozzle
- Safe process all the way through the mold



Leading screw technology
- Precise and gentle processing of silicones
- Without leaks

Mixing and metering unit
- For each requirement, the right range of peripherals

Barrel with cooling-jacket
- Short cycle time thanks to precise temperature control

Special silicone non-return valves
- Very good, repeatable closing behavior, adapted to the respective material

Proven in-line injection unit
- High-precision injection due to direct line of action

Highly demanding consistency
LSR – Liquid Silicone Rubber

The processing of liquid silicones, so-called LSRs, is particularly demanding. The consistency of LSR varies from water to honey and demands absolute platen parallelism to ensure that the mold closes extremely tightly and an injection molding process that is sophisticated to the finest detail.

Machine technology for state-of-the-art liquid silicone processing

Liquid Silicone Rubber consists of two components that produce a stable yet nonetheless elastic matrix in a platinum-catalyzed additive cross-linking without fission products. With the SilcoSet process developed by KraussMaffei, the screws, cylinders and nozzles of the injection molding machines are configured for the special features of the LSR material and furthermore are optimally suited to production in a cleanroom.

Typical material characteristics of Liquid Silicone Rubber are:

- Extremely wide operating temperature range from -50 °C to 290 °C with stable characteristics profile
- Exceptionally high purity without softeners; biologically compatible and therefore ideal for medical technology
- Outstanding mechanical and elastic properties with extremely low compression set
- Highly transparent, but can be colored from translucent to opaque
- Fast cross-linking reaction

The SilcoSet injection molding machines from KraussMaffei let you take advantage of these very properties.

Process properties

When LSR is processed, the raw material is made into a homogeneous mixture in a mixing and metering unit and fed to the plasticizing unit. The reactive, shear-sensitive mixture is cooled in the specially configured injection unit and gently transfered to the mold. It is important is that the material is now injected very precisely as it reacts and cross-links very quickly during the vulcanization process at mold temperatures over 170 °C. The finished parts can be demolded either by automation or by brushing.



Fresnel lens with microstructure of highly transparent LSR

THE BENEFITS OF LSR:

- Exceptionally high purity without softeners
- Biologically compatible and hypoallergenic
- Outstanding mechanical and elastic properties



All-electric PX series with mixing and metering unit.

APPLICATION AREAS:

- Aerospace
- Automotive
- Electrical/electronics
- Medical technology
- Consumer goods

Machine equipment

Standard package	Add-ons
Interfaces to mixing and metering unit	Hybrid solution for electric drive units
Special LSR plasticizing unit with sealed screw shank	Vacuum preparation and pump, including integrated control system
Dipping nozzle, non-return valve (RSP) and water-cooled cylinder casing	LSR bolt-on injection unit and other mixing head solutions such as rotary plate, index and transfer technology
Precise clamping unit for large molds	Complex automation solutions
Temperature control units	Full equipment catalog for electric and hydraulic model series

Maximum dimensional stability
HTV – High Temperature Vulcanizing

The 1-component HTV is a solid silicone that comes in the form of rectangular blocks before it is processed. The art lies in processing the modeling-clay-like consistency without forming bubbles, which is guaranteed among other things by the intelligent design of the material feeding unit.

High-performance materials for maximum dimensional stability

In addition to liquid silicones (LSR), there are also solid silicones (HTV: high-temperature vulcanizing), which come in rectangular blocks before being processed into their final shape. Due to their insulating properties and even higher dimensional stability, they are particularly well suited to applications in the electronics industry or applications involving high mechanical stress.

Typical material characteristics of solid silicones are:

- Very good insulating properties, but can also be configured to become electrically conductive
- Very good dimensional stability, cut resistance and resistance to weathering
- Flame-resistant; decomposes into non-toxic combustion products in the event of fire
- Excellent resistance to aggressive media, especially oil, fuels and coolant
- More cost-effective than liquid silicones

The SilcoSet injection molding machines from KraussMaffei allow you to use precisely these material properties to your advantage.

Process features

When processing HTV, the bubble-free supply of modeling-mass-like blocks is especially important. This is guaranteed by adequate bleeding in the aterial feeding unit. The shear sensitivity of HTV allows it to be non-compressively plasticized with precise temperature control at temperatures below 45 °C. Afterwards, bleeding is crucial for charging the cavity and for component quality. The vulcanization process occurs at mold temperatures of 165 to 190 °C.

THE BENEFITS OF HTV:

- Excellent media and aging resistance
- Very high dimensional stability with high mechanical load capacity
- Reliable and dependable



High-temperature-resistant plug sleeve

Machine equipment

Standard package	Add-ons
Mechanical screw anti-rotation device and viton stripper on the clamping unit and recirculating ball guide	Automatic AZ50/100 material feeding unit for bubble-free material preparation, integrated into control system (vessel volume 50 or 100 L)
Water-cooled cylinder and dipping nozzle, RSP additionally optimized for HTV with compatible key set	Polylift for fully automatic feed of the AZ (automatic feed) without interrupting production
Injection compression molding and venting circuit	Integrated heater circuit monitoring for mold heating
Automatic purging program for production downtimes	Versatile automation solutions
Sufficient temperature control units	Numerous other options

For the processing of HTVs, KraussMaffei offers injection molding machines that are specially configured for the properties of the material—for example the AZ automatic material feeding unit.

APPLICATION AREAS:

- Aerospace
- Automotive
- Electrical/electronics
- Medical technology



Meeting the highest standards
Adaptive Process Control (APC plus) and two-platen technology

For processing silicones, the clamping unit must close absolutely tightly and reliably—which is no problem for the two-platen technology from KraussMaffei. The plasticizing unit ensures high-precision injection and thus optimum component quality, which can be even further enhanced with the APC plus machine function (adaptive process control system).

New: APC plus for SilcoSet

KraussMaffei is the only manufacturer that has successfully integrated the specially developed APC plus machine function, which compensates for every process fluctuation, into a silicone production process, taking into consideration the material-specific properties. APC plus is available for hydraulic, electric and hybrid machines.

Compensation for batch fluctuations

As is known, silicone primary products are subject to relatively large batch fluctuations that can lead to varying material viscosity and thus variations in the filling behavior of the cavities. As the process progresses, APC plus monitors the viscosity of the material and corrects the filling volume already in the shot. The process as a whole is made even more precise; the weight of the parts remains extremely constant. APC plus is even able to compensate for any potential preliminary cross-linking of the silicone.

LSR micro injection molding:

The smallest articles are produced with high precision using the all-electric PX series—on minimum floor space. The servoelectric SPX picker picks up the micro parts in full automation and with process reliability. APC plus ensures a flawless process at part weights of 0.03 g.

Process Control by APC+

YOUR BENEFITS:

- Consistently high component quality and much lower scrap rates with APC plus
- Space-saving and absolutely precise closing behavior





High-precision micro injection molding using the PX25 on minimum floor space

High standards for top quality
Plasticizing unit for LSR and HTV

Demanding materials need modern machine technology. To enable liquid and solid silicones to be processed reliably, exact temperature control, perfect closing behavior, reliable material feed and high-precision injection are essential in the process.

Reliable cooling

To rule out the possibility of premature cross-linking, the uninterrupted cooling provides for stable thermal conditions during plasticizing. The temperature can be precisely controlled from the cylinder to the tip of the nozzle.

Reliable material feed

The broad range of nozzles means that every mold can be reliably used. The water-cooled, pneumatically driven dipping nozzle in particular ensures process-reliable material feed for every shot. In addition, it also acts as a mold seal, preventing material leakage and reducing material consumption.

Perfect closing behavior

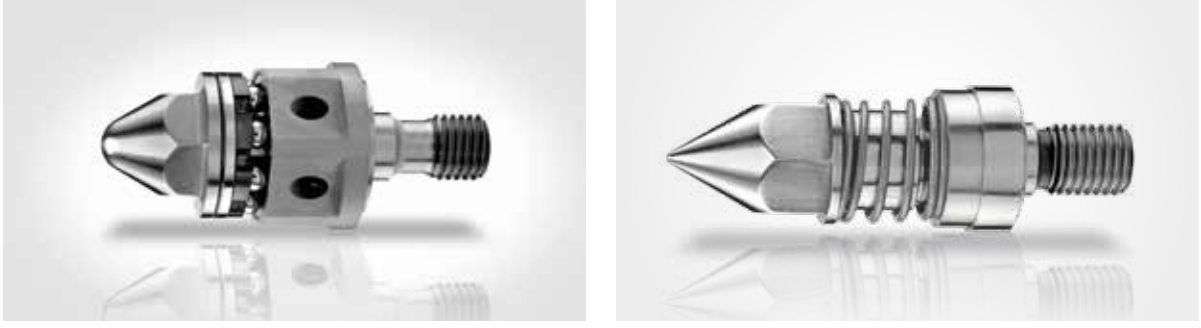
Depending on the material requirements, special non-return valves have been developed for the SilcoSet process. The special feature of these valves is that they close perfectly, even at extremely low viscosity, thus ensuring absolute reproducibility.

Maximum shot weight consistency

The minimal holding pressure means that high-precision injection is a major challenge when processing silicone in particular. Thanks to the unique in-line design of the plasticizing unit, the force is transmitted directly and centrally from the injection pistons to the screw. This results in maximum shot weight consistency and optimal reproducibility.

YOUR BENEFITS:

- Optimal reproducibility and reliable production
- Reduced material costs
- Stable component quality
- Flexible use of your molds



The non-return valves developed by KraussMaffei guarantee reliable production.



The proven in-line injection unit and innovative APC plus provide for extremely good shot weight consistency.

Unbeatable properties for every application
Familiar and new applications with silicone

The material characteristics of silicones are as varied as the industries in which they are used. KraussMaffei knows these properties very well and can support you with process expertise and machine technology from decades of experience.

Electronics

The versatile properties of silicone are especially interesting for the electrical/electronics industry. Properties ranging from electrically conductive to insulating are possible.

Wire-end ferrules:

- Machine: all-electric, clamping force 800 kN
- Number of cavities: 256
- Shot weight: 13 g
- Cycle time: 16 sec.
- Special features:
  High-torque direct drive with high-precision injection unit and complex take-out automation with simple core-pulling programming
- Material: LSR



Wire-end ferrules: 265 parts in one shot.



Cover housing with LSR seal.

Automotive

The automotive industry is also becoming increasingly enthusiastic about the extremely wide temperature range in which silicones can be employed. Self-adhesive types are suitable as seals on covers made of polyamide (including with glass fiber element) or other thermoplastics. Ignition cables for electric motors with high mechanical properties can also be easily realized with HTV.

Cover housing with LSR seal in the engine bay:

- Machine: CX 2-component with rotary plate, clamping force 1600 kN
- Number of cavities: 1 + 1
- Shot weight: 170 g
- Cycle time, including automation: < 1 minute
- Special features: rotary plate with hose bushing; piggy-back combination of thermoplastic and LSR

YOUR BENEFITS:

- **Perfect machine design for minimal cycle times**
- **Precise temperature control despite opposing processing temperatures**
- **Complex production cell including automation in a very tight space**
- **Scrap rates reduced further thanks to APC plus**

YOUR BENEFITS:

- Production up to cleanroom class 5
- Servo-electric drive unit for high-precision shot weight
- Unbroken documentation due to data records in the machine control

Medical technology

One of the most frequently encountered fields of application is the health care sector. Machines with cleanroom capability are used to produce cannulas, pacifiers, bottle teats or breastfeeding aids, for example. Access to medical care is increasing in many countries around the world, and demand increases along with it. In the booming market in China, growth is also influenced by two other trends. First, the population in China is aging at a high rate similar to Europe. Second, the number of very young users of silicone products is increasing due to the rising birth rate.

Pacifiers / bottle teats

– Machine: all-electric with cleanroom equipment
– Number of cavities: 8 with 21 g shot weight
– Cycle time: 25 seconds—of which 20 seconds heating time
– Special features: encapsulated drive units and closed lubrication systems for a lubricant-free mold chamber
– Full automation for maximum cleanliness



The modern and flexible material for all applications in the field of baby care.

Benefit from our SilcoSet expertise
Advantages that speak for themselves

Only the concentration of expertise will produce success in the long run, especially in demanding applications such as silicone processing. As one of the first processors, KraussMaffei has gathered well-founded experience in processing silicones. Here, we combine our process knowledge with our own automation and gripper technology.

Clever process reliability

Holistic thinking is the decisive factor for the success of SilcoSet technology from KraussMaffei. The consistent combination of the injection molding process and automation ensures efficient production solutions suitable for industrial applications. We offer a compact production cell with integrated robot and peripheral stations. This saves floor space and makes possible the use on identical injection molding machines. In practice, this facilitates component demolding and the linking of production steps. With our expertise in gripper technology and suitable peripherals, we are developing the optimum automation concept for your requirements—as simple as possible and as complex as necessary.

Two-way operation

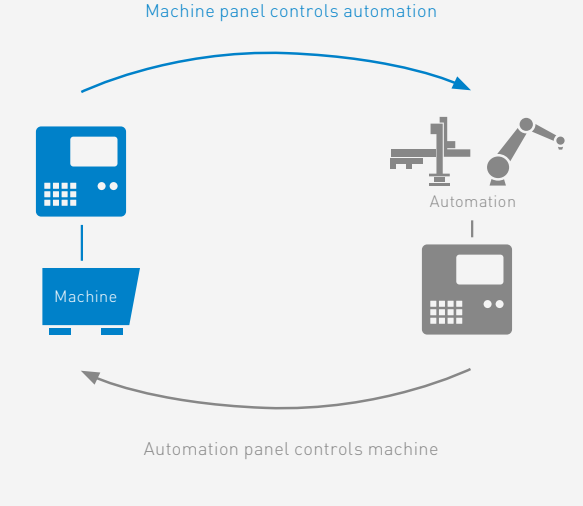
A consistent control concept and the integration of the robots in the MC6 control system facilitate operation. Features such as the two-way operation of injection molding machine and automation simplify the production process and product change-over.

Powerful network

Concentrated expertise is the key to success in complex applications. KraussMaffei gives you the most powerful network in the industry, consisting of application technology, project and technology management and a modern TechCenter for sampling. This allows for identifying ever more new, individual customer solutions, and the communication with suppliers and universities also enables us—and you—to retain a competitive edge.

YOUR BENEFITS:

- Reduced machine downtimes
- Very high user-friendliness
- Far less scrap, which reduces costs
- Complete processing of turnkey projects
- Automation solutions from a single supplier
- Wide-ranging network of partners in the silicone industry





Perfect basis for the efficient production of premium-quality precision silicone components: The all-electric PX series.



The start of automation with the servoelectric SPX 10 picker for rapid and precise component demolding.



Quality control in a confined space – Integrated camera systems for component inspection.



Our own gripper technology for the high-precision removal of 32 membranes with a wall thickness of only 0.2 millimeters.





OUR WORLDWIDE EXPERTISE IS YOUR ADVANTAGE
DIGITAL & SERVICE SOLUTIONS

With your KraussMaffei machine, you have chosen a product that delivers the highest levels of productivity and reliability. In addition to our range of machinery, KraussMaffei focuses on comprehensive and future-oriented solutions, innovative business models and an innovative portfolio of digital products.

Customer service at the touch of a button

The process of digital transformation is becoming faster and easier than ever for the customer. Our Digital & Service Solutions unit makes your production chain even more flexible and efficient with future-oriented solutions. KraussMaffei thus globally provides an all-inclusive customer service package and networks machines and processes with each other. Our global support offers a sound basis for your local long-term success.

Individual challenges in mechanical engineering call for intelligent solutions

With our services portfolio, we support you throughout your machine's lifecycle with a strong focus on your specific needs. In order to satisfy your wishes, we offer you a wide range of solutions in order to ensure maximum availability and optimum productivity of your machines.

Technology³ as a unique selling proposition

KraussMaffei is the only supplier in the world with a product range comprising the most important machine technologies for plastic and rubber processing: injection molding machinery, automation, reaction process machinery and extrusion technology. KraussMaffei is represented worldwide with more than 30 subsidiaries and over 10 production plants as well as about 570 commercial and service partners. Working together with our customers and partners, we are thus in a position to offer vast and unique expertise in the industry.

You can find further information at:
www.kraussmaffei.com





KRAUSSMAFFEI –
PIONEERING PLASTICS



Extensive expertise from a single supplier

KraussMaffei is one of the world's leading manufacturers of machinery and systems for producing and processing plastics and rubber. Our brand has been synonymous with cutting-edge technology for over 180 years. Our product range includes all technologies in injection molding, extrusion and reaction process machinery. KraussMaffei has a unique selling proposition in the industry as a result. By drawing on our proven innovative capacity, we can guarantee our customers sustained additional value over their entire value-adding chain through our standardized and individual product, process, digital and service solutions. The range of our products and services allows us to serve customers in many sectors including the automotive, packaging, medical and construction industries. We also supply manufacturers of electrical and electronic products and household appliances.

At your service all over the world

KraussMaffei is represented all over the world. Subsidiaries provide you with support in the countries shown in light blue. Our sales and service partners take care of you in the regions shown in white.

You can find all contact information at www.kraussmaffei.com

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