

# simrit® insight.

No 2 | 2011

The magazine for Simrit customers

## Quality XXL

Unique testing equipment



### Applications

Silent stabilisation



### Applications

1,000,000 km under ground



### Products

Innovative solar module clip



### Products

Multifunctional plug connectors



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Freudenberg  
Sealing Technologies



Dr. Jan Gupta,  
Simrit

# Dear Readers,

This issue of Simrit Insight contains, once again, a whole range of interesting topics with a focus on quality and innovation. A key feature of our daily activity is the close co-operation with our customers to find sealing technology solutions and to keep improving the performance and quality levels of products. JCB, a global manufacturer of mobile machines has invited Simrit to present the characteristics of a successful partnership during an event of the Manufacturing Technology Association (page 3). Many of our long-standing partners have expanded their activities in the area of renewable energies. Our partners have made it clear that they want Simrit to develop new materials and product innovations for this developing market segment. A few weeks back, our annual Industry Forum event took place. It is an industry platform which we offer to our customers to facilitate exchange and transfer of expertise. This year's event focused on new, innovative product solutions and materials in the area of wind energy (page 5). A new introduction to the market was the pioneering, easy-to-install solar module clip which makes the installation of solar modules safer and more economical (page 18). Innovation is key for Simrit, but equally so is the quality of its products. On pages 6–9 you can read how comprehensive our measuring and testing technology for "oversized" radial shaft seals is. As always, next to these topics there are many further application examples of our products in practice. Finally, a word about myself. After eight years with Simrit I shall be leaving at the end of December 2011 to take on a new position within the Freudenberg Group. My successor will introduce himself in the next issue of Simrit Insight. I would like to take this opportunity to thank you personally and / or your company for the trust and co-operation I have enjoyed over the years.

I wish you and your families a wonderful Christmas, a happy New Year and every success in the future together with Simrit.

Yours,  
Dr. Jan Gupta

## Seminars

Date	Topic	Language	Place
01.02.2012	Reading of technical drawings	German	Weinheim
14.02.2012	General product knowledge concerning sealing techno-	German	Weinheim
11.04.2012	Materials in sealing technology	German	Weinheim
06.03.2012	Hydraulic and rotational seals for heavy duty applications	German	Hamburg
13.03.2012	Sealing systems in mobile hydraulics	German	Schwalmstadt

## Imprint

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# Model partnership with JCB

The request came directly from JCB, which in itself was an honour: Simrit was to present the long-standing partnership with the global manufacturer of mobile machinery at the Contract Manufacturers Seminar of the Manufacturing Technology Association (MTA) as an example of a successful supplier partnership in the components segment. "If Simrit is chosen by JCB as an example of a good partnership it shows that we are on the right track," commented Jamie Dickinson, Global Account Manager for JCB at Simrit UK. The presentation focussed on Simrit's materials and design expertise regarding components for mobile machinery as well as on the strategic approach with a view to globally operating customers. The résumé presented the synergies of these two areas in the example of the partnership with JCB. Jamie Dickinson illustrated in his MTA presentation application examples for the use of Simrit components in JCB applications and also highlighted the varied events during which JCB developers and Simrit specialists get together on a regular basis. These events include application specific TechDays as well as the Global Team Meeting, which took place in June 2011 at the JCB headquarters in Rocester.









# TechDay at Siemens



Simrit has recently been able to score top marks at the Power Transmission Division of Siemens AG Energy with its high material competency and with a constructive design of sealing and vibration technology components.

During a TechDay at the company's site in Berlin, Simrit specialists presented its comprehensive portfolio of solutions for power transmission applications. Products such as Simmerrings, O-rings, elastomer composite parts, convolution bellows and vibration technology units are used in high voltage switching devices. They form the intersections within the grid of energy distribution companies. They are the points where electrical energy is controlled and distributed on its way from the power plant to the consumer. Highest performance levels are required for components such as gas-insulated switchgear, circuit breakers and disconnectors as well as surge arresters which are used at these interchanges. O-rings, for example, have to make it practically impossible for the SF6-insulating gas to escape. Simrit demonstrated its competence not only with regard to general material compositions but also with regard to their ability to offer important components – for example for drive and control units – in the same material and in different sizes.

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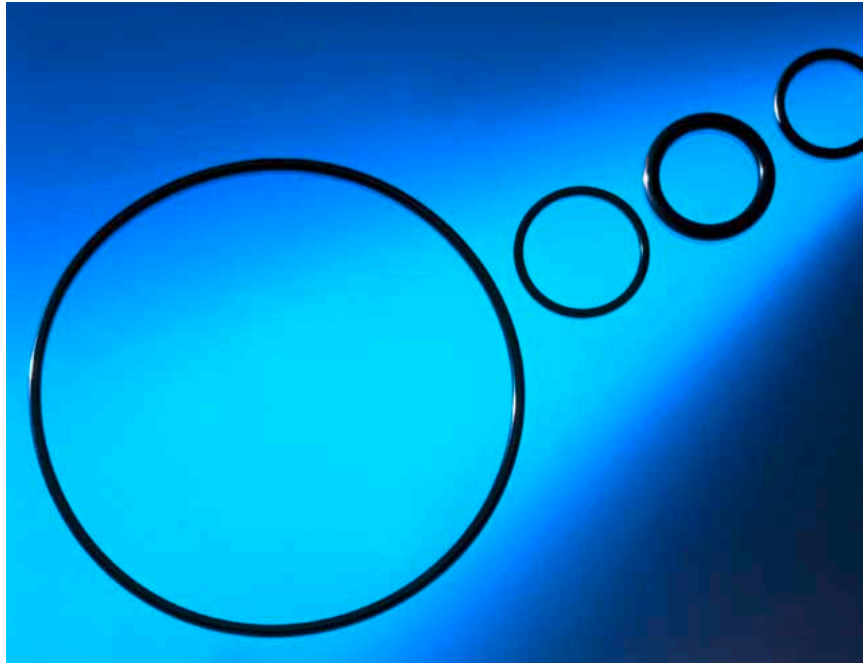
## UL certificate for EPDM

Simrit has developed a special material for solar energy systems called 70 EPDM 135151 which has recently been presented for the first time at the Solar Power International in Dallas, Texas. The material is suitable for O-rings which are used as seals in photovoltaic plugs and distributor boxes of solar energy equipment. The material is UL-1703 certified which provides manufacturers of solar energy equipment with the guarantee that in quality terms they are "on the safe side" with sealing rings made from this material. The US certification body "Underwriters Laboratory" (UL) tests materials and components for their suitability in certain application areas. The UL-1703 certificate, for example, relates to the use in solar energy

O-rings made of EPDM 135151 are UL certified.

equipment. For the award of the UL-1703 certificate Underwriters Laboratory have defined specific minimum quality standards regarding the design of solar modules, the utilised housing and glue materials, the casting compound and the sealing components. Materials and components are tested for their flame-retardant proper-

ties, their thermal stability and various electrical properties. Reddy Tudi, Sales Director Energy at Simrit Americas is pleased: "The UL-1703 certificate for our EPDM 135151 material demonstrates once more Simrit's technological leadership in the manufacture of precise, application specific materials."



The Simrit UK site in Lutterworth is accredited with the expanded AS9120 certification to Revision A.



"This certification rewards the commitment to continuous improvement of processes as well as the efficiency in the manufacture of sealing components for the Aerospace Industry", comments Stuart Campion, Sales Director Aerospace Europe.

## Aerospace Certification for Simrit sites around the globe

The AS9120 certification of its sales and logistics site in Lutterworth, UK demonstrates once again Simrit's leading position as a supplier of seals for the global Aerospace Industry.

At the beginning of the year, Simrit's production site in Santa Ana, California had already been awarded with an important design certification.

These accreditations have been jointly devised by the international Aerospace Industry. The certification requirements include exact traceability of production batches, comprehensive documentation and the compliance with regulations for the Aerospace Industry. "This certification rewards Simrit's commitment to continuous improvement of processes as

well as its efficiency in the manufacture of sealing components for the Aerospace Industry", Stuart Campion, Simrit's Sales Director Aerospace Europe is pleased to comment on the certification.

Simrit's site in Lutterworth functions as a warehouse and logistics centre for sealing components for the European Aerospace Industry.

## A fresh breeze at the Industry Forum

Simrit has long been an important supplier of components for wind turbines built by leading manufacturers world-wide. This was also evident in the auditorium of the Industry Forum event, held on the subject of “wind turbines – trends and innovations” which took place in the beautiful surroundings of the Simrit conference centre Hermannshof in Weinheim. 27 customers from more than 10 countries (from Europe as well as from Korea, the USA and China) had accepted the invitation and listened to lectures such as the one held by Prof. Dr. Berthold Schlecht of the Technical University Dresden on current developments and trends concerning wind energy or the one by Uffe Larsen of Dong Energy on best practice in offshore maintenance. Two speakers were present as representatives for Simrit’s mother company Freudenberg Sealing Technologies: Dr. Ernst Osen who spoke on the subject of “Wind-energy specific material expertise” and Dr. Arman Barimani who gave a speech on “Innovative sealing technology for the wind power industry”. Comments by attendees of the event documented the great interest raised by the presentations: “On the one hand the forum demonstrated to me the level of detail which R&D departments go to, on the other hand it showed Simrit’s capabilities and level of quality”, commented, for example, Dipl.-Ing. Andreas Mascioni of Vensys Energy AG in Neunkirchen, Saarland. Hans-Joachim Köther of PowerWind GmbH, Hamburg said: “The Industry Forum event has been very interesting. I have gained many insights and impressions.”



Attendees from more than 10 countries followed the invitation to this year’s Industry Forum event.



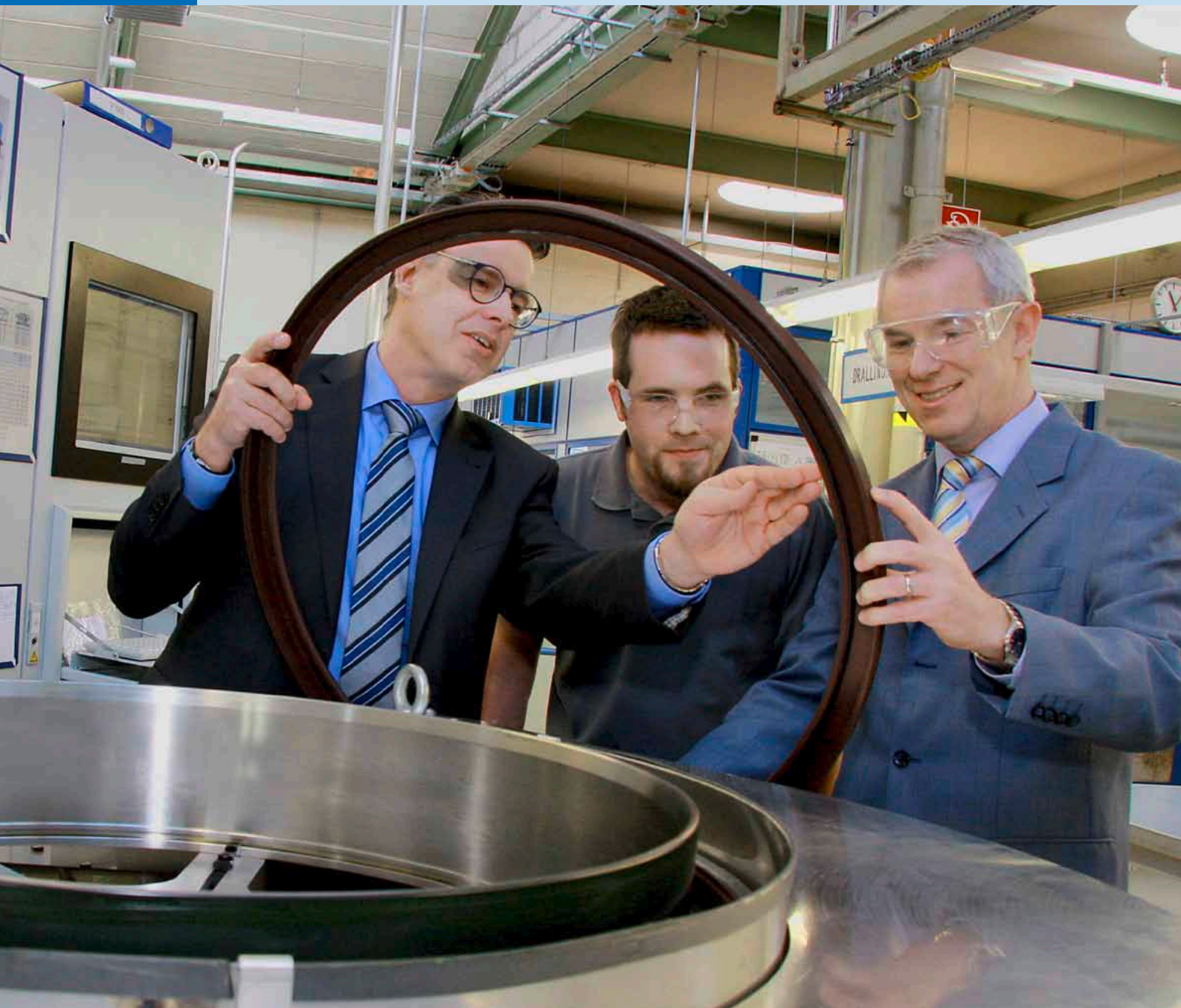
Dr. Lorenzo (Head of Innovation Center Freudenberg Sealing Technologies) spoke on reliable and low-maintenance sealing designs for wind turbine applications.



Heinz Mutterer (Freudenberg Sealing Technologies, 2. v. r.) demonstrates a main bearing application with lubrication sensor.



Prof. Dr. Schlecht (TU Dresden) was present during a discussion, to answer questions regarding current developments and future trends of the wind power industry.



# CUSTOMER SERVICE BIG STYLE

For Simrit, as a member of the Freudenberg Group, technological innovation is a way to demonstrate customer orientation and is therefore a key condition for entrepreneurial activity. Investment in machines and people is therefore done on a long-term basis and is largely independent of economic cycles. In recent years, large investments have been made in projects aiming to optimise quality levels and these projects are now benefitting customers world-wide. A good example are the investments made in measuring and testing equipment for “oversized” Simmerrings, such as they are used in applications for marine engines, paper mills or mixing facilities. For these sealing products, which have diameters of 300 mm or more, Simrit is worldwide the only brand who offers the same tested quality standards as for regular sizes. Investments in the training of employees and in lean and safe processes over recent years have also remained high or have even been further increased. Result: one is flexible and able to meet the demand to the satisfaction of the customer, even if order levels are volatile.

# Minute tolerances for mega parts

Simmerrings between 300 and 1,600 mm are quite common in marine engines, wind turbines and in heavy paper-rolling mills. Simrit, as a global technology leader, offers also for these parts the same, tested quality as for regular sizes. In recent years a substantial amount of investment has gone into this.

Also Simmerrings with large diameters of more than 1,000 mm require minimal production tolerances in the range of tenths of a millimeter. At the same time, these large parts have to perform over many operating hours under the harshest of conditions. Suitable measuring and testing equipment is necessary in order to reliably maintain such quality standards. Because no matter how sophisticated FEM calculations and computer simulation are, they do not always allow for reliable conclusions to be drawn regarding the long-term functioning of a Simmerring in practice. "Until now, there were no possibilities to test large rings with diameters of more than 300 millimeters. The knowledge which we have regarding small and medium sized Simmerrings cannot be transferred one

to one onto large Simmerrings", Rolf Vogt, Head of Product Development Simmerrings for Industry informs us, speaking from experience. This is why Simrit has made significant investments in cutting-edge measuring and testing equipment as well as in production facilities as part of its expansion programme for large-size applications.

## Reliable service life information

The new testing equipment for large Simmerrings is world-wide the only one of its kind and was developed specifically for Simrit. "Customers expect from us reliable information regarding the service life span of a Simmerring in the unit. Thanks to our new testing equipment we are now able to provide them with this information also for large Simmerrings with

diameters of up to one metre", explains Hubertus Prinzler, Head of Development for Simmerrings. Another major investment within the large-size programme is the 3D measuring facility for the finishing process which has been installed in the production area for large-size parts. This high-precision equipment is necessary to check the accuracy of dimensions in order to further increase the stability of production processes for large Simmerrings.

## Down to one hundredth of a millimetre

The 3D measuring facility weighs 10 tons and is equipped with a delicate



The new testing facility for large Simmerrings is the first and only one of its kind world-wide.



sensor which performs fully automated inspections of entire large-size Simmerrings. Whether it is the inside diameter of the sealing lip or dust lip, the outer diameter or the height: the new facility delivers all measurements down to a few hundredths of a millimetre. The large amount of measured data allows the detection of the

smallest run-out in a ring. The 3D facility allows both manual as well as fully automated measuring processes, providing Simrit customers with a Simmerring which is guaranteed to precisely meet their specifications. “We carry out spot-checks of our semi-finished products before each subsequent production stage and take one control measurement during each shift. If it is required by the customer we even carry out 100-percent checks” explains Ricardo Hess, Head of Production for large-

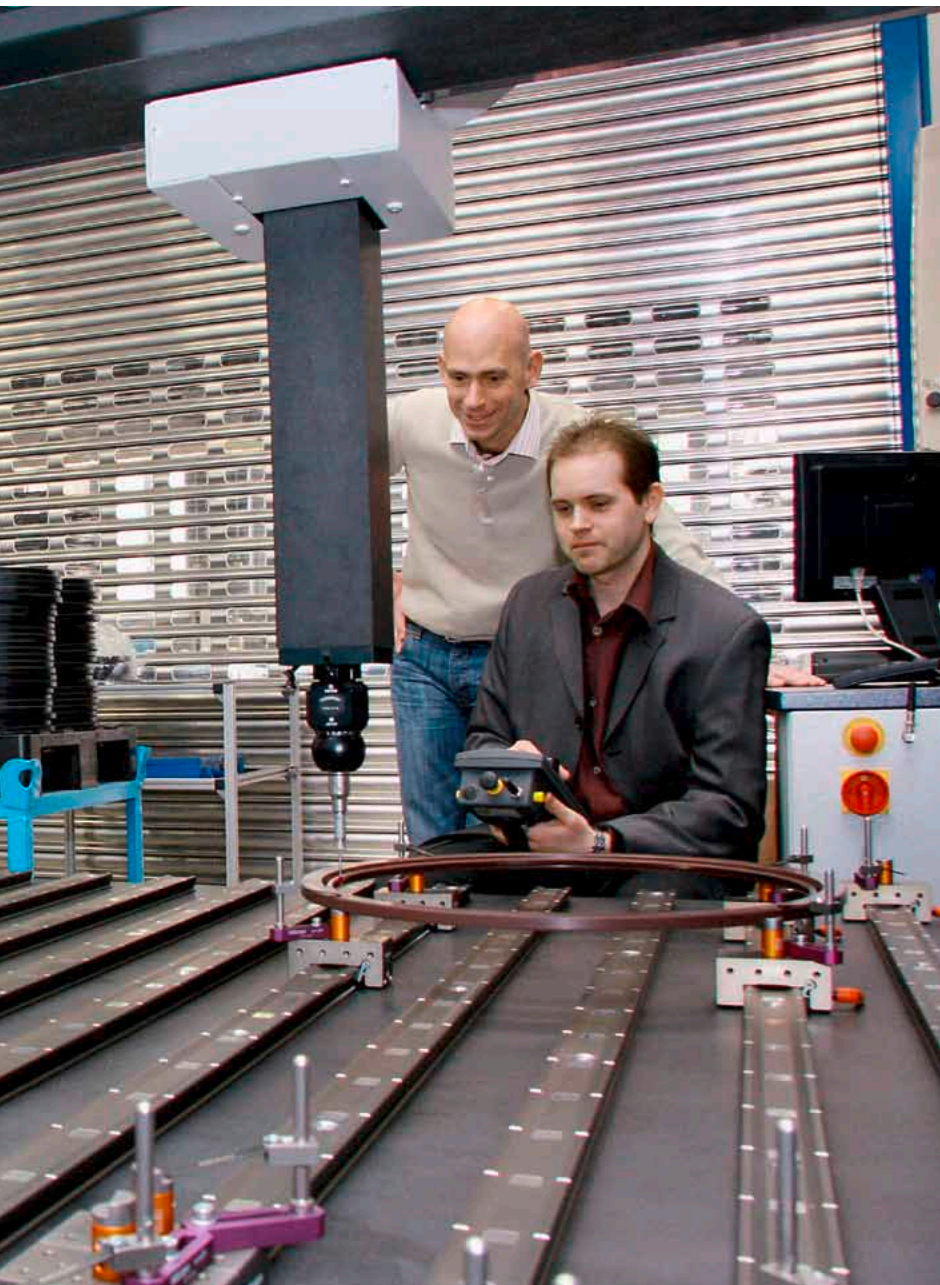
size parts. Hess is particularly proud of the so-called pallet measurements. For that, it is possible to place several parts together at the same time on the measuring table made from granite which measures four square metres. “Once it is programmed, the machine fully automatically measures each ring, one-by-one, offering a very high level of flexibility and productivity in day-to-day use”, explains Theo Wilde, Measuring Equipment Specialist for Simmerringe Industrie.

### Knifing instead of grinding

A second investment in the production area for large-size parts ensures higher process stability, shorter lead times, lower tooling costs and improved quality: a flexible clamping device for large Simmerrings in the finishing process. Until now, surplus material on large Simmerrings had to be manually ground off during the final production stage. Now it is possible for the sealing rings to be centred and exactly positioned on the same finishing machine, allowing an automated knifing of the surplus flash.

### Nothing remains hidden

The CT scanner of Freudenberg Research Services represents another piece of measuring technology at the highest level. It ensures consistent levels of quality as it allows a three-dimensional view of what is inside a part. With a CT scanner it is possible to check materials, prototypes and initial samples for set specifications without destroying the part itself. It is also possible to carry out damage analysis of parts. For this, a sectional view of the three-dimensional picture can be viewed from any angle. With the click of the mouse, specific materials can be suppressed or made transparent, for example in order to reveal integrated electric conductors and contacts.



The large amount of measured data allows the detection of the smallest run-out in a ring.

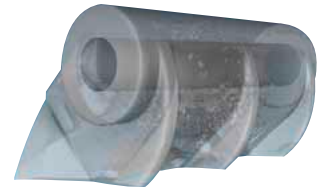


The CT scanner provides a three-dimensional view of what is inside a part.

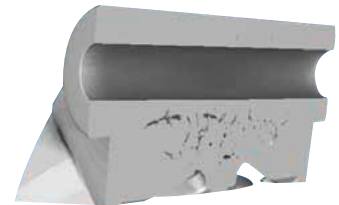
### Three-dimensional view of the inside of parts



Original image of an engine mount made of aluminium.



The transparent 3D image makes it possible to see what is inside the part.



Via the sectional view it is possible to investigate in detail the location of the defect for a better assessment of possible consequences.

### Future-oriented investments

All of these investments were planned during a phase when global economic developments presented major challenges to many businesses. The successful implementation of these investments for the production of large parts on the one hand, and the failure analysis and quality assurance on the other, shows that Simrit follows a continuous investment strategy which does not follow economic cycles but which is completely geared towards the highest quality for the benefit of the customer.

### In brief



- Special testing and measuring equipment is indispensable for mega-seals such as Simmerrings of more than 300 mm
- Simrit has made substantial investments in order to be able to offer its customers the same, high quality level for large-size parts as it does for standard parts



Do you have any questions or suggestions? Please contact [waldemar.stein@simrit.de](mailto:waldemar.stein@simrit.de)

As gyroscope specialists luxury yachts are a major market segment for Seakeeper.



## Silent Stability

When the world leader in active gyroscope (gyro) stabiliser technology needed a vibration- and sound-reducing solution for its innovative technology, it turned to Simrit. With its extensive materials expertise, Simrit was able to provide Seakeeper with a damping solution that eliminated noise and vibration, while still fitting the existing design, helping Seakeeper continue to silently stabilise the sounds and shudders of the sea.



### In brief:

- When Seakeeper needed a material expert, it contacted Simrit to help the cutting-edge company reduce the sound of its successful gyroscope technology
- Simrit developed a customised material for Seakeeper's precise damping needs that fit into the proven existing gyro application

### Modernising a century old innovation

Seakeeper was formed for a defined purpose. In 2003, the privately funded start-up company was created with the goal of updating gyro stabiliser technology for use on large boats (60 feet and longer). This technology has a long history, dating back to the early 1900s for motion control of ocean vessels, but it was used sparingly due to its weight, size and required power consumption. Using modern technology and materials, Seakeeper knew it could reinvent the gyro to make it far more practical. And that is just what they did! By using state-of-the-art engineering and manufacturing, Seakeeper was able to modernise the existing gyro technology to reduce the natural roll of a boat by more than 70 percent. This is quite an improvement considering that a boat's natural roll has the potential to be three to five times the slope of a wave.

While there are different types of roll stabilisers on the market, e.g., underwater external fins which add drag and are vulnerable to damage, Seakeeper is the first to make internal stabilisation practical in terms of size, weight and power. According to Seakeeper, its updated gyro innovation – a "Control Moment Gyro" (CMG) – employs the physics of gyro-dynamics. Seakeeper offers two CMG models. Model 8000 is applicable to boats between 40 and 80 feet, while Model 21000 is applicable to boats 80 feet and up (boats over 100 feet typically require multiple gyros). What separates Seakeeper's product from its competitors is that the gyro flywheel operates in a vacuum, which reduces air drag and enables a more efficient system. The system, which is mounted inside the hull structure aft of amidships, has a heavy flywheel that spins at high



Do you have any questions or suggestions? Please contact [Joe.DePopolo@simrit.us](mailto:Joe.DePopolo@simrit.us)

speed in a near vacuum to produce a gyroscopic torque that exerts a powerful righting torque to counteract boat roll. The unit also includes an active control mechanism, which optimises the gyro's performance over a wide range of sea states.

Seakeeper's small, lightweight system is able to virtually eliminate zero and low speed boat roll both when a vessel is anchored and underway. Offering a flexible installation that consumes minimal power, the system requires no through-hull cutting, which eliminates the need for drag-producing and damage-prone appendages. These results provide yacht manufacturers and owners outstanding luxury and performance, without compromised comfort or safety.

### The sound of success

Once it established its successful gyro technology, Seakeeper wanted to address the continual "humming" noise produced by the system. With the stabiliser mounted to the hull of the boat, when the gyro spools up, its harmonic frequencies are transmitted throughout the yacht. These frequencies are transmitted to the cabinets and other interior objects, which in turn act like speakers and cause the humming noise to be amplified. While some would consider this the sweet sounds of success, Seakeeper was determined to damp the vibration and noise of its proven system.

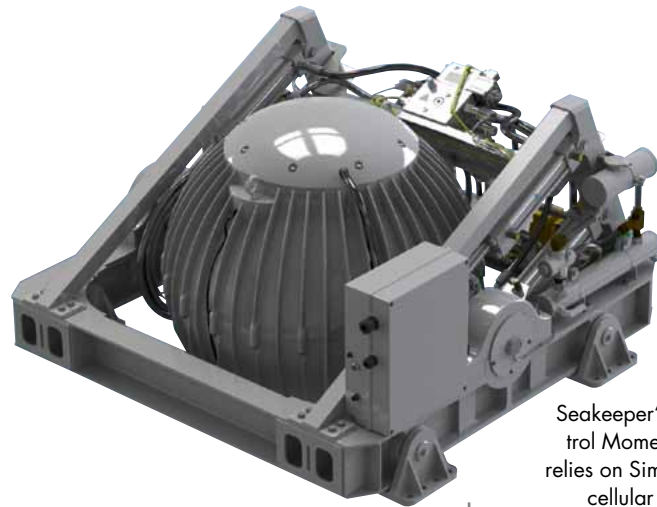
A successful anti-vibration mount was developed for the Model 8000 using polyurethane.

However, Seakeeper went looking for a materials expert that had the capabilities to develop and "dial in" the needed material damping characteristics to further reduce the sound when it started developing the Model 21000.

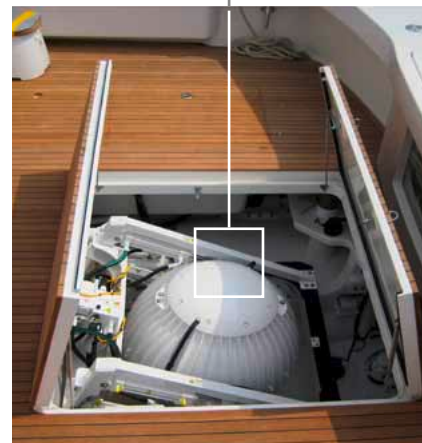
Utilising its materials and testing expertise, Simrit "tuned" its microcellular polyurethane material to meet the needs of the application. Offering superior durability and deflection without the addition of noise and weight, the material solution was further customised to meet the load deflection curves required for the gyro. Using comparative load deflection curve data, the material's stiffness was adjusted to precisely meet the application's requirements.

Once developed, the material was tested at the Simrit lab, as well as on the actual Seakeeper gyro, and was successful in eliminating the unwanted noise from the system.

When Seakeeper needed a materials expert it looked to Simrit for a customised solution to improve an already successful design. In addition to addressing the damping issue, Simrit worked within Seakeeper's existing design parameters to provide a more cost-effective, easy to implement solution. Simrit and Seakeeper are now working on an improved anti-vibration mount design for the Model 8000 gyro using Simrit's microcellular technology.



Seakeeper's updated „Control Moment Gyro“ (CMG) relies on Simrit and its microcellular technology for a customised solution.



Gyroscopes are capable of reducing and virtually eliminating a boat's natural roll.

# Optimised diaphragm pump

British company Flotronic Pumps Ltd has optimised its air-operated double diaphragm pumps and opened up a large number of completely new application areas for these units. The key element of this optimising strategy is the construction of the diaphragm.

When it comes to pumping liquids, be that seriously contaminated waste water or ink from a printing process, the British company Flotronic Pumps Ltd. based in Bolney in West Sussex is one of the leading manufacturers of double diaphragm pumps where high demands on pump performance go hand in hand with high material wear. Flexibility and technological innovation are the most important assets of this globally operating manufacturer for air-operated double diaphragm pumps: "Our ability to manufacture in both small and large quantities enables us to exactly meet our customer's demands", explains Flotronic's Managing Director Jane Waite.

Technological expertise forms the basis for Flotronic's continued success in the marketplace: The double diaphragm pump is literally held together with one nut, situated on the side of the pump which is opposite to the external air valve. (ONE-NUT design). This allows

swift disassembly of the pump without disconnecting it from the process.

## Close cooperation

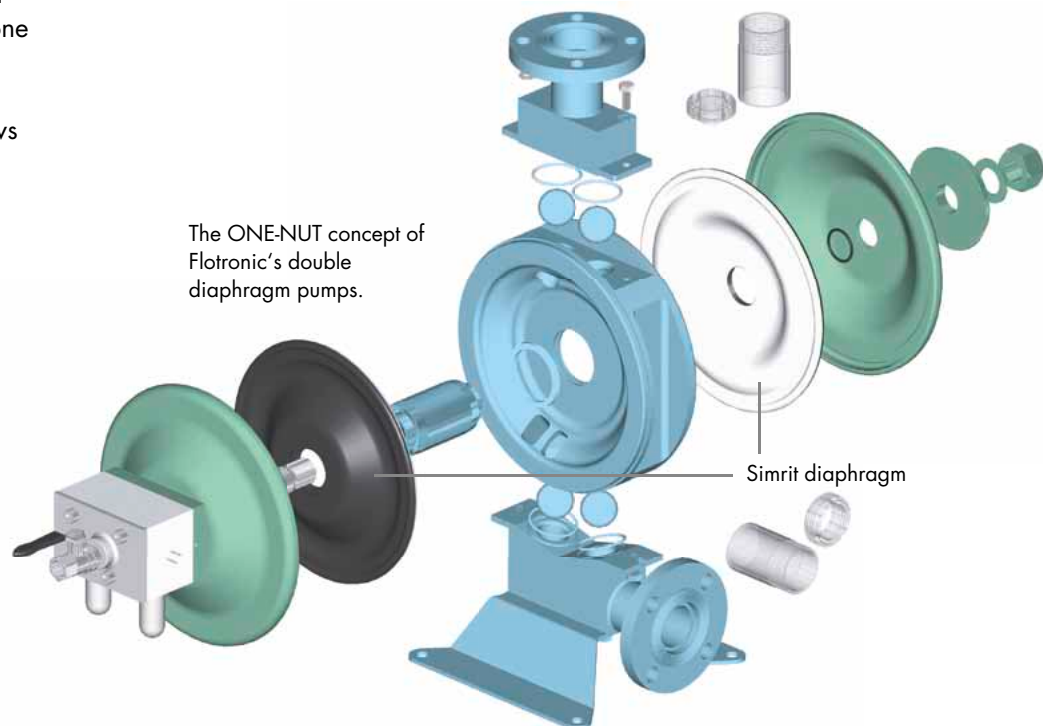
Flotronic's innovative designs have led to completely new application types for air-operated double diaphragm pumps. Traditionally used in dirty applications such as waste water transfer, emptying sumps etc., the pumps are now increasingly used in critical processes such as pumping aggressive chemicals, transferring food stuffs and providing constant liquid feeds. Compared to a conventional air-operated double diaphragm pump,

the ONE-NUT design, with its optimised pump diaphragm is unique, in that air pressure operates on the outside, while the medium flows on the inside. The diaphragm is thereby the most critical component within the pump. This makes close and regular cooperation between pump manufacturer and Simrit, their key diaphragm supplier, absolutely essential.

## Reduced maintenance

Simrit has been supplying diaphragms to Flotronic for the past 10 years. This long and open dialogue has led to the development of a new 14-inch

The ONE-NUT concept of Flotronic's double diaphragm pumps.



## In brief

- Diaphragm with up to 50 % longer service life
- Easier fitting resulting in easier equipment maintenance
- Improved permeation resistance



Any questions or suggestions?  
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diaphragm. Design improvements mean less tension and stretching of the diaphragm and lengthen the service life of the part. At the same time it is far easier to fit with no requirements for any tools – and without any loss in capacity. The profile of the membrane is designed to fit the ONE-NUT application, which makes maintenance activities easier and faster. The component is also designed to allow admission by the respective government agencies for the food and health sector, for example for the admission by the US Food and Drug Agency (FDA). “Simrit have continually taken positive and committed steps to enhance the relationship with Flotronic. Service is at a high level and still undergoes even further improvement” explains Flotronic’s Chief Engineer, Peter Wheel and continues: “The diaphragm plays a key role for the quality of the final product.” Simrit diaphragms are manufactured with a consistently high level of quality which fulfils the requirements resulting from

highly aggressive media. A leading chemical company, for example, uses pumps for aggressive chemical substances and the diaphragms are well adapted to meet the requirements of the application. For Flotronic, the close cooperation with Simrit in the development of diaphragms has resulted in particularly trustful and stable customer relationships.

### Long term partnership

Peter Wheel is therefore very positive regarding the cooperation between Flotronic and Simrit: “Over the many years of our partnership with Simrit, Flotronic has been impressed time and time again with Simrit’s continued rapid and competent response to technical challenges. Simrit have always shown an immediate willingness to contribute their high level of expertise, to explore further developments and to enhance Flotronic’s product range and overall performance. We look forward to continued future expansion of the business relationship.”



Flotronic’s F-series Slimline for use in chemical, pharmaceutical, biotechnological and clean applications.



The pump handles different liquids i.e. diesel oil. It can empty a 30,000-litre tanker in less than two hours.

# Fast and robust

RAZOL, a family business, is one of the leading European technology leaders for disk harrows. The company now has an impressive new harrow which combines high work speed with excellent robustness. The applied sealing ring plays thereby a crucial role in the success.

Like many businesses for agricultural machines, RAZOL, located in the Departement Lot et Garonne in the south-west of France, started out as a forge. Today, the family business is one of the technology leaders for disk harrows (see box).

Apart from the hydraulics which control the precise entrance of the disks into the soil, it is the reliability and performance of the drive which plays a decisive role if one is to make the best use of this important machine for the surface treatment of soil.

The drive unit must be protected against ingress of soil, mud and water whilst at the same time performing at maximum speed. Sealing components play a central role in the achievement of these goals.

## High demands

The demands on the seal for the drive shaft of a particularly fast and robust disk harrow was therefore clear: it had to be extremely low-maintenance, suitable for high rotational speeds of the shaft and had to seal reliably against ingress of dirt.

RAZOL chose to contact Simrit for the design of such a seal, after all, the agricultural machine specialist and Simrit have been technological partners for more than 10 years.

Bastien Menville, Head of Development at RAZOL, has a succinct way to summarise the requirements also from an economical point of view: "We need a seal which is easy to use at a reasonable price."

The sealing ring was only to require initial lubrication and subsequently function throughout its entire service life without the need for further lubri-

cation. Another requirement was that the unit should be able to perform without fail even under the harsh conditions of agricultural surroundings, even in the case of some axial offset. Not least, an important element in RAZOL's specifications was ease of installation, requiring only a few easy manual steps.

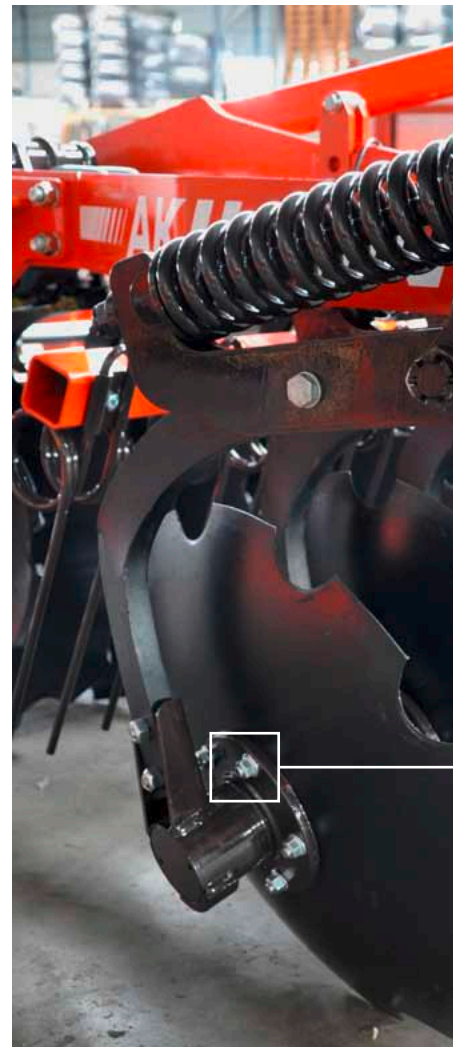
In the search for a suitable sealing ring the close technological partnership between RAZOL and Simrit once again paid off. Comprehensive field studies were carried out and it was established that cassette ring type 3 made from NBR (acrylonitrile butadiene rubber) was, in the words of Bastien Menville, Head of Development, the "ideal component for our application".

The cassette seal protects the ball bearing on the drive shaft against ingress of dirt from the outside and also against contamination from the inside, for example by metal particles. The cassette seal can withstand shaft speeds of 1,250 rotations/min without being damaged. There is also no need to harden or grind the shaft for the installation.

## Sealing ring as key component

RAZOL has long been a leading name for technical breakthroughs: the X-shaped, patented disk harrow "Octo" with its own chassis frame, for example, made it possible to move on normal roads, and ten years ago RAZOL impressed the specialist public with the PHÉNIX concept which meant that it was possible to fully operate the disk harrow from the tractor cabin. The new disk harrow AKILON now impresses with excep-

tionally high operating speeds of 15km/h and with its particularly robust design. Simrit's cassette seal type 3 makes a big contribution to this technological success.



The specifications for disk harrows are demanding: the drive unit has to be sealed against ingress of soil, mud and water whilst reaching the highest possible operating speeds.



### The disk harrow: background information

Harrows are mainly used to chop up soil that has been recently ploughed to eliminate clumps and loosen the top layer of the soil to form fine crumbs. The disk harrow is one of many types of harrows. It consists of concave disks which rotate at an angle and work the soil. In most cases, there are two rows of disks working at opposite angles in order to cut the entire soil horizon. Classic disk harrows have all disks in one row along an axle which is positioned at an angle and they therefore feature larger overall length compared to short disk harrows. Short disk harrows are thus more likely to be coupled to a three-point hydraulic, whereas classic disk harrows usually have their own chassis frame.



Cassette seal type 3 made from NBR material is the ideal component for this application.

### In brief



- Cassette seal made from NBR for a particularly fast and robust disk harrow
- After the initial lubrication of the seal, no further lubrication is required throughout its entire service life
- The seal can withstand shaft speeds of up to 1,250 rotations/minute



Do you have any questions or suggestions?  
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# 1,000,000 km under ground

FAG TAROL wheelset bearings (Tapered Roller Bearing) by the Schaeffler Group Industry stand for quality amongst rail vehicle manufacturers worldwide. For underground railway projects in Shanghai and Singapore the FAG components underwent further optimisation. With the entire project facing very tight deadlines, customer specific seals with particularly low friction values were needed.

The requirements for the underground carriages in Shanghai and Singapore are highly demanding: for example, the seals for the tapered roller bearings in the wheel bearings of the bogies must have a service life of at least one million kilometres and are to seal reliably even if the railway carriages are used in rainy areas

where also rail tracks occasionally get flooded. The seals also have to feature lowest friction values which meant that already during the development stage various tests were carried out, among them tests according to AAR (Association of American Railroads) specifications.

The rail sector management of Schaeffler Group Industry supplies double-row FAG wheelset bearings for the underground railways in the two Asian megacities. In order to fulfil the described requirements for this TAROL variant, a special cassette seal was developed that does not need spring support on the main sealing lip, thereby considerably reducing friction and temperature.

## Ready for production in only seven months

Schaeffler made a point of choosing Simrit as a reliable development partner who was known to them from many years of co-operation. Over the last few years many different projects have been carried out in co-operation and this, once more, paid off during the "TAROL cassette seal project". It was possible, for example, to implement a number of additional design optimisations, which came up at short notice during the allocation of the underground train projects, within only seven months – from the initial enquiry to the delivery of the first serial

parts. The short development time was the result of previous careful stipulation of requirements, very good familiarity with the production conditions gained during a visit to the factory as well as of Simrit's wide experience in turning sophisticated



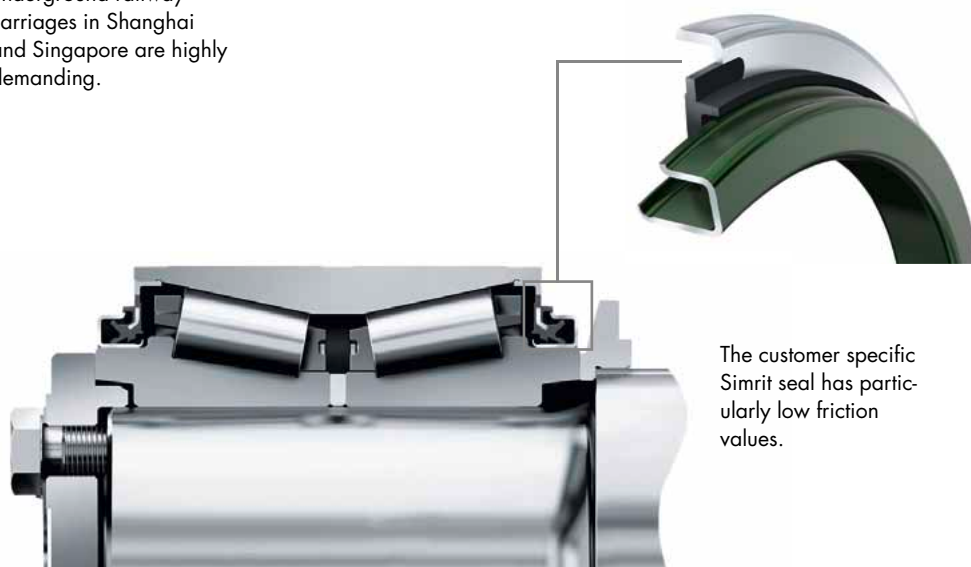
## In brief

- A customer-specific type of cassette seal for bogies of light rail vehicles was developed ready for serial production within seven months
- Sliding seal with extremely low friction values
- Highly compact design compared to standard solutions



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The requirements regarding service life spans of underground railway carriages in Shanghai and Singapore are highly demanding.



The customer specific Simrit seal has particularly low friction values.

Cross-section of an FAG TAROL wheelset bearing

### FAG wheelset bearing units for railway applications

TAROL units of the FAG brand are double-row wheelset bearings which are supplied ready to install, greased and sealed, with factory-set clearance and with all the necessary retaining elements and fittings. The bearings are pressed onto the shaft journal by means of an hydraulic press. The modified line contacts between rollers and raceways prevent edge stress. Wheelset bearings can absorb high radial and axial loads.

#### Compact and customer specific

The restricted installation space represented a huge challenge. The lip geometry which had been designed by Schaeffler Group Industry was soon ready for serial production due to Simrit's considerable experience in turning demanding designs in production-ready seals. It was also possible to adapt and optimise the sealing material to suit the unusual requirements and operating conditions of the wheelset bearings. The product not only has to comply with customer

specifications but also with above mentioned ARR regulations. Only then can it be released for the wheelset bearing. The necessary tests were carried out at the Schaeffler factory in Schweinfurt, Germany. For the rail sector management of Schaeffler Group Industry Simrit has, once again, shown to be a reliable development partner. By now, already four references of the cassette seal are ready to go into production. The fifth reference is currently at the sample stage.

designs into products ready for production. Exceptional measures further shortened the time needed for the initial samples and enabled Schaeffler to supply its customer at short notice which meant that it succeeded in winning the order.

# Innovative solar module clip

The performance and cost-efficiency of photovoltaic modules depends, among other things, on the connecting components. Simrit's new solar module clip for frameless thin-film photovoltaic modules represents a big step towards cost efficiency and long service life.

The solar module clip has a number of advantages: the innovative design makes installation of the modules quicker and a lot easier, at the same time it brings the entire construction more up-to-date with regard to material and design. The construction of the solar module clip guarantees even contact pressure across the surface. Furthermore, integrated silicone beads provide additional tolerance compensation so that unexpected movements, for example during installation or due to high winds, cannot cause any damage to the solar module. Solar modules which are fitted with the new clip

can also withstand major temperature fluctuations and larger amounts of snow without suffering any damage. The combination of these performance characteristics results in a substantially longer service life of the installed photovoltaic modules and therefore in lower costs for potential warranty claims.

## Solution consisting of only two parts

A major advantage of the new solar module clip is the simple installation. The unit consists of only two parts, an upper part made of polymer material, featuring a theft-proof locking mechanism and a polymer substructure with a connection bar. Competitor solutions often consist of no less than six parts. The solar module clip is strictly designed according to ergonomic principles and contains a bayonet-shaped fixture which can be inserted as an anti-theft device into the aluminium profile via a simple 90 degree turn. This is because theft-proofing represents a major challenge in the installation of solar panels.

## Fast and tool-free installation

The solar module clip is not just designed for fast and tool-free manual installation, but is also compatible with the conventional industry standards and certifi-

cations. The 2K clip is made from synthetic material and does therefore not require any additional earthing. The roof clip also has an extremely low profile which eliminates unwanted shading. That way, the sunlight can be exploited to the full. "The new solar module clip with its innovative design clearly stands out against competitor solutions because of its elegance, long service life, simplicity and efficiency of installation", Armin Barth, Product Developer of this new type of clip explains and continues: "Simrit has provided the design with several unique and exclusive performance features which ensure considerably reduced installation costs, less labour input and increased safety." What's more, this new product can be delivered, according to customer requirements, in a large number of different colours.



## In brief

- The solar module clip consists of only two parts and can be installed without any additional tools
- The innovative design of the solar module clip not only limits any damage occurring during installation, it also reduces thermal and mechanical stress
- The solar module clip allows safer and much more economical installation of solar modules



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By now it is possible to integrate comprehensive sensor and signal transfer elements into the Plug&Seal components.

# Multifunctional plug connectors

Plug&Seal connectors are a combination of seal, pipe connection and decoupling element in one, single component. But that is not all. Now, the patented components are also available with lip contour, with sensor or with an installation part called Plug&Tube Seal for mounting on the end of a tube.

Simrit's Plug&Seal components combine several functions in one component, allowing easier and more compact construction of units with less components, thereby reducing installation and logistical effort. An integrated elastomer bead provides the components with acoustic and mechanical decoupling. They also compensate axial offset and thermal expansion which means that larger housing tolerances become possible. Examples for applications with Plug&Seal components include cooling systems in combustion engines, connections in EGR systems or multi-staged turbochargers. In the case of the latter the components can, for example, compensate axial offset of up to 5mm and the utilised elastomer material is designed to withstand temperatures of up to 230 °C.

## Plug&Seal with sensor

By now it is possible to integrate comprehensive sensor and signal transfer elements (for pressure, temperature, humidity, speed, etc) into the Plug&Seal components. Simrit offers this kind of sensor technology for nearly all areas of liquid and gas transfer, thus also for water and oil circuits, air circuits in combustion engines, auxiliary units for engines such as compres-

sors, turbo chargers or intake manifolds, for fittings and piping systems as well as for heating and climate control systems in machines and buildings. The advantages of such an integration are obvious: the sensor does not have to be installed separately, cable bushings are no longer required and a separate sealing of the signal feed-through is also no longer necessary, whilst the measurement value acquisition takes place directly inside the medium.

## Reduced installation effort

The latest developments further optimise the functionality and ease of installation of the Plug&Seal compo-

nents. An additional lip contour, for example, allows the tube connection to withstand even higher pressures (up to 40 bar) and simultaneously reduces the force needed during installation. Installation is made even simpler through the combination of several Plug&Seal components, for example through a rod or an elastomer tape. Plug&Seal components combined in such a way are easier to lift and to be positioned by installation robots. Simrit have now developed the Plug&Seal concept even further to allow the use of piping or pipe connectors of nearly any curved design. Plug&Tube Seal extends this idea to pipe sockets.

## In brief



- Plug&Seal components increasingly combine a number of functions in one unit
- Plug&Tube Seal allows the integration of pipe sockets into the original concept

- Plug&Seal components can be designed according to customer specifications



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## Quality without compromise

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*Gary Bell, Group Chief Executive,  
Bell Equipment, South Africa*

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