

THE RICO GROUP MAGAZINE

INSIGHTS

ISSUE 2020

PLASTIC AND METAL

Inserts overmolded
with silicone

HEALING WOUNDS

2K pad for
light therapy

INCREASING PROPORTION OF WOMEN

Female engineers
on the rise

FINDING WAYS

Opportunities from the crisis:
what Covid-19 brought out in us

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In order to improve readability, the INSIGHTS magazine does not use gender-specific phrasing. Where the masculine form is used, such references relate to both men and women.

Credits and legal notices

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FLEXIBILITY – AN SME STRONG POINT



EDITORIAL INSIGHTS 2020

Everything there is to say about the all-encompassing coronavirus situation has probably already been said, but allow me to make a few brief observations.

At the start of the year, who would have thought that a microscopic virus could so quickly and profoundly affect so many aspects of our lives? Almost overnight, companies were confronted with a totally new set of challenges, and had to take swift, pragmatic action. The outcomes were not always good. Nevertheless, we can still take something positive from this pandemic: the realization that we cannot take everything for granted and that taking our foot off the gas a little can be a good thing.

This magazine features articles about two standout projects that SILCOPLAST has recently completed. Working with our customers to turn a vague idea into a finished product is always an exciting process – with a few ups and downs along the way, of course. But our flexibility as an SME enables us to fulfil our customers' requirements – at least where technically feasible.

Thanks to our close collaboration with the other RICO GROUP companies, when approaching new projects we know that we can harness the Group's combined capabilities – be it rapid prototype production or highly complex molds for 1K and 2K technology. As a result, the most recent addition to the Group feels right at home as part of the RICO GROUP family. You can read about our path towards develo-

ping solutions for our customers on the following pages.

In this addition of Insights, we report on RICO's reliable production process for a 2K membrane, the balanced business growth at SIMTEC, two recent medical projects at SILCOPLAST, HTR's heat treatment for rocket fuel tanks, and also highlight the RICO GROUP's capabilities in LSR and 2K face mask production.

We wish you an enjoyable read!

Philipp Gaus
CEO and member of the supervisory board of
SILCOPLAST AG



COVID-19: NEW PROJECTS AND LESSONS LEARNED

WHAT THE CRISIS BROUGHT OUT IN US

The coronavirus sent the whole world into turmoil in the spring of 2020. Quick decision making and new approaches were the order of the day. Find out how the RICO GROUP companies fared, where they had to tighten their belts, and the lessons they learned for the future.

We won't beat about the bush: the crisis was a hammer blow for us all. From one day to the next, normal procedures went out of the window, regular lines of communication became totally ineffective, and nobody knew what to expect. Responding quickly and putting new structures and processes in place were the top priorities. As were assuring employees that their jobs were safe and customers that we would be able to fulfil their orders.

We were fortunate that the companies in the RICO GROUP were classed as essential to key supply chains, not least because the Group serves such a wide variety of industries and has many customers in the medical and food technology sectors.



The impacts of Covid-19 were keenly felt across the RICO GROUP

Sudden change: new ways of working

The crisis showed us how important it is to remain flexible

and agile. The founders of all of the RICO GROUP companies still play a hands-on role, which aided the implementation of specific, tailored measures at each location. Existing crisis plans were quickly adapted and put into action. In this regard, direct communications were decisive. Just to give you an example: RICO held meetings with small groups of staff almost every day at the beginning of the crisis, and was very open about the next steps.

Arrangements were made for the employees of all companies to work from home where possible. RICO also participated in the government's short-time working scheme. Staff who had to be on site to do their work were assigned to shifts – this was designed to minimize overlaps between different groups of employees. SILCOPLAST implemented a three-part working time model, with 30 minutes between each shift when there were no employees in the buildings.

The overriding objective was to ensure maximum protection for our people, while at the same time remaining in a position to carry on fulfilling orders should an employee contract the virus. SIMTEC in Florida decided to close its facility for a short time due to a suspected case (for more details, see the box on the next page). So far, we had one positively-tested case in the RICO GROUP [as of August 31, 2020].

Impact on business relations

In terms of orders, the picture was extremely varied.

SILCOPLAST, SIMTEC and RICO had to contend with falls in demand for production parts, which were quite dramatic in some cases. Lots of customers temporarily closed their plants, had to furlough staff, and – especially in the automotive industry – the disappointing figures of the past few

months made this a double whammy.

It was obvious that these factors would also leave their mark on the RICO GROUP companies.

That said, the crisis has also opened up opportunities for new projects. SIMTEC and SILCOPLAST benefited from an increase in demand for ventilators, masks and other medical devices. Lots of customers have also used the crisis as an opportunity to push ahead with planned projects. We were able to reassure concerned callers – all of the RICO GROUP's companies remained operational at all times, and generally delays were limited.

There was no noticeable decline in demand for mold production. At RICO, where a daytime shift system was introduced, the mold manufacturing department operated at full capacity. HTR responded particularly flexibly when it had to find a new freight forwarder for the Tyrol/South Tyrol region at short notice after the introduction of border restrictions by the Italian government. In just a few hours, HTR switched to an Italian delivery company, and will continue to benefit from reduced costs with its new partner.

Headcount unchanged

It is important for us to say that we did not lay off any of our employees. Firstly, because we believe we have a social responsibility to protect our people's jobs. And secondly, because after the crisis, a time will come when we will need all of our highly skilled employees in order to fulfil customer orders.

Lessons learned and Aha! moments

After a crisis, you never really return to the structures you relied on previously. Everyone needs to learn their own individual lessons and identify the opportunities which have presented themselves. So what have the companies of the RICO GROUP learned from the crisis?

- We have found out how important good IT equipment and fast internet connections are.
- Alternative forms of communication proved their worth during the crisis, and after making lots of video calls we realized that meeting virtually *can* in fact be more efficient in some cases, especially where customers are far away or staff are working from home.
- We recognized the importance of communicating directly and meeting in person. In the long run, it is just not



Rapid response to suspected case at SIMTEC

After receiving information that a close relative of one of its employees had tested positive, SIMTEC reacted quickly and took all the necessary precautions. The company voluntarily closed its doors for seven days in May. All members of staff were tested during the closure, and thankfully none of the tests came back positive. Before reopening, the premises were cleaned and disinfected.

SIMTEC kept customers and staff fully and regularly updated before and during the closure, as well as after reopening.

possible to dispense with it totally.

- Crisis plans are very useful! Not having to start from scratch saves time that could be better spent on other things, especially in the current circumstances.
- A strong team is the cornerstone of every business. Once again the huge importance of team spirit has been very plain to see. We would like to take this opportunity to thank all RICO GROUP employees for their outstanding performance, especially during the past few months.
- New circumstances require optimized processes. You go back to focusing on the essentials, or look for new, more efficient ways to get things done. These are lessons that will certainly stay with us.
- The importance of working with suppliers who are as stable and reliable as possible.

Conclusions

Of course, who's to say that we won't see multiple waves of this pandemic? But we would still like to draw some initial conclusions. It has been a difficult time and anything but enjoyable. However, we have come through the crisis well. Outstanding flexibility, a strong team spirit, excellent preparation in the form of emergency plans and tailored measures have enabled us to successfully navigate the first wave. And we are confident that we will overcome whatever lies ahead.

We wish you all the best, too. Take care, stay healthy and we hope you emerge from the crisis stronger.

The RICO GROUP companies



HORMONE-FREE PRODUCT HELPS INCREASE CHANCES OF CONCEPTION

SILICONE CONCEPTION AID

In spring 2019, Rosesta Medical BV was looking for a manufacturing partner for its product FERTI-LILY, a conception aid made from silicone. SILCOPLAST won the contract and has been producing the high-quality medical product for Rosesta since the middle of last year.

The FERTI-LILY conception cup is a hormone-free conception aid that helps maximize the delivery of sperm into the cervix, increasing the chances of pregnancy. Made from silicone, it is well tolerated by the body, comfortably soft and easy to use at home.

Product details

- 4 cavities
- Part weight: 6.12g
- Shot weight with 4 cavities: 24.48 g
- Shot volume: 25.3cm³
- Medical silicone

Production process

After experiencing quality and supply problems with its previous supplier, which was located in the Far East, Rosesta Medical set about finding a new, dependable medical technology supplier. SILCOPLAST won the manufacturing contract in mid-2019, and has been producing the conception cup at its Wolfhalden site in Switzerland.

The product is injection molded using a four-cavity mold featuring an open cold-runner nozzle system. The gripping head, made of heat-resistant PEEK with four stripper plates and four grippers, removes each product and deposits it



FERTI-LILY is available online at www.fertilily.com
(c) FERTI-LILY stock images

separately according to the respective cavity. SILCOPLAST manufactures the FERTI-LILY on a fully-automatic Arburg Allrounder 470 A molding machine, which has a clamping force of 1,000 kN.

Medical silicone and tension tests

The product is made of medical-grade silicone with a low Shore hardness. The user removes the device by means of the long stem after use, so it was tested for tensile strength and tear resistance using ASTM D412-16 standard methods. The bell and stem can withstand strong pulling forces and do not tear, while the softness of the material allows for easy and comfortable removal. The product is sterilized within the clean production environment.

There are also plans for SILCOPLAST to handle product packaging. When choosing a supplier, the key considerations for Rosesta Medical are price, quality and reliable delivery – requirements that SILCOPLAST is able to fully satisfy.



PAD FOR TREATMENT OF DIFFICULT-TO-HEAL WOUNDS

2K PART FOR LIGHT-THERAPY

SILCOPLAST manufactures the thermoplastic composite silicone pad, which is used to treat poorly healing wounds with light therapy, in small production runs. The customer is Zurich-based start-up Piomic Medical GmbH, the developers of the COMStouch sterile wound adapter.

COMS stands for combined optical and magnetic stimulation, and describes how the product from Piomic works. The COMS One therapy advanced wound treatment system promotes healing using optical and magnetic stimulation. SILCOPLAST AG supplies a key element of the system – the silicone wound adapter.

Silicone pad with connecting ring

The part manufactured by SILCOPLAST is a multi-component product consisting of a thermoplastic (THP) bracing ring and silicone (LSR) pad. The ring supports the attached LSR element and connects it to the therapy unit.

SILCOPLAST manufactures the product using a single-cavity process, with the THP ring molded first on an Arburg 370 A with a clamping force of 600 kN, followed by the LSR element on an Arburg Allrounder 470 A with a clamping force of 1,000 kN. The transfer between the machines is carried out manually. "The ability to offer small production runs and the manual intervention in the process were important for our customer," notes SILCOPLAST's CEO Philipp Gaus, talking about the unconventional production process. The product is sterilized after the injection molding stage.



The system promotes wound healing by means of optical and magnetic simulation

Product details

- 1 cavity
- Part weights: THP 7g, LSR 34g
- Part volumes: THP 2.762cm³, LSR 37.427cm³
- Medical silicone

Development services

SILCOPLAST supported the customer on the product design and material choice. Two materials were tested for their suitability so as to ensure optimal processing for the design specifications, and meet the special requirements for this medical device. SILCOPLAST also finely adjusted the radius dimensions to prevent particle detachment.



Recommended

"We were delighted to have been recommended to Piomic Medical GmbH by one of our existing medical technology customers," comments Gaus. The two Swiss companies found working together straightforward and they collaborated very directly. SILCOPLAST was able to bring

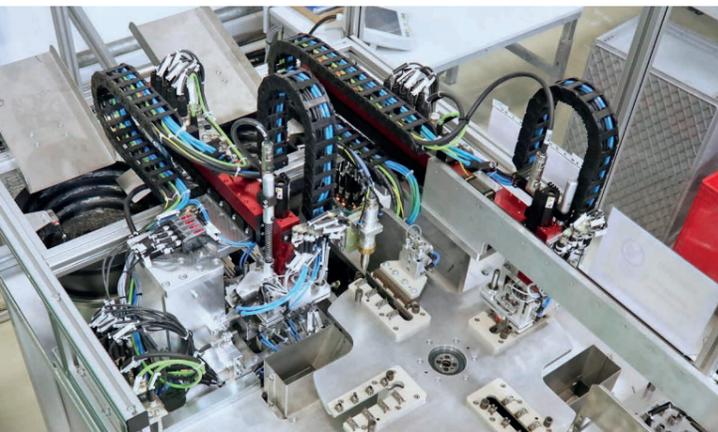
Piomic's vision to life. Further projects are already in the pipeline, such as the packing for the 2K wound adapter.



efficient elastomere projects

PLASTIC AND METAL PARTS OVERMOLDED WITH SILICONE INSERT OVERMOLDING

In addition to conventional 2K injection molding, RICO's technical capabilities also include overmolding of plastic or metal inserts and substrates. The company has developed sophisticated inspection, conveyor and pre-treatment systems to prepare inserts for the molding process.



Inserts are fed and positioned fully automatically in preparation for the injection molding stage

Inspection of inserts

Inspecting the inserts ensures uniformity and stability in the injection molding process, maximizing the quality of the finished part. The system checks if the inserts are in the machine and correctly positioned. This procedure also prevents damage to the mold caused by errors such as the introduction of duplicate inserts. RICO uses both optical and tactile inspection processes.

Feeding, conveying and supply of inserts to the mold

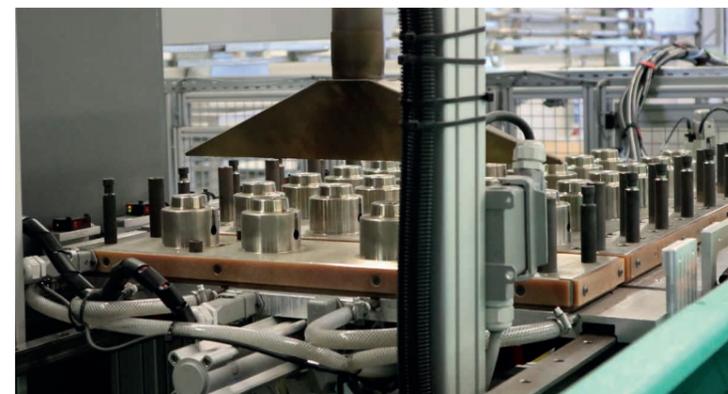
After checking, the inserts are automatically fed into the injection molding stage of the process and precisely positioned by the conveying systems. RICO systems use vibration, linear, and bunker-feed conveyors as well as belt feeds. The correct positioning of the inserts is important for perfect reproducibility and consistency of quality within the specified timeframe for the process. When the inserts are correctly aligned, they are accepted by the feeding system and prepared for overmolding.

Surface activation, cleaning and pre-warming

Achieving good, consistent chemical bonding between the silicone and the insert or substrate requires surface activation, cleaning or pre-warming. RICO activates the surface of the insert or substrate before the injection-molding stage using processes such as plasma treatment. Pre-warming affects the centering and the transfer of energy into the insert, as well as helping to reduce cycle times.

Every step essential

Mapping out each manufacturing step and maintaining an overview of the entire process are essential. Ancillary tasks need to be carried out without delay, in order to avoid wasting valuable machine time. High-precision and customized technologies, as well as the necessary 'how to' – in other words, how these technologies are applied – are vital. This is why RICO invests heavily in employee training and development. The company trains its highly-skilled staff by way of apprenticeships and the programs at the RICO Academy.



Pre-warming affects the centering around the insert



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AWARD FROM BABY-PRODUCT MANUFACTURER MAM SUPPLIER OF THE YEAR 2019

It means a lot to a supplier when a customer presents it with an award. RICO was delighted to have been named 2019 supplier of the year by its customer MAM.

Baby-product manufacturer MAM has been synonymous with quality, innovation and design for four decades. Besides soothers and bottles, the company produces cups, oral care and teething products, cutlery and breastfeeding products. RICO has a 25-year track record in mold manufacturing and injection molding of high-quality single- and multi-component silicone parts. The collaboration between the two companies is no accident – use of silicone is becoming increasingly widespread in the baby-product sector. Although the partnership only dates back five years, the companies have completed a host of different projects. For instance, RICO produces silicone bottle teats and breastfeeding products for MAM.



Convincing arguments

In spring 2020, MAM staged its first-ever awards ceremony for its suppliers, and RICO won the title of 2019 supplier of the year in the category for major suppliers of assembly parts for baby products. Harald Schermann, MAM's Head of Technical Product

Management & Strategic Technical Purchasing, was involved in the ceremony and explained the reasons for presenting RICO with the accolade: "Outstanding technical expertise, professional handling, a proactive and solution-driven approach, and a strong culture of communication at all levels were the key reasons why RICO was named 2019 supplier of the year. All this and more has enabled RICO to become firmly established as an important strategic partner for MAM in just a short space of time."



RICO was delighted to pick up the award, as Managing Director Markus Nuspl comments: "It's a great honor for us to be the first company to receive this award from MAM. I would like to thank RICO's employees, because this prize is testimony to the tireless work they do day in and day out."

Evolving partnership

Further projects are in the pipeline and MAM would like to intensify the partnership. "We also see this award as a driving force for continuously developing our partnership," Schermann notes.



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2K MEMBRANE: 0.1MM-THICK MEMBRANE FROM 1-SHORE SILICONE

RELIABLE PRODUCTION PROCESS

A cup which you can drink from without having to tip. And a silicone membrane that pushes up the liquid. This was the starting point for a development and manufacturing project that two medical technology students put forward to RICO. The product posed a particular challenge: the membrane had to be made from 1-Shore silicone and have a thickness of just 0.1mm.

sippa home, a product from Munich-based company iuvas, is a cup which helps people with limited mobility, swallowing disorders or dementia to drink more easily by removing the need to tip their cup. The key component of the invention is a highly elastic membrane that prevents the level of the liquid from falling. This gives the user the impression that they are always drinking from a full cup. iuvas chose RICO Elastomere Projecting GmbH to manufacture the membrane.

From 1K to 2K: modifying the prototype

RICO's customer iuvas already had an initial silicone prototype of the membrane. However, tests carried out by RICO showed that the part's technical viability could not be guaranteed due to its current geometry and material choice. This was overcome by developing an alternative two-component solution made from mechanically-bonded silicone and thermoplastic. The project team then validated the injection-molding process by running several test series using a test mold. "Because the membrane is so thin, we couldn't rely on simulations – it wouldn't have made any sense given the thickness," explains RICO project manager Josef Sorger.

Challenging material

In parallel with the component modifications, material testing generated some important insights. Even for RICO – a specialist with 25 years of injection-molding experience – processing a 1-Shore material was uncharted territory. The selected food-grade silicone had a water-like consistency which made working with it extremely complex. "It is a very unique type of silicone with characteristics which resemble water more closely than other types. But once you know how the material works, you can process it flawlessly," confirms Josef Sorger.

Mold concept and surface treatment

Due to its low viscosity and Shore hardness, the material flowed like water in its unprocessed state. But after vulcanization it became very adhesive, making the demolding stage extremely tricky. The choice of material for the mold and the cavity surfaces was therefore crucial in avoiding the need for costly coatings. Such coatings tend to lose adhesion, which can entail subsequent maintenance and recoating. Their use also involves additional process and mold monitoring, which results in increased costs. This meant that selecting the right mold steel with the correct treatment and surface structure was RICO's number one priority. Which is why RICO called on the expertise of the RICO GROUP member and hardening technology specialists HTR.

RICO came up with a 2+2-cavity mold design for transfer molding – a tried-and-tested technique. The molded thermoplastic part is transferred within the mold using end-of-arm tooling technology, and prepared for silicone overmolding.

Demanding parameters: low-viscosity silicone, large diameter and thin membrane thickness



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The membrane is part of a sophisticated system

The combination of low-viscosity silicone, the large 62mm diameter and the extremely thin membrane thickness of 0.1mm posed a technical challenge. Thanks to the direct injection molding process using a valve gate nozzle system, RICO is able to manufacture the component with no waste and an economical cycle time, and ensure a reproducible, fully automated and stable supply of the component for its customer.

Temperature control essential

"Precise temperature control and a perfectly balanced cold runner system was an absolute must," comments Sorger. The exacting requirements that the mold and process had to satisfy demanded meticulous temperature control and a sophisticated vacuum system. Any fluctuation from a very low temperature of only a few degrees Celsius would have caused a change in the material's flow behavior and reactivity. Post curing also presented some technical hurdles. Several preliminary tests were necessary to evaluate the material behavior, primarily due to the properties of the special type of LSR.

End-to-end automation concept

In order to deliver ideal automation solutions for the specific product and customer requirements, RICO always thinks

beyond its own in-house production. RICO tailored all automation steps and downstream processes to the customer's needs, which saved iuvas additional assembly and delivery preparation steps.

iuvas required two forms of packaging. The parts are fed directly into the post curing unit in a monitored process before being automatically packed, either individually or in boxes according to the customer's requirements. This ensures that the process is human-touch-free and the 2K membranes are manufactured in an extremely clean environment.

Satisfied customer

iuvas was impressed with how RICO approached the project. As David Fehrenbach, who is responsible for development and production at iuvas, confirms: "As the customer we were sold on RICO's production and business philosophy from our first visit. Reliable delivery, direct lines of communication and top quality confirmed our initial impressions."



A video showing how the membrane works is available at www.rico.at/en/Services/Application-examples



IN-HOUSE TRAINING

Sharing knowledge, improving performance and team comradery.

SIMTEC's most valued resources are its team members, and we are committed to provide the resources needed to ensure quality and safety, offer continuous training and guidance, encourage team member suggestions for improvement, and drive continuous improvement in all that we do! In addition to outside training, SIMTEC turned to its in-house experts to provide training specific to our industry and specific to our in-house technology and operations. The training sessions, held on Saturdays at SIMTEC, were taught by our knowledgeable leaders and attended by members of Production, Engineering, Secondary Ops, and Quality.



Production, Warehouse and Secondary Operations team members enjoying their training session

Topics covered included: Material science (plastics & silicones), tooling, injection molding troubleshooting, IQMS ERP system, QA, and machine/equipment maintenance. The training was valuable and provided the opportunity to share knowledge, improve performance, personal growth, have some fun with fellow team members, and of course enjoy tasty food and refreshments.

ENGINEERING DIVERSITY SHINE

SIMTEC is blazing new trails in diversity. SIMTEC boasts a respectable number of women engineers.

SIMTEC's female engineers are project engineers, with varied project management responsibilities:

- **Ana Ochoa** is a production project engineer. A recent graduate from Florida International University where she earned a Mechanical Engineering degree. Before becoming a full-time production engineer, she worked as an Intern at SIMTEC for 2 years while a student. Ms. Ochoa focuses on production automation and efficiency goals.
- **Kirsten Palma**. A graduate of University of Florida, Ms. Palma is a project engineer and has been a valued member of the engineering team for 3 years. She manages projects requiring installation of new equipment as well as projects involving new process development at SIMTEC and new product development with customers.
- **Ilayda Sayin**. Ms. Sayin joined SIMTEC as a project engineer in 2019 upon graduating with her Industrial Engineering degree from Southern Illinois University, Edwardsville. Ms. Sayin manages all facets of customers' projects including part validations and approvals through to the start of production.



SIMTEC's process engineers, quality engineers, and project engineers



NEW AND INCREMENTAL BUSINESS FUELING GROWTH GROUP SUPPORT

For SIMTEC, 2019 was a year of sustained, well-balanced growth from both existing and new customers, and across industry sectors.

Medical

Since adding its class 8 clean room in 2018, SIMTEC has seen a steady stream of new business. SIMTEC credits its early involvement, exceptional process stability, automated manufacturing, and high capacity production capabilities with enabling them to offer their customers customized solutions to meet customers' specific requirements. SIMTEC's smart clean room, and modular design allowing for rapid expansion, will come in handy in 2021. With Phase 1 near capacity, Phase 2 and an expansion of the clean room is expected will be necessitated in 2021.

Automotive

SIMTEC has also seen significant growth in the automotive sector. While some sectors in the automotive industry have been sluggish, SIMTEC has enjoyed an upturn in business from their Tier 1 customers' with products related to electronic connectivity and safety.

Similar to those in the health-care and medical sectors, the Tier 1 suppliers in this segment are selective in awarding such critical programs. In addition to having the necessary ISO certifications (ISO 9001, IATF/ ISO 16949) this echelon of Tier 1's choose partners that can handle their high-capacity requirements, challenging part geometries, and critical-performance applications.

Group Support

To handle the rapid growth, SIMTEC has added numerous manufacturing cells with customized technology for maximum output and efficiency, state-of-the-art molding machines and auxiliary equipment, and additional skilled team members. Our colleagues at RICO have also shown support, with RICO team members assisting on site for 3 months during the ramp.



Significant growth in SIMTEC's production



The RICO men at the SIMTEC Christmas party



HTR – LIFT-OFF TOWARDS A BRIGHT FUTURE NEW HEAT TREATMENT FOR ROCKET FUEL TANKS

HTR's special heat treatment process gets helium tanks used in rocket engines ready for their journey into space.



3... 2... 1... lift-off! The engines have been ignited, massive amounts of fuel are being burned, and the rocket launches into space. It's hard to imagine the magnitude of the forces exerted on the components and launch environment when a rocket takes off. But thanks to HTR, these forces are much less of a concern for a rocket engine's aluminum tanks. Following the expansion of its facilities last year, HTR has taken another major step in its history. It has developed a new process for treating the helium tanks used in European rocket engines – bringing Thalheim bei Wels into the space age.

The specially developed heat treatment process means that the tanks – made from an aluminum alloy which the customer covers in a carbon fiber layer after hardening – can easily withstand this harsh environment. The tanks have to fulfill extremely demanding technical requirements, and not

just at lift-off. The helium in the tanks is under a permanent pressure of 400 bar, and discharges in a matter of seconds when the rocket launches. The tanks need to withstand incredible forces over a long period of time. Pressure vessels such as these are required to have a burst pressure of over 600 bar. But for the tanks treated by HTR, the burst pressure rating increased to over 800 bar.

With its new, cutting-edge production facility and expert, reliable staff, HTR is in a perfect position to meet all of its customers' requirements and requests. Even the sky is not the limit for the Upper Austrian company with 54 employees that has propelled itself into the space age thanks to the dedication and expertise of its workforce.



CUSTOMERS, BUSINESS PARTNERS AND PROSPECTS MEET THE RICO GROUP

The RICO GROUP puts in appearances at industry events and trade fairs all over the world. Several of the get-togethers on the 2020 calendar had to be cancelled or postponed due to the coronavirus crisis. But we will see each other again at these events next year. Until then, we look forward to catching up with you virtually or by telephone.

THE RICO GROUP APPEARED/WILL BE APPEARING
AT THE FOLLOWING EXHIBITIONS AND EVENTS:





FACE MASK PRODUCTION: TECHNICALLY DEMANDING, BUT NOTHING NEW WHY LSR IS THE BEST CHOICE

Masks: the hot topic on – or rather over – everyone’s lips at the moment. They have become the focus of huge attention due to the worldwide spread of coronavirus. But protective masks, respiratory masks, sleep masks and diving masks have been vital pieces of equipment for a long time. We look at the important role that liquid silicone plays in producing this equipment.

Emergency services, hospitals and research institutes began using protective masks a long time ago. They are also increasingly being used at home for the treatment of conditions such as sleep apnea. Liquid silicone rubber (LSR) is often the material of choice as it ensures a very comfortable fit. LSR is also frequently combined with other materials in mask design. For instance, the housing might be made from thermoplastic and the mouth and nose area from silicone, and the mask could feature a replaceable or insertable filter system. Masks have many different applications and can be produced in lots of different ways.

The RICO GROUP has been manufacturing injection molds and silicone masks for its customers for over three decades. It uses both one-component and multi-component injection molding technology in its production operations.

Liquid silicone in mask production – the main advantages:

- Biocompatible, allergy-friendly, neutral odor and taste
- Resistant to water, alcohol, polar solvents and weak acids
- High temperature resistance and flexible at low temperatures (-50°C to +250°C)
- Pleasant feel against the skin and comfortable to wear thanks to soft material (up to 5 Shore)
- Differences in thickness and texture possible in different areas of the mask
- Well suited to 2K injection molding (e.g. LSR+LSR or LSR+thermoplastic)
- Enhanced design flexibility

LSR combines outstanding material properties and reliability in the production process. The material is a true all-rounder, excelling due to its biocompatibility, allergy friendliness, neutral odor and taste, and heat resistance (-50°C to +250°C), as well as allowing for a high degree of design flexibility and making complex geometries and material combinations feasible.

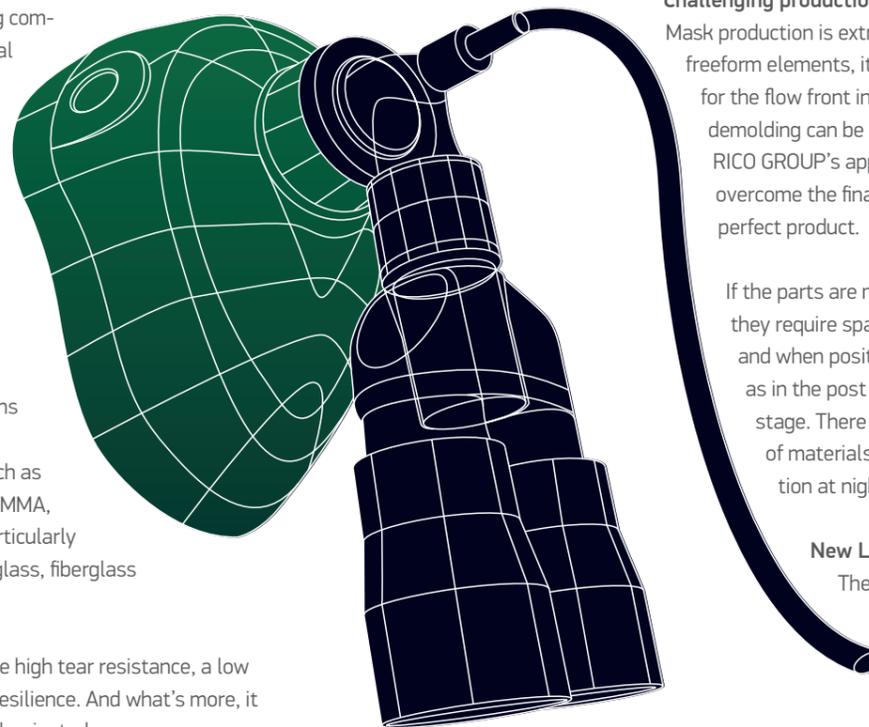
Multi-component injection molding

Liquid silicone can be processed using 2K or multi-component technology, enabling combinations of LSRs of different shore hardnesses, or of LSR with thermoplastics. Mask designs featuring high-performance and engineering plastics such as PEEK, PPS, PSU, PBT, PA, PMMA, PET and PC have proved particularly successful, but bonding to glass, fiberglass and metal is also possible.

Other advantages of LSR are high tear resistance, a low compression set and good resilience. And what’s more, it can be dyed any color and illuminated.

From thick silicone for functional elements to delicate face coverings

The special requirements associated with mask design and functionality continually present new challenges for mold making and material processing. Comfort and varying face shapes both have to be taken into consideration. This



results in the use of 3D freeform elements for the mouth and nose areas, which need to be incorporated in the mold.

For silicone-only (1K) masks, the thickness of the silicone often varies greatly in different parts of the mask. It may be thick in areas with a functional purpose, but supple and soft where the mask comes into contact with the face. This means that the mask will be very thin and membrane-like in some areas. Differences in texture can also lead to complexity in production.

Low-viscosity materials, such as 5 Shore materials, are especially challenging in terms of both mold making and production. Working with these materials calls for particularly close attention to repeatability, process stability and achieving outstanding quality.

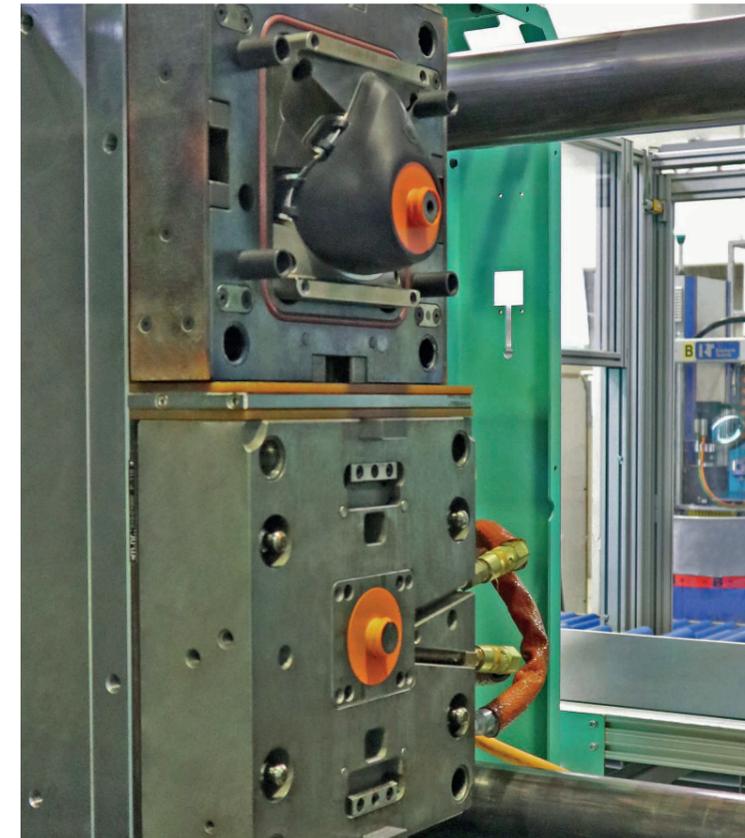
Challenging production process

Mask production is extremely difficult to plan. With 3D freeform elements, it is very hard to make calculations for the flow front in materials. Although the design and demolding can be simulated, the experience of the RICO GROUP’s application engineers is essential to overcome the final hurdles on the way to creating a perfect product.

If the parts are manufactured fully automatically, they require space: in the handling during demolding and when positioning on the conveyor belt, as well as in the post curing oven and at the packaging stage. There also needs to be a sufficient supply of materials for unmanned, automated production at night.

New LSR masks

The coronavirus crisis has demonstrated that masks which need to be supplied in a hurry are rarely made from silicone. The development time required for the production of high-quality LSR masks is longer than for other materials and the production concepts need to be highly sophisticated. Preventing rejects is vital due to the high cost of materials and in order to comply with the RICO GROUP’s environmental protection requirements. Silicone is a unique material that is ideal for the production of masks and is also perfectly aligned with the RICO GROUP’s sustainability strategy.

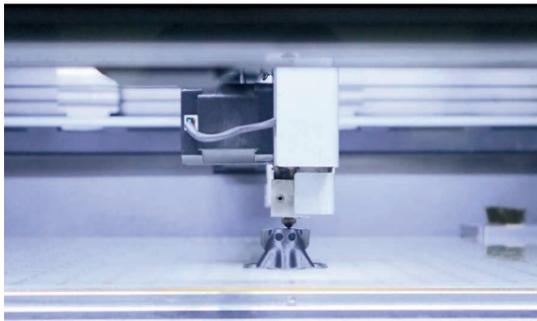


Mask production considerations:

- Production concept: the mask can have one or more components (1K, 2K or multi-K)
- Material combinations: combinations of hard and soft materials are possible, e.g. silicone+silicone (from 5 to 80 Shore), thermoplastic+silicone, metal+silicone or glass+silicone
- Features: wide range of possibilities including highly transparent areas, haptic elements for comfort while wearing, varying silicone thickness, functional elements such as a screw-on filter, as well as ventilation elements
- Increased space requirements: in the mold, at handling stages (demolding and positioning), in the post curing oven, in the packaging box, in the warehouse
- The right handling: materials supply, removal, controlled positioning of parts for post-processing, packaging



FLASHLIGHTS NEWS FROM THE RICO GROUP



RICO: 3D PRINTING AT RESEARCH EVENT

RICO normally uses its 3D printers to produce prototype molds. But at the moment the company is using the equipment to print a small thermoplastic ghost for its presentation of RICO's unmanned night shift at the Long Night of Research. The aim of the event is to spark an interest in technology among children and young people.



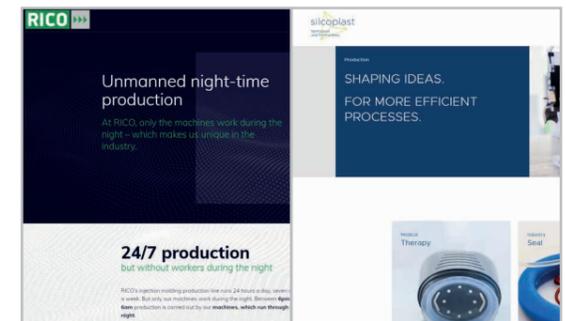
SIMTEC: LSR CONFERENCE SPEAKERS

SIMTEC was asked to share its LSR injection molding knowledge and expertise at the 2019 LSR Executive Conference. Calvin Pendorf, SIMTEC Head of Engineering, discussed LSR Injection Molding for Clean Room & Medical Applications and attracted a lot of interest for his topic.



SIMTEC: BREAST CANCER WALK - GIVING BACK

SIMTEC employees and their families participated in the Making Strides Against Breast Cancer 5K walk, raising money and awareness for a great cause! Following the walk, SIMTEC had a BBQ for team members and their families at a nearby park, with grilled hot dogs and hamburgers, and fun and games for the kids.



RICO AND SILCOPLAST: NEW WEBSITES

The RICO and SILCOPLAST websites were given a fresh new look for 2020, and now contain a lot of new content and information. Check out the new sites at:
www.rico.at | www.silcoplast.ch



RICO: FUNDRAISING CAMPAIGN

RICO has been doing its bit for good causes for many years now, focusing primarily on children's charities. Every Christmas, the company collects donations from staff, and management then matches the amount donated euro for euro. In 2019 the money once again went to the Kumplgut center, which helps children with cancer. "We were delighted to present them with a check for EUR 7,200 on behalf of RICO and its employees," says RICO employee Elke Zahrer, who organized the collection with her colleague Arno Pellingner.



SILCOPLAST: FAREWELL TO FIRST EMPLOYEE

SILCOPLAST's first permanent employee was Markus Rohner, who joined what was then still a very small company in 1977. After 42 years, Markus has now taken his well-earned retirement. His in-depth knowledge of thermoplastic processing was always much sought after and he was consistently at the forefront of technical and structural developments. We would like to thank Markus wholeheartedly for his loyalty and service to the company.



SILCOPLAST: FUTURE DAY

SILCOPLAST's Future Day was all about sparking children's interest in technology. We invited our employees' children to the company for a day to give them an insight into our routine work. They saw a mold being changed and the silicone compression machines, and also visited the freight forwarding and design departments. And there were plenty of opportunities for the kids to get hands-on and help out. We were delighted with the youngsters' response and are already planning the next Future Day.



HTR EXPANDS ITS ELECTRIC VEHICLE FLEET

As part of its environmental protection strategy, HTR is committed to reducing the carbon emissions produced by the vehicles in its car pool. So the company's new operations manager Klaus Höggerl was delighted to take delivery of a new electric car at Tesla in Vienna recently. The vehicle can be charged at the company's on-site charging point. HTR now has two fully electric vehicles and is playing a valuable part in the shift towards emission-free driving.



rico GROUP

▶▶▶ transforming business to partnership



efficient elastomere projects

RICO Elastomere Projecting GmbH

Am Thalbach 8
4600 Thalheim bei Wels
Austria
T: +43 (0)7242 76460
office@rico.at
www.rico.at



SIMTEC Silicone Parts, LLC

9658 Premiere Parkway
Miramar, FL, 33025
United States of America
T: +954 (0)289 6161
info@simtec-silicone.com
www.simtec-silicone.com



Silcoplast AG

Luchten 75
9427 Wolfhalden
Switzerland
T: +41 (0)71 898 5060
info@silcoplast.ch
www.silcoplast.ch



HTR Rosenblattl GmbH

Am Thalbach 7
4600 Thalheim bei Wels
Austria
T: +43 (0)7242 206699
office@htr-rosenblattl.at
www.htr-rosenblattl.at