Anyone who has consciously given attention to the subject, will have been amazed to discover the variety and the multitude of applications for lids and covers. Many of these often unremarkable moulded parts are equipped with seals for protection against dirt and moisture. These are normally rubber seals. However, seals made from liquid silicone rubber (LSR) are being increasingly used. Sinsheimer Kunststofftechnik GmbH (SKT) commissioned ARBURG with the development and construction of a fully-automated production cell for the injection of liquid silicone seals onto metal covers. The system operates fully autonomously, beginning with preheating of the components through to the leak test at the end of the production process.

“It was important for us to obtain a complete solution from a single source,” explains SKT Managing Director Uwe Heiss. In addition to the machine itself, ARBURG was responsible for mould-related consulting and the entire automation.

The task: to inject an LSR seal directly onto the metal base material. The production process must be fully automated and the sealing of all produced parts tested. As Uwe Heiss goes on to explain, the specification was formulated in the shortest possible time with the support of the ARBURG experts. “The fact that the ALLROUNDER machines are relatively easy to configure, proved to be an advantage at the planning stage.” The background for the demanding requirement profile is that SKT produces parts for numerous automotive suppliers and must meet their high quality requirements. “In comparison with the previously practised semi-automated production, we will have a continuous and reproducible production process in the future,” says Uwe Heiss. A further advantage, he mentions the short cycle time and the consequently significantly improved productivity. 35 injection moulding machines with clamping forces from 250 to 3,000 kN are in operation at the SKT parent factory in Sinsheim and in the production facility in Mosbach.

For this project, ARBURG designed a complex autonomous production cell. It is based upon a fully-hydraulic ALLROUNDER 520 C with a clamping force of 2,000 kN. The machine has been equipped with a size 350 liquid silicone cylinder module, an air blast device as well as a vacuum device and a hydraulic needle-type shut-off nozzle. A robotic system suitable for the task at hand was selected: a MULTILIFT V in cantilever design with a maximum load weight of 25 kg. The metal covers with edge lengths of 180 x 330 x 14 mm (W x L x H) weigh about 400 grams.

The gripper mounted on the robotic system must also be appropriately robust and must perform a variety of tasks. It must insert parts on the nozzle side of the mould and must remove finished parts from the ejector side. For handling the parts, the gripper is equipped with insertion and removal modules that can swivel downwards through 90 degrees independently of one another.

Due to the required unit volumes, a two-cavity mould was installed. The seals must not contain any air enclosures. A preheating station for temperature conditioning the inserts, a cooling station and an inspection station for finished parts were integrated into the system. The parts are provided via an externally-loaded paternoster system, without interrupting ongoing production. A special challenge posed by this project was the programming for the complex movement sequences of the robotic system. This becomes clear when
Selection

ated sealing

considering a complete cycle: The system works on the “first in, first out” principle. A linear unit lifts two inserts at a time out of the paternoster system and transports them to the preheating station. The metal covers are preheated by a hot air blower to a maximum of 90 °C. The linear unit then transports the preheated covers to a transfer station.

If, due to an interruption, the specified heating time is exceeded, the system automatically sorts out the overheated covers and excludes them from further processing. The robotic system takes over the unprocessed parts and sets them down on a conveyor belt at the production cell outlet. From there, the operator can return the parts to the paternoster storage. The same procedure is applied to parts which have to wait too long in the transfer station.

In the next step, the gripper moves to receive the parts, swivels the insertion module through 90 degrees to the horizontal position and picks up the covers using vacuum suction units. Subsequently, the module again swivels through 90 degrees and moves into the open mould with the parts now held vertically. The gripper is aligned via centring pins which enter bushes on the nozzle side of the mould. A lift plate on the insertion module then moves forward in order to transfer the metal covers to the mould. They are held there by means of vacuum.

Insertion and removal are performed simultaneously, whereby the insertion module also plays a small role in the removal process. This is because as soon as the lift plate is in the forward position, four parallel grippers grasp the overflows protruding from the nozzle side of the mould. When the lift plate moves back, the gripper
Meanwhile, on the ejector side, the lift plate of the removal module has moved forward in order to remove the finished parts using vacuum suction units. The MULTILIFT V then moves out of the mould and the insertion module again swivels downwards through 90 degrees, so that the parallel grippers can drop the overflows. The MULTILIFT, with the empty insertion module swivelled downwards, then moves over the cooling table.

The exact target position depends upon the relevant dwell time of the finished parts on the cooling table. This is because the finished parts are taken in and out of storage according to the “first in, first out” principle. On the cooling table, a total of eight cooling places for four injection cycles are available. Cooling of the finished parts is supported by one fan per cooling place. Consequently, the insertion module is first lowered over those finished parts that have been subjected to the longest cooling period at this point in time, in order to collect them. The system then repositions itself, the removal module swivels downwards through 90 degrees and the two hot covers that have just been demoulded are set down onto the currently free places.

The robotic system then moves to the inspection station with the insertion and removal modules still swivelled downwards. Here, the removal module picks up the already inspected finished parts. Subsequently, the insertion module transfers the finished parts that were just collected from the cooling station to a pickup plate for the leak test. The MULTILIFT can now return to its starting position at the transfer station for the preheated inserts.

For the leak test, a hold-down device presses the covers against the pick-up plate before the hollow spaces under the covers are evacuated. Further handling of the finished parts depends upon the test result. Good parts are placed on the conveyor belt, reject parts in a rejects crate.

SKT is already planning the next extension of production, as the trend towards direct moulding of LSR seals onto carriers made from steel, aluminium or plastic is proceeding at a dramatic rate.

The parts are set down on eight cooling places (top and left). From there, they are transported to an inspection station by the MULTILIFT V, are leak tested and are set down on a conveyor belt as good parts (below).

INFOBOX

Founded: Sinsheimer Kunststofftechnik GmbH (SKT) in 2000
Employees: 150 in the SKT Group
Turnover: 25 million euros for the SKT Group
Machine fleet: approx. 90 injection moulding machines with a clamping force range from 250 to 4,000 kN
Products: Production of thermoplastic parts and items made from silicone
Contact: SKT - Sinsheimer Kunststofftechnik GmbH, Kaiserstraße 1, 74889 Sinsheim-Weiler, Germany
www.s-k-t.com
Demoulding of soft sprues

Whenever flexibility and elasticity are required, recourse is made to thermoplastic elastomers (TPE) or liquid silicone rubbers (LSR); the difficulty being that if a conventional tunnel gate is used, these flexible materials can pose problems when it comes to demoulding the sprue.

Tunnel gates are the most widely used variety for separating the sprue automatically from the moulded part. A conical bore runs diagonally to the parting line, which connects the moulded part and the sprue system together. This connection to the moulded part is severed automatically when the mould is opened. Normally, that is to say in the case of dimensionally stable, “hard” thermoplastics, the runner is held in place by means of an undercut in the movable mould half and is withdrawn from the sprue lining when the mould is opened. The entire runner is then demoulded independently of the part by means of a separate ejector.

However, soft materials can be a problem: if adhesion inside the sprue cone or the tunnel is excessive, the elastic material will be stretched out from the cone when the mould is opened. The entire sprue will then remain stuck inside the sprue bush on the nozzle side and will have to be laboriously removed by hand. By simply enlarging the undercut it is possible to ensure that the soft material is compressed by the ejector and that the sprue cone is cut off.

This can be facilitated by using an ejector pin with perforated grooves in combination with an ejector sleeve. The material is firmly held in place between the undercuts on the pin and the bore. Even elastic materials cannot be pulled away from the ejector pin because the external profile is secured by the bore. It is only once the sprue becomes free at the external diameter that demoulding is possible.

During ejection, the ejector pin is also dragged out to begin with. As soon as the external profile of the sprue cone has been freed, the pin is stopped by a limit stop. The actual demoulding operation is performed by means of the sleeve, whose continued movement is controlled by the ejector plate and which pushes the sprue over the grooves of the ejector pin. Both the part and the sprue are thereby reliably removed and a continuous production process is guaranteed. This ejector system can also be used for “hard” thermoplastics when a curved tunnel gate is to be demoulded.
The development and production of medical technology products requires a high degree of precision, highest quality standards and in-depth knowledge of the processing of thermoplastics and silicones, inserts and two-component injection moulding applications.

The California-based US company, APEC - a subsidiary of Helix Medical LLC since January 2008 - has been offering all this to its customers for more than ten years. APEC was established in March 1997 by Anura Welikala and Wolfgang Buehler. Together with sister company Magor Mold, a mould manufacturer, APEC can look back on a corporate success story covering more than a decade. Wolfgang Buehler was and is the owner of Magor Mold and Anura Welikala was previously a customer of this mould manufacturer. The two companies’ expansive corporate history began when Anura Welikala compared the services provided by Magor Mold with those of other mould manufacturers he had previously worked with in Asia and on the West and East coasts of the USA. Owing to his immense satisfaction and their shared high quality standards, the two new partners decided to jointly set up an injection moulding company - initially for testing the moulds made by Magor Mold.

The company kicked off in 1997 in Irwindale, to the East of Los Angeles, with three employees, one customer and one injection moulding machine. The company became profitable after only two quarters and at the end of the first fiscal year, they boasted a fleet of six machines. The success story continued seamlessly, so that in 2006, a sales volume of 13.5 million dollars was achieved. Today, medical technology products account for some 99% of APEC’s turnover. Since 2005, the company headquarters, with an area of approx. 23,000 square metres and production facilities operating 24/7, have been situated in the nearby Baldwin Park. The construction of a class 10,000 clean room for the assembly of devices is underway and sufficient space remains available for a second, class 100,000, clean room. The company’s successful development is also demonstrated by the fact that APEC was taken over by Freudenberg NOK on 1 January 2008 and now belongs to the Freudenberg Group.

Recently, APEC opened a second production location in Shenzhen, China. In terms of production technology and personnel, APEC ASIA has the same excellent facilities as its American parent company. “Around 12,000 square metres of production area and clean room class 100,000 prove that Asia is of vital importance for us and our customers,” concludes Anura Welikala. China is becoming one of the largest markets for luxury items and high-end medical technology products fit the bill perfectly. Consequently, high growth is expected to continue.

APEC products are currently used in China, Mexico, the Dominican Republic, Puerto Rico and, of course, the USA. Turnover increased by an impressive 30% last year, while the number of customers - most of whom are long-standing APEC customers - remained virtually static. Today APEC has 125 employees in the USA and China is also set to reach 100 employees by the end of 2008.

At Baldwin Park, 43 injection moulding machines, including 14 ALLROUNDERs, are currently in operation, covering a clamping force range from 28 to 300 US tons, including eight special silicone production
medical technology

cells. APEC Asia opened in 2007 with six injection moulding machines in a clamping force range from 550 to 2,000 kN. Catheters, haemodialysis machines, lancets and components for intravenous injections are produced to the highest quality standards, as evidenced by certification according to ISO 13485:2003 and US CDHS Licensed Medical Device Manufacturer, FDA cGMP and FDA QSR certifications. In addition to its medical technology products, APEC boasts outstanding expertise in the field of multi-component processing, so it comes as no surprise to know that other manufacturers failed in the production of many of the components before they were successfully manufactured by APEC.

APEC is particularly successful in the field of silicone injection moulding, so-called liquid injection moulding (LIM). For this purpose, APEC utilises eight ARBURG ALLROUNDER S and C type injection moulding machines with modern silicone injection units, vacuum units and closed temperature circuits. Cold runner moulds are employed, which must meet stringent requirements in terms of the machines’ reproducibility. For this reason, the ALLROUNDERS are equipped with position control and the moulds are automated in order to achieve the required cycle time consistency. A further important factor for APEC was the high degree of flexibility of the ALLROUNDERS, as the machines can be quickly converted to thermoplastic injection moulding when no silicone parts are being produced. Conversion can be completed in less than two hours.

APEC has been working with ARBURG virtually from the outset of its business activities. Now, it employs electric ALLROUNDER A machines, the ALLROUNDER Rotarytable, multi-component machines and ALLROUNDERs with swivelling clamping unit. APEC is highly satisfied with the quality of the machines and the cooperation with ARBURG: “ARBURG is known worldwide as a leading manufacturer of injection moulding machines and APEC only purchases the best equipment,” says the owner, Anura Welikala. “For medical technology products demand the best production technology on the market - and this is what ARBURG provides!”

INFOBOX

Founded: 1997
Locations: USA, China
Turnover: 13.5 million dollars (2006)
Production area: 23,000 square metres (USA), 12,000 square metres (China)
Employees: 125 (USA), 100 by end of 2008 (China)
Machine fleet: 49 injection moulding machines (USA and China)
Products: Medical technology products of thermoplastics and silicone
Contact: APEC, 5050 Rivergrade Road, Baldwin Park, CA 91706, USA
www.apec-plastics.com
Plastic and ketchup? No need to worry, this isn’t a new material combination, but rather a sealed diaphragm, such as those used in ketchup bottles in order to prevent afterdripping. These will be produced on a machine configuration from the Austrian LSR specialist and system supplier Rico, one of ARBURG’s partners in the field of LSR processing. This is only one of the highlights from the area of multi-component processing, which ARBURG will be displaying in great depth at K 2004. A total of four ALLROUNDERs will produce moulded parts in a variety of materials and/or colours.

Rico is one of the leading mould manufacturers on the international market. Its core competencies include the manufacture of elastomer moulds and the implementation of multi-component solutions combining thermoplastic and elastomers. ARBURG’s ALLROUNDERs and efficient SELOGICA machine control system mean that it is ideally placed to provide solutions for industrial plants. Even complex manufacturing processes with all the associated peripherals can be managed via SELOGICA without the need for separate control systems. This advantage will be in evidence on the trade fair machine.

The exhibit demonstrates the combination of a polyamide (PA) and an LSR component on an ALLROUNDER 570 C 2000-350/350. The two injection units are set up together in an L-configuration, in which one injection unit injects through the fixed platen in the standard manner and the second injects from the rear of the machine into the cold-runner. The cylinder modules can be exchanged individually. All the system peripherals – in addition to the robotic system, there are also temperature control units, the THERMOLIFT dryer and conveyor, the dosage systems, the mould heating system and the core pulls – are integrated into the machine control system and can therefore be operated centrally.

The removal robot is set up with an extension arm at right angles to the machine axis. A hinged axis is also mounted on the gripper for the execution of 90-degree movements along with a rotation module for 180-degree movements.
The mould details are of special interest. The mould is a two-cavity mould with an eight-cavity hot-runner system and 32-cavity cold-runner system, i.e. a 32+32-cavity mould. Each of the four PA components is injected with a hot-runner nozzle via a subsidiary distributor. In contrast, the LSR component is injected directly into the cavities via separate cold-runner nozzles (one for each cavity) in order to ensure waste-free production.

The moulded parts are produced as follows: first, the central unit injects the polyamide. At the same time, a pre-manufactured PA part is encapsulated with LSR. Next, the rotary mould transports the pre-moulded part to the LSR side for final injection. When the mould opens, the finished parts and PA sprue are ejected and separated simultaneously. The sprue drops into a container underneath the machine. The finished parts are picked up by the robotic system and removed from the mould area in order that the latter can close again and production can continue. During subsequent closing and injection, there is enough time to apply a cross recess to the LSR diaphragm outside the machine. This is performed by the removal robot and a special cutting and sinking device. The parts are then set down on a conveyor belt.

The sealed diaphragm for disposable bottles effectively prevents afterdripping of the contents. It is used in ketchup and condensed milk bottles and also in shampoo bottles, as is the case on the machine demonstrated by Rico. What is special about this moulded part is that the LSR component, i.e. the diaphragm, is injected onto a PA ring, making post-injection assembly significantly easier. The finished part is manufactured entirely in the production cell without the need for downstream processing operations. In this context, Rico’s system is another example of how intelligent mould design can be combined with practical automation solutions and appropriately high levels of autonomy even in multi-component applications to meet the most exacting production requirements at the best possible price/performance ratio.

Compact high performance. This is the injection moulding system which ARBURG will be presenting together with Rico at K 2004. Sophisticated mould- and production technology for the manufacture of sealed diaphragms.
Helvoet B.V. has been involved in the processing of rubber and plastics for over 60 years. The excellent reputation which the company enjoys as a manufacturer of high-precision technology components in the micro and small parts sector is attributable to factors which are also to be found in child’s play: unlimited and never-ending experimentation with new possibilities and their limitations.

The Dutch company, based in Hellevoetsluis and Eindhoven operates a further production location in Singapore and a joint venture in South Korea. Worldwide, Helvoet has 380 employees.

Control systems for the automotive industry, dosing devices for beverages (coffee machines and beer) and cosmetics (hair spray and creams), Seals for household appliances as well as gas and water installations, and finally, connectors for electronic products are Helvoet’s main product areas. In order to meet the highest production quality standards, the company is certified according to QS 9000 and ISO 9001. Certification according to TS 16949 is fully under way and will be realised at the latest by the end of 2006.

Helvoet utilises a broad range of technologies to manufacture its parts and components. These include the semi and fully automatic assembly of parts made from several materials, the production of rubber and LSR parts, two-component injection moulding for the production of hard/soft combinations, the injection of a LSR component onto a plastic part using two-component technology, the encapsulation of inserts, as well as rubber extrusion.

This great variety of technologies has ena-
bled Helvoet to successfully establish itself as a systems supplier for its customers. These customers involve the company at a very early product development stage. Owing to the extensive expertise which Helvoet has achieved, particularly in the production and combination of rubber and plastic parts, the specialists are consulted from the outset in the planning stage of new components. Their further involvement ranges from the design and construction of moulds through parts production to on-schedule delivery. In addition to Europe, Helvoet’s major selling markets are Asia and North America.

Co-operation with ARBURG extends back to 1997. Today, it is not only standard machines, but also complete production cells with the corresponding peripherals such as MULTILIFT robotic systems which are delivered to the Netherlands and Singapore.

One of the most recent examples is an integrated production system for manufacturing a cap adapter for the beverage industry. The cap parts are not only produced on an ALLROUNDER 630 S 2500-675/150, but are also removed by means of a MULTILIFT H module with a servo-electric main axis and palletised in special plastic trays for further processing. The highly autonomous system ensures precise part set-down. ALLROUNDERs with a mould indexing unit and removal robot without a B axis and adapted picker system were fully integrated by ARBURG and are operated centrally via the SELOGICA machine control system. The palletising station operates with a dedicated overhead three-axis NC handling system and separate PLC control for the palletising functions. It is connected to the injection moulding machine via an interface. High packing density and precise positioning of the parts is necessary for subsequent processing. Throughout the entire parts handling process, the soft components must not be touched. A read/write unit in the palletising system allows precise recording of the production times for each pallet by means of a microchip in order to ensure reliable troubleshooting. The entire system’s autonomy is approx. eight hours or 10,000 parts.

It is not least the excellent performance of this system in practice which has ensured the continued co-operation between ARBURG and Helvoet. Further ALLROUNDERs as well as automation solutions and LSR machines are planned or currently being delivered to both the company’s European and Asian locations. As with many other customers, when asked about the most important aspect of co-operation with ARBURG, the answer is: ARBURG offers optimum quality and service at a reasonable price.

INFOBOX

Founded: 1939
Employees: 300 at the Hellevoetsluis headquarters, 380 worldwide
Machine fleet: 90 injection moulding machines, 57 of which are ALLROUNDERs
Specialised areas: Systems supplier for high-precision technical micro and small parts for use in the automotive industry, consumer electronics, veterinary technology, in heating systems as well as dosing devices for the beverage and cosmetics sectors.
Contact: Helvoet B.V. Sportlaan 13, P.O. Box 2, NL3220 AA Hellevoetsluis, Netherlands, www.helvoet.com
The more specialised the task, the greater the demands. This applies to customers in exactly the same way as it does to processing techniques. Rico, one of the few globally operating mould and layout constructors specialists specifically in the field of elastomer processing, uses this motto as the basis of its own company philosophy. In order to operate successfully on the market, qualified employees, a structured company concept, speed and quality are required. With its ALLROUNDERs, ARBURG helps to make these principles become a reality.

Founded in 1994 in Thalheim near Wels in Austria, the history of Rico reads like a traditional American success story. The company’s three founders took the step of forming their own company as they viewed elastomer processing as a market of the future, just as they do today.

Currently, Rico exports nearly 100 percent of its products - mainly to central and northern Europe with the focus being on Germany, Switzerland, Italy, France and Scandinavia. The USA is one of Rico’s prospective markets whereby, according to Gerhard Kornfelder, co-founder with responsibility for Sales and Applications Technology at Rico, the following principle also applies to the potential development of this economic region: “We are concentrating solely on our core area of expertise in which we have many years of experience - the production of elastomer moulds and creating turnkey installations for elastomer processing. It is then down to our customers to produce these parts.”

Rico’s technological lead, as far as the key sectors are concerned, is protected by patents. The silicone moulds are equipped with a special cold-runner and vacuum system which allows for waste-free and burr-free production without the need for secondary operations. The company manufactures moulds for processing LSR, solid silicone and rubber on a 100% in-company basis and provides support for the core aspects of manufacturing with a high proportion of in-house manufacturing under their own control. In order to achieve this there is not only an in-house construction area but also an affiliated hardening shop which pre-treats the tool steels in a special process which Rico guarantees will yield production of one million parts as well as two years of problem-free operation.

As a system partner for the customer, Rico not only constructs the moulds in accordance with customer specifications but also provides support from the development stage to manufacture through to production. Training courses and on-site support for commissioning moulds or installations rounds off the company’s range of services. So-called “turnkey” projects are being used for an ever-widening spectrum. In this respect Rico is not only involved with the manufacturing of moulds and the related automation, but also the selection of the machine and its specifications as well as the associated peripherals. The relationship with their cooperation partner, ARBURG, is also an important factor here. ARBURG either directly refers silicone customers to Rico or Rico approach the company with a specific machine inquiry.

After having successfully completed the quotation stages, the machine specifications, the design of the mould and the automation are worked out by Rico in cooperation with the customer and ARBURG. The resulting article/machine checklist is submitted for confirmation. With regards to the development of parts, Rico achieves quick results, for example with material selection, due to a well-thought out
sample mould concept. The mould remains the same to a large extent - only the mould inserts are changed. Therefore, according to Gerhard Kornfelder, it is both possible and important to include Rico into the parts development/project planning as early as possible.

During the construction phase the customer has repeated opportunities to see how things are progressing and to make their wishes known. Rico then provides the initial sample and the relevant test and data reports by an agreed delivery date. After the customer has given their acceptance, a hand-over date is agreed in Wels which includes a training course on an ALLROUNDER and the mould.

Kornfelder expects to see further growth in the future, particularly in the area of project business, which Rico procure in cooperation with ARBURG. The company is also considering expansion on an international basis. After the joint appearance at this year’s NPE in Chicago, at which Rico was on the ARBURG stand for the first time as an elastomer specialist, good contacts in the American market have been established. "But it will be impossible to succeed there without a service partner", commented Kornfelder, explaining his intentions.

From a technological point of view Rico is putting his trust in the bonding of plastics and elastomers in the field of two-component injection moulding. He also believes that there is a demand to be exploited in this area too, especially in the automotive and medical technology sectors.

Kornfelder is extremely happy with his ALLROUNDERS and the cooperation with ARBURG. "The joint trade fair appearances are of great benefit and the SELOGICA control system was, of course, a real success for the special processing techniques in particular, as it can do without separate control systems and remains easy to operate despite complex processing operations. As the SELOGICA is also ideally suited for two-component production we will also be putting our faith in ARBURG in this sector. Another joint trade fair exhibit is also planned for the K 2004 which will focus on this particular production process."

INFOBOX

**Founded:** 1994 in Thalheim  
**Employees:** 60, an increase to 70 is planned  
**Range:** Elastomer moulds, production facilities for producers and suppliers  
**Customers:** Automotive, medical technology, hygiene, white goods, baby supplies  
**Annual production:** 40 to 50 moulds with automation  
**Project business:** 50 percent of orders  
**Machines:** Four ALLROUNDERS for evaluation, fifth machine (2K) has already been ordered  
**Location:** Am Thalbach 8, A-4600 Thalheim/ Wels, Austria, www.rico.at
We produce small, detailed, precision parts – in their entirety! What can be summed up by Peter Halverscheid, managing partner of JuHa Kunststoffverarbeitung GmbH & Co. KG in Lüdenscheid, in such a friendly, easy-to-understand way, appears much more complex on closer examination.

The company, founded in 1983 by Peter Halverscheid and his business partner Bertold Junker, manufactures complex, high-quality products from silicone and thermoplastics for purchasers for the automotive industry across the globe. Exemplary product parts for well-known names in the automotive industry like BMW, Daimler Chrysler, Volvo, Renault, VW and Skoda can be seen on display in the showcases.

Water-proof plug connections, with a double locking mechanism for example and recess for headlamp assemblies, water-resistant sealing elements, membranes or the complex mechanism for a sunroof – this is only a small selection from the wide range of products, which covers part weights from 0.1 to approximately 300 grams. Multi-component injection moulding, composite technology with automatic insertion and assembly during the injection cycle are used in addition to conventional injection moulding processes.

The partners Junker and Halverscheid began to work together as early as 1974. This is
when the present partner company, Junker & Halverscheid Formenbau GmbH & Co. KG, was founded in the southern area of the Ruhr Basin, which was well-known for its mould construction companies. “And mould construction still plays a central role for our company, as, in addition to excellent machinery, the quality of the moulds is a decisive factor in the quality of the final product”, commented Erich Schmidt, Technical Director at JuHa, as he explained the company’s philosophy. Therefore both companies are located “under one roof” in order to ensure that cooperation and lines of communication run smoothly.

From the very beginning of their production of plastic parts, the company from Lüdenscheid put its faith in ARBURG machines as the guarantee for the high degree of precision needed for their products. And they always performed excellently, as Schmidt and Halverscheid explicitly underlined. Today, 37

 layoffs are supported by 15 additional subcontract workers. The number of employees is scheduled to increase rapidly.

The quality of the products is one of the factors which determines the extremely positive business development of the company. Comprehensive service provision is the other. Adherence to delivery schedules and good performance levels are also quality issues which are closely monitored by the automotive industry. “We are subject to a great deal of pressure when it comes to engineering and production quality. If the performance and the quality are the same the service provision is the decisive factor in the supply sector”, commented Erich Schmidt. “From the initial product idea to the finished part” is JuHa’s maxim as a certified systems supplier.

And JuHa is A1 in this field - 98 percent of the company’s customers are multinational concerns with enormous purchasing potential but also with high demands with respect to comprehensive services. “The market decides on the rules”, is how Peter Halverscheid describes the business. And therefore they would – if required – go along with the automotive industry in the future, even though JuHa is actually a supporter of central production systems. But the company from Lüdenscheid wants to remain faithful to one part of the company philosophy at all costs - the sophisticated products are to be produced independently, under their own direction. “Which, incidentally, has clear parallels to the extremely agreeable philosophy of our machine supplier ARBURG, which is probably why the partnership between us works so well”, asserted Erich Schmidt.

With this philosophy, the companies Junker und Halverscheid Formenbau GmbH & Co.KG and JuHa Kunststoffverarbeitung GmbH & Co.KG were able to increase their turnover by more than 20 percent in the year 2002. And the prospects are positive - an end to this healthy growth is not to be expected with this quality performance and with this customer portfolio.

**INFOBOX**

**Founded:** 1983  
**Partner companies:** JuHa Kunststoffverarbeitung GmbH & Co.KG and Junker und Halverscheid Formenbau GmbH & Co.KG  
**Employees:** 120, plus 15 subcontract workers  
**Machine fleet:** 37 ALLROUNDERs  
**Specialised areas:** High-tech products made of silicone and elastomers for the automotive industry  
**Location:** Auf dem Schüffel 2, 58513 Lüdenscheid, Germany, www.juha.de
As far as the injection moulding of liquid silicone rubber (LSR) is concerned, the family-owned Swedish group Medical Rubber counts among its European pioneers. The service offered to its customers by the medical technology specialist reaches far beyond design, prototype, initial batch and series production; it includes comprehensive consultation from the choice of materials through to suitable packaging solutions.

Dialysis, anaesthetics, drug delivery systems, orthopaedics, nutrition or cardiology – products by Medical Rubber can be encountered everywhere. More than 20 years ago, the company was among the first in Europe to begin processing LSR using injection moulding technology. As a pioneer in the field, Medical Rubber today commands comprehensive expertise regarding LSR. Moreover, thermoplastic elastomers (TPE) and thermoplastics are also processed into customer-specific precision parts. Regardless of whether these are small-volume individual moulded parts or high-volume series products, Medical Rubber develops the appropriate complete solution in close collaboration with its customers.

The bulk of its customers are from the medical technology field, but others belong to industrial sectors such as food or electronics, which have comparably high product requirements with regard to hygiene and precision.

Today, Medical Rubber counts among the leading medical technology manufacturers in Europe, with an export rate of over 70 per cent. The company, however, does not rest on its successes, but continues to develop, be it in terms of hygiene, precision or materials.

At all three of its production plants, Medical Rubber maintains a modern machine park with a high degree of automation, whereby speed, precision and cost-effective production are ensured. The medical products are exclusively produced at the two Swedish plants, where stringent hygiene and cleanliness requirements are fulfilled by means of class 100,000 and 10,000 clean rooms. The manufacture of industrial products is located at the company’s Polish plant.

As the key to its success, Medical Rubber cites its proven project management model, which enables the customer to remain constantly up-to-date with the development status of its product – from design to realisation.

Medical Rubber implements all manner of
customer ideas during this process, whereby the support provided ranges from the selection of materials and machines through to injection moulding and packaging. The close collaboration maintained by Medical Rubber with regard to its customers also applies to its suppliers. Whether in terms of material handling – (no easy matter in the case of LSR) – or of the finished moulded parts, the company relies on its own expertise and develops systems tailored to the requirements at hand jointly with the relevant manufacturer.

In the injection moulding machine sector, Medical Rubber has collaborated successfully with ARBURG for more than 20 years. Contacts are maintained both via the Swedish ARBURG agent Rafo AB as well as via the Lossburg headquarters, the latter particularly when highly technical issues need to be resolved with the aid of the technical experts.

The machine park of the three Medical Rubber plants totals more than 25 injection moulding machines, all of them ALLROUNDERs, with clamping forces from 200 kN to 1000 kN. The majority of the machines process LSR, so that these ALLROUNDERs are equipped with cold-runner moulds as well as the ARBURG LSR equipment package consisting as standard of a highly wear-resistant silicone cylinder with liquid temperature control, a compression-free dosing screw and conveyor screw, a non-return valve and a hydraulic needle shut-off nozzle. The hydraulic system with two pumps ensures regulated machine movements. Furthermore, the SELOGICA control system features symbols adapted to LSR processing in the sequence editor, interfaces for mixing and dosing units as well as blow-out units and the capability of controlling a total of six mould heating circuits.

And because the pioneer of LSR processing is entirely satisfied both with ALLROUNDER machine technology and SELOGICA control technology, Medical Rubber will continue to rely on ARBURG injection moulding technology in the future.

INFOBOX

Founded: 1973
Plants: Sweden, Poland
Production area: 5000 square metres (S), 1000 square metres (PL)
Employees: 125
Products: LSR and TPE moulded parts, mainly for medical technology but also for the food and electronics sectors
Company headquarters: Medical Rubber, SE-242 93 Hörby, Sweden, www.medicalrubber.se
If you're looking for high-end products made from liquid silicone (LSR) and require the highest standards of precision, then SIMTEC Silicone Parts in Madison, Wisconsin, is the place to go. The company's range covers not only high-grade LSR products, but also two-component moulded parts and encapsulated inserts. The US company's motto “Extraordinary Solutions” provides a clue to what customers can expect.

“We specialise 100 percent in LSR - that’s our core area of expertise”, says CEO Enrique Camacho. “This enables us to meet all requirements, whatever sector customer comes from: for example clean room production, safety and hygiene for medical technology or long service life, thermal resistance or reproducibility for the automotive sector.” SIMTEC’s list of customers worldwide includes some major players: around 95 percent of them belong to the “Fortune 500” with sales above 60 billion US dollars. The fact that this relatively new company is a major supplier of high-grade, high-precision LSR products is the result of a clear, far-sighted strategy.

The SIMTEC team is made up of highly qualified employees with decades of experience in both silicone and thermoplastic processing. This is an important aspect for two-component injection moulding, in which adhesion properties and consequently the right choice of materials play a crucial role. Various ovens are available for the subsequent curing processes, enabling us to apply the right process according to product requirements.

“Our advantage is that our expertise goes beyond just LSR processing,” explains the CEO. “In fact we come from a scientific background and are aware of how a particular material will react to different conditions at a molecular level." This also results in the fact that SIMTEC invests heavily in research and development, cooperates with leading institutions in the field of LSR technology and publishes numerous specialist articles.

“Our extensive expertise secures us a competitive advantage and, of course, for our customers too. To ensure that things remain that way in the future, we intend to further develop our two-component injection moulding and insert encapsulation areas,” explains Camacho. SIMTEC offers the full range of expertise from a single source. In his opinion,
Selection
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the best product results are achieved by being on board from the very outset. He provides a clear illustration of the innovative spirit of his company: “99 percent of the products we manufacture didn’t exist before. Customers simply came to us with an idea.” This was followed by the design stage, involving the optimisation of the product design, choice of materials and processes, prototype production, pre-production and, finally, series production.

In an effort to find exactly the right material for a customer’s specific needs, it is not just different plastics that are extensively tested in advance. Customer-specific materials have also been developed for very special requirements in collaboration with raw materials suppliers. This extensive know-how is also reflected in the quality of the products: the reject rate - or more precisely the PPM (parts per million) rate is less than ten.

“We also only cooperate with the best suppliers,” emphasises the CEO, who ordered the first ALLROUNDER injection moulding machines when the newly founded company’s premises were still a shell. The ARBURG machines, which now number eight in total, currently operate in a class 100,000 clean room. “However, if our customers demand a class 10,000 clean room at some time in the future, we will meet those requirements,” promises Enrique Camacho. “We also always equip our ALLROUNDERs to very high standards to ensure that we are well positioned for the future. The modular concept of the ARBURG machines leaves us a wide range of options. We are also very pleased with our MULTILIFT robotic systems.”

The complexity and quality of the products we produce also require the corresponding moulds. The range includes 1 to 128-cavity moulds for “simple” LSR parts and up to 8+8 cavity moulds in the two-component sector. When it comes to the integration of complete systems, SIMTEC can call on the skills of its own in-house experts. “We implement the entire automation system in-house, which affords us great flexibility in providing our customers a tailor-made service.”

INFOBOX

Founded: 2002
Employees: High 17
Products: high-grade LSR products, including two-component moulded parts and encapsulated inserts.
Customers: Automotive, consumer goods, medical technology, personal care and special applications for the European and North and South American markets
Machine fleet: Eight specially equipped LSR ALLROUNDERs with clamping forces from 800 to 2,200 kN, including three two-component machines
Contact: SIMTEC Silicone Parts, LLC, 1902 Wright Street, Madison, WI 53704, USA
www.simtec-silicone.com
International flexibility. When looking at some parts made from liquid silicone (LSR) it is impossible to imagine the complex production steps required to make them. Durability, acid resistance and thermal stability - these advantages enable a wide range of applications. But only if you have application technology know-how and flexible injection moulding technology at your fingertips. ARBURG has both, Internationally.