

simrit[®]

The magazine for Simrit customers

01 | 2005

insight.



**Simrit at the 2005
Hanover trade fair**

Intelligence and Integration

Compression set

**Materials
performance test**

O-rings in switchgear

**Extremely low
leakage rates**

Editorial

Dear Customers,

Innovations are the prerequisite for long-term economic growth. You experience this daily in your own company. The innovations of Simrit and our technical competitive advantage are only as valuable as their contributions to successfully positioning your products in the global market. Practically all ideas and concepts, as well as the selection of Simrit innovations presented in this magazine, are the result of intensive discussions with you, our valued customers, and represent the realisation of your wishes and requirements.

The Hanover Trade Fair scheduled for the near future gives Simrit the opportunity to present the innovations and new products which we have developed in the area of seals and vibration control. These also include new materials exceeding the previous limits of chemical and physical resistance. The title story about the Hanover Trade Fair (pages 6 to 10) introduces one of these innovations and describes its advantages for use in your products.

A second important international trade fair will be practically over by the time you read these lines. Here I am referring to the International Power Transmission Exposition (IFPE), which takes place from 15 to 19 March, 2005 in Las Vegas. At both fairs, you will once again recognise the uniform global presentation of Simrit. Particularly for our globally operating customers, this has immense advantages: with Simrit, you have a single partner worldwide, and at the same time local contacts in every region for your special requirements and wishes.

In the interview on page 11, David Monaco (responsible for Simrit in North and South Ameri-



Dr. Jan Gupta,
Simrit® Europa

ca) discusses how the cooperation functions in the global organisation of Simrit. Talk with us about this at the Hanover trade fair or at the IFPE 2005 in Las Vegas. Simrit representatives from all regions of the world will be on hand at both fairs. If you're planning to engage in business in the near future in China, India or Russia, just ask us. Simrit is already on site.

The best performance for our customers is demanded not only with regard to innovations and global support, but also with regard to services. Are you familiar with our Live online seminars? Here, you yourself or your colleagues can attend training in seals and vibration control. Just ask us.

In the next edition of Simrit insight we will inform you about other innovations at Simrit, such as our Europe-wide Simrit dealer network for Simrit products.

So, as a valued customer you can see that we at Simrit are committed to a single lofty goal - absolute orientation to the customer! In this spirit, I look forward to discussions with you in the near future and hope that you enjoy the articles in this edition of Simrit insight.

Yours

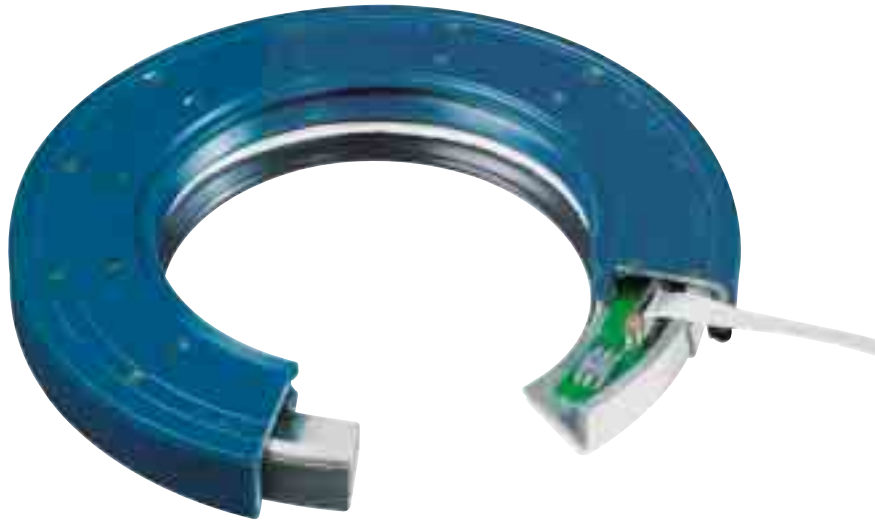
Dr. Jan Gupta

... and what do you think?

Simrit insight aims to encourage dialogue between readers and ourselves. To ensure we can offer contributions of particular interest to you we welcome any suggestions on your part. We would also like to know what you did not like! Please let us have your views in a letter, postcard, telephone call or e-mail addressed to:

Michael Littig
Freudenberg Simrit KG
Marketing
69465 Weinheim
Telephone: +49 (0) 6201-805433
e-mail: insight@simrit.de

Title



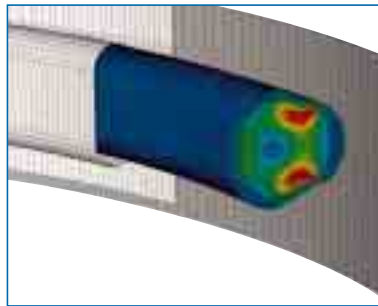
All Development areas of Simrit® are awaiting the Hanover Trade Fair with new innovative products and solution concepts. See pages 6-10.

Simrit Global



David R. Monaco, Simrit® North and South America, discusses the advantages of Simrit's global orientation for the customer. Page 11

Materials



The compression set is one of the most important parameters for the assessment of material performance. Pages 12-13

Areas of application



O-rings play an important role in the gas-isolated medium voltage systems of the AREVA Sachsenwerk GmbH. Pages 14-15

Editorial information

Simrit® insight is the magazine for Simrit customers

Published by: Freudenberg Simrit KG,
69465 Weinheim

Responsible: Michael Littig, Klaus Liesegang

Telephone: +49 (0) 6201-805433

Internet: www.simrit.de, e-mail: insight@simrit.de

Editorial and design: Trurnit & Partner Mediengruppe

Reproduction only with the approval of the publisher

Contents

News	4
Title story	6
Simrit Global	11
Materials	12
Areas of application	14
Trade fair plan	16

José Caro is the new Head of Trade and Export

Global strategy - local concepts

For Simrit®, trade is an important partner. José Caro fully supports this



A few weeks ago, José Caro was named the new Head of Commerce and Export at Simrit. The native of Spain grew up in Germany and previously held leading positions with different companies in the automotive supplier industry as well as in other industries. The 44 year-old will focus on the implementation and further development of strategic commercial partnerships, since ultimately trading partnerships represent an important component of Simrit's new strategic orientation. This new challenge embraces three areas of activity: firstly, the beginning of operation of the new logistics centre, currently in the planning stage, through which the logistics chain right up to the end customer will be optimised; secondly the new attractive trade concept, which will contribute to the consolidation of the preferred distributors in Europe; and, not the least of these activities, building up a new trade organisation, with which Simrit will be able to implement its global strategy in local concepts.

Presence seminars of the Simrit® Academy

Made to measure expertise

The Simrit Academy offers seminars dealing with the entire range of Simrit products and services. This knowledge enables you to confidently select the best product for your requirements, avoiding unprofitable investments and acquiring exactly what you need. In 2005 the academy offers two new presence seminars: "Lederer liquid silicone products" and "Assembly and

servicing, by and for practically-oriented staff" (2nd half-year).

If you would like to receive the Simrit Academy brochure for 2005, simply send an e-mail to academie@simrit.de and indicate your postal address.

Contact: hans-joachim.wendel@simrit.de

Presence seminars for the months April to June 2005

Month	Dates	Length/days	Seminar	Course no.	Language
April	18.-29.	10	Simrit prof. seminar, all product groups	30405 E	English
June	1.	1	Liquid silicone products from Lederer	90605 D	German
	2.	1	Liquid silicone products from Lederer	90605 E	English
	13.-17.	5	Simrit basic seminar	20605 E	English
	21.	1	Simrit single-module prof. seminar "Shock absorber seals"	40605 E	English
	28.-29.	2	Simrit single-module prof. seminar "Elastomeric materials"	41605 D	German
Registration for the seminars and dates for the second half-year under www.simrit.de/akademie					

IFPE 2005 in Las Vegas

Simrit® as a global partner

The International Exposition for Power Transmission (IFPE 2005), from 15 to 19 March, 2005 in Las Vegas, will break all attendance records. This year, in excess of 100,000 visitors from all over the world are expected to attend the trade fair for load transmission and hydraulic, pneumatic, electrical and mechanical motion control technologies, which takes place every three years. According to the information of the organiser, the

exhibition space will be 17 percent greater than that of the 2002 trade fair. Simrit as well will introduce its globally unique range of products for seals and vibration control. All our innovations will be on display at the stand with number 13849. Furthermore, Simrit will utilise this trade fair, as well as the Hanover Trade Fair one month later, to introduce its globally present uniform team to its global customers (see interview on page 11).



Two-digit growth rates: IFPE 2005

Live online seminars (LOS)

Learning about the Internet

The live online seminars (LOS) offer the possibility to take part in seminars of the Simrit Academy directly from your PC. Here, all those taking part in a seminar are linked to both the seminar instructor and the other individual course participants. Everyone sees and hears

the course content at the same point in time. As of now, the live online seminars will be transmitted with Simrit iComm2, the simplest, most capable and fastest communications platform since video conferencing.

Contact: hans-joachim.wendel@simrit.de

Overview of dates for live online seminars (LOS) - April to June 2005

LOS seminar series - Simmerring	Month/date	Course no.	English	German
Failure analysis	5 April	LOS-S-0805	11:00	14:00
LOS seminar series - Elastomeric materials				
History: From natural rubber to today's high-tech materials	2 May	LOS-E-0105	11:00	14:00
Classification of the individual unvulcanised rubber types, polarity and media compatibilities	3 May	LOS-E-0205	11:00	14:00
Base elastomers; strengths and characteristics, Part 1: NR, NBR and its "sisters" CR, ACM, EPDM	4 May	LOS-E-0405	11:00	14:00
Base elastomers; strengths and characteristics, Part 2: the silicones, FKM and its big "brothers" PU and PTFE	9 May	LOS-E-0405	11:00	14:00
From natural rubber to the recipe and via the vulcanisation tools to the rubber product	10 May	LOS-E-0505	11:00	14:00
The properties of a high-quality sealing material - physical values and more	11 May	LOS-E-0605	11:00	14:00

Registration for the seminars and dates for the second half-year under www.simrit.de/akademie



Simrit® at the 2005 Hanover Trade Fair: Product innovation and solution expertise



Compact

Simrit Innovations

- "Lube&Seal" service offer. Contact: matthias.arnold@freudenberg.de
- Simmerring MSS1+Condition Monitoring. Contact: matthias.arnold@freudenberg.de
- Patented Merkel rod seal systems with pressure relief. Contact: gerd.woelk@freudenberg.de
- Low temperature hydraulic material. Contact: mathias.burker@freudenberg.de
- Universal bellows. Contact: ingo.schaedlich@freudenberg.de
- Flexibly adjustable bearing elements. Contact: udo.lange@freudenberg.de

You'll find these and other innovations at our stand during the trade fair: Hall 19 (B31) and Hall 24 (A18/13)

Simrit® at the 2005 Hanover Trade Fair

Intelligence and Integration

All Development areas of Simrit® are awaiting the Hanover Trade Fair with new innovative products and solution concepts. In discussions with customers and visitors, though, the innovations of coming years are already being developed.

Seals and vibration control components are being employed in increasingly more complex machine environments. The users therefore expect that these elements form a technically optimal, homogeneous whole with their surroundings. On

the basis of its enormous material and engineering expertise Simrit is able to carry out the required integration as no other seals and vibration control specialist in the world can. Intelligent and integrati-on-oriented solutions are thus at the

heart of the range of Simrit's offers at this year's Hanover Trade Fair, from 11 to 15 April.

Lube&Seal service offer

Power transmission engineering is one of the most important fields of

application for the integrative complete systems of Simrit. The competitive advantages for manufacturers of gearboxes resulting from systems designed according to integrated functional relation-

the "Lube&Seal" service offer, Simrit together with its sister company Klüber Lubrication is the ideal partner to realise these wishes. "Lube&Seal specifies characteristics determined and verified in static and dynamic

Intelligent simmerring

With "Lube&Seal", the integration depth of today's sealing technology is far from exhausted. At least not for Simrit. In the Simmerring MSS1+ Condition Monitoring, for example, a standard simmerring (catalogue part) is modularly coupled with an optical sensor and a special fleece to obtain a highly integrated high-tech part. With the help of the sensor and the special fleece, oil leakage is measured in a leakage depot within the sealing system. By way of pre-programmed evaluation electronics, the electrical signals are acquired and transmitted via an interface

"The cost savings resulting from the intelligent simmerring MSS1+ are considerable, since the required units and seals must often be positioned at places accessible only with difficulty, where an unplanned replacement is tedious and costly."

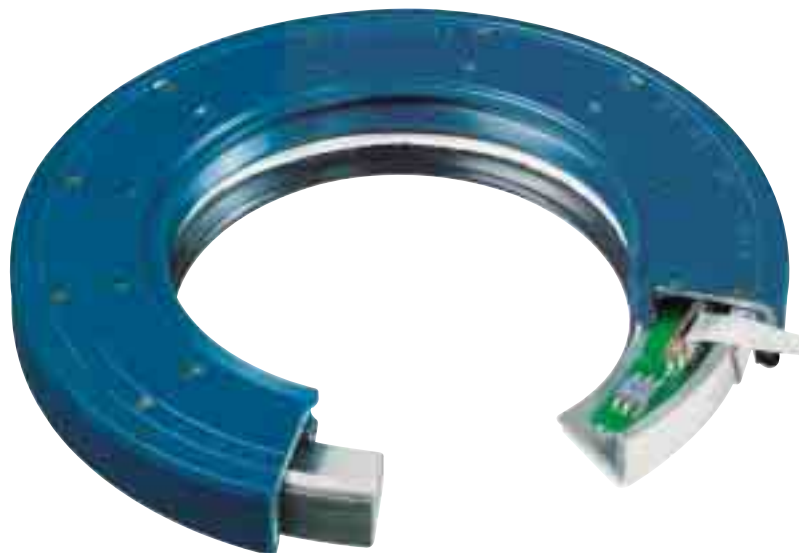


Sealing and lubrication as an integrated solution

ships are apparent. One example is sealing technology: Ideally, the supplier should assume responsibility for the entire "lubricate and seal" system. In the course of attempts to achieve greater reliability and longer service life, a matched integrated system of simmerring and lubricant is necessary. "In order to arrive at a predictable service life of the simmerring, it is necessary to consider the lubricant. Consequently, we'll leave the choice of the lubrication media employed to Simrit as well", explains Udo Vittalowitsch of the gearbox development at SEW Eurodrive in Bruchsal, for example. Not the least of the factors underlying these demands is the wish of power transmission engineering to be able to arrive at a more secure basis for their reliability figures in relation to their customers by way of a still more refined supply policy. With

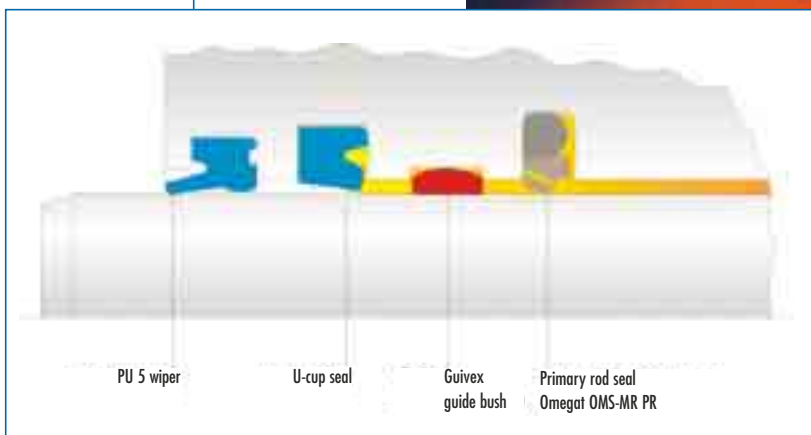
test series. "Lube&Seal" offers our customers a product programme that is chemically and mechanically/ dynamically matched and tested", says Matthias Arnold, Head of Product Marketing for simmerrings.

based on commonly employed industrial standards for further processing, ranging from the simplest control systems to teleservice and telemonitoring. With this integrated "Simmerring+Sensor" sealing



High-tech Simmerring MSS1+: standard components with optical sensor and special fleece

Rod seal system with pressure relief for hydraulics



The diameter of the chamfer bore is less than one millimetre

system, Simrit offers a component which greatly simplifies the planned replacement of seals. "The cost savings resulting from such a pre-warning element are considerable, especially if one considers that the relevant units and seals are often located in positions which are difficult to access, such as in escalator drives, assembly belts and heavy machines, where an unplanned replacement is tedious and costly", explains Klaus Liesegang of the Simrit Service Centre South.

Patented pressure relief

Early warning systems such as the leakage sensor are one factor and

seals with extremely stable long-term behaviour the other factor for the prevention or reduction to an absolute minimum of down-times. With the patented Merkel Omsat rod seals, Simrit ensures the performance features referred to in the area of hydraulics systems. "Viewed from the technical standpoint, stable long-term behaviour and improved operational reliability result from the automatic limiting of the critical pressure rise in the seal inter-space", says Hans Werther, Head of Merkel Applications Technology. This is made possible by a single pressure relief bore with a diameter of less than

one millimetre, according to size, chamfered through the PTFE sealing element. Hans Werther explains the ingeniously simple principle: "as a rule, when the pressure in the main space is greater than in the seal inter-space, the primary seal lies in the seal housing in such a way that the PTFE sealing element lies closed against the wall of the groove. If the pressure in the seal inter-space rises above that in the main space, a minimum pressure difference then suffices to lift the seal slightly from the wall. The pressure relief bore is then immediately freed, allowing pressure equalisation to

occur. When the pressure in the main space becomes greater than in the seal inter-space, the pressure relief bore is automatically shut again."

The sealing system is offered in two different versions, as the Omegat OMS-MR PR for hydraulic systems subjected to normal loads and as the Omegat OMS-S PR for heavy duty hydraulics, such as in large presses, in hydraulic steel structures, in special machine constructions or in the offshore area.

Low-temperature materials

Materials expertise plays the main role in another Simrit innovation from the area of hydraulics seals. With the new 92 AU 21100 polyurethane seal, the low-temperature range for such seals is lowered by around 20 Kelvin. This further improves the restoring behaviour of the seals and significantly increases the functional reserve. Mobile hydraulic systems utilising this new seal material show no significant leakage during start-up even at extremely cold temperatures, which in some cases can reach minus 50 degrees. Mathias Burkert, Head of Product Marketing for Merkel Mobile Hydraulics, gives the example

of the application of an excavator or a mobile crane, which must be started following an ice-cold night. A conventional hydraulic seal is slightly deformed as a result of the transverse loads occurring on the cylinder and nearly freezes in this state. Due to the limited restoring capability, it is therefore initially able to fulfil its sealing function only inadequately, often resulting in leakage. Such a limitation of performance is increasingly unacceptable to today's customers. Thus, once again Simrit helps the customer to improve his products for the global market, which of course encompasses all climatic zones.

Universal bellows

A wide range of knowledge and many years of experience in the



Universal bellows

pass not only elastomers, but also natural rubbers - repeatedly ensures Simrit the decisive competitive advantage. In the form of innovative products, this know-how advantage immediately leads to competitive advantages for Simrit's

"The Hanover trade fair is a good opportunity not only to become familiar with innovative products and concepts, but also to become acquainted with the persons behind these."

area of materials development, as well as a range of products unique worldwide - both in fact encom-

customers as well. Examples for this are bellows and bearing elements, such as those developed and produced in Berlin and in Veltten, Brandenburg. At the Hanover trade fair, Simrit will introduce a universal bellows that enables the clean and permanent sealing of cable bushings, such as through the floor plate of cabins in agricultural utility vehicles. This type of sealing enables not only a reduction in noise inside the driver's cabin, but also opens up the possibility for building up an overpressure inside the cabin, which also protects the driver against harmful substances (e.g. plant protective agents). Ingo Schädlich of the Bellows Product Marketing sees possible applications not only in the area of



Even after an ice-cold night, full performance is required from the very start

agricultural and construction machinery, but wherever cable bushings must be securely and permanently sealed, such as in boat building. Integrated installation aids enable the correct and secure installation of the universal bellows. With this sealing system, the cables can be easily replaced at any time. Thanks to the graduated attachment system, widely different cable diameters can be sealed with a single bellows design. This means that, in spite of great flexibility only a single tool is required to prepare the bellows, representing a considerable cost advantage for the user.

Flexibly adjustable bearing

The new hydro-bearing concept also originates in agricultural and construction machines. Just as for the universal bellows, in the opinion of Dr. Udo Lange, Head of Product Marketing, "it can be used in many other types of vehicles and in other machines and units." Solutions for



Flexibly adjustable bearing element

improved convenience in the driver's cabin must be not only cost-effective, but must also "solve the goal conflict between effective vibration damping and at the same time good structure-borne noise isolation", explains Dr. Lange.

According to Lange, the new hydro-bearing from Simrit permits "individual matching to customer-specific cases." The maximum damping effect of the bearing element can be set

over a wide frequency range and is activated from a pre-defined vibration amplitude threshold.

Tomorrow's innovations

The Simrit stand at the Hanover trade fair will document both the innovative power of Simrit and the enormous range of our services. This range of services derives above all from the expertise of our staff at the Simrit research, development and production sites throughout the world. The Hanover trade fair is a good opportunity not only to become familiar with innovative products and concepts, but also to become acquainted with the persons behind them. The Simrit experts would like to convey the advantages of this year's innovations in discussions with customers and visitors and, at the same time, listen to the requirements and wishes of customers. For it is the realisation of these requirements and wishes which constitutes tomorrow's innovations.



We look forward to your visit at our stand B31 in Hall 19

Condition monitoring - reduced down-time

At the special "Condition Monitoring Systems" presentation, within the scope of the Motion, Drive & Automation part of the Hanover trade fair the Deutsche Messe AG will introduce intelligent solutions for the maintenance and fault diagnosis. Condition monitoring offers the targeted optimisation of monitoring and thus represents a considerable aid for machine manufacturers. The leakage sensors in Simrit simmerrings offer similar capability. These continuously inform the operator about the functional integrity of the seals, detect leakages and signal these to Service. This prevents unplanned machine down-times and simplifies the planning of maintenance tasks.

Naturally, Simrit also has an extra stand and a number of special exhibits on the subject of condition monitoring: our expert team awaits your visit in Hall 24, stand A18/13.

David R. Monaco, Simrit® North and South America

"Global togetherness for the benefit of our customers"

Simrit is present worldwide as a global partner, in Europe, in North and South America, and in growth markets such as China, India and Russia. The different sites are linked by a closely bound information and communication network, guaranteeing every customer "local globality". Under the category "Simrit global", we invite you to join us in a brief world tour, beginning in North and South America and continuing in the next issues of Simrit insight.

Mister Monaco, what comprises "Simrit America" organisationally?

David R. Monaco: Simrit America is the marketing and sales organisation for our general industrial business. Similarly to our European sister organisation, we cover the entire continent, from Canada to Argentina and Chile.

...with a lead centre structure, as in Europe?

Our organisation is based on 22 lead centres in North, Central and South America. These lead centres are production sites, each of which is specialised in the manufacture of certain products and product groups. Not only the required production expertise, but also the necessary development expertise, is concentrated in the lead centres.

In this connection, what is the function of the technology centre in Plymouth?

Plymouth is practically comprehensively responsible for product and

material development in general and also for test procedures.

How does this technical expertise reach the customer?

The organisational structure of our local sales representatives is oriented to a combination of geographical region, key customers and allocation according to market segment. Simultaneously, the sales staff is well distributed over both semi-continent. Geographical proximity to the customer is very important to us.

Does the geographical proximity play any role at all for globally present customers?

Yes, very much so. Large, globally present customers, such as Caterpillar, John Deere or Bosch Rexroth, have direct access to Simrit worldwide, while they are supported locally and individually in Europe, Asia or America. Along with our unparalleled range of products, this is a decisive advantage for a company like Simrit over the competition.

In practice, though, I think this local globality can function only if the Simrit organisations in the different continents work very closely together, and the responsible persons know each other and exchange experiences.

That's correct. A simple parallel existence of the individual Simrit organisations is not enough, there must be genuine cooperation.

Can you cite some examples of this cooperation?

In frequent joint meetings, Simrit America and Simrit Europe coordinate the services for globally present customers. Furthermore, at important trade fairs we work together in the respective other continent, for example by inviting selected customers to take part.

Which trade fairs are you referring to?

This year, for example, the Hannover trade fair and the International Exposition for Power Transmission, in short IFPE, in Las Vegas.

Does exchange take place at the industrial forums which Simrit organises?

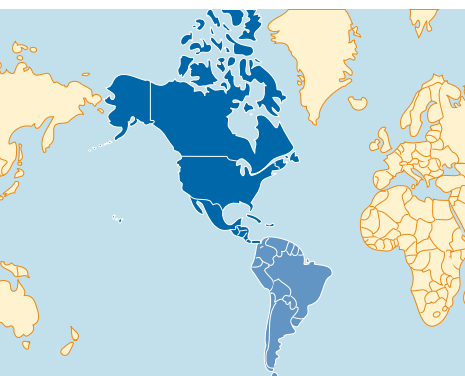
Yes, for the first time the industrial forum "Future-oriented solutions for diesel engines", which will take place in Weinheim in the second half of the year, will be designed for our globally present customers. We will therefore invite some of our American customers to Weinheim to take part in this forum.

If you had to summarise customer relationships as practised by Simrit in one sentence, what would you say?

We help our customers to optimally develop business opportunities, firstly through worldwide development and production resources and uniform contract layout and also through exact knowledge of the local markets and partners on-site.



David R. Monaco
Simrit® North and
South America



"At home" worldwide: Simrit® is represented in every part of the world

Compression set for elastomers

Performance test for materials

The compression set is one of the most important parameters for the assessment of material performance in sealing technology.

If a high pressure is applied to an elastomer part, besides elastic deformation plastic and viscous flow also result. The ratio of elastic to plastic-viscous can be very different for elastomers. This depends above all on the composition of the mixture, the temperature and the type and duration of deformation. The compression set specifies the fraction of plastic-viscous deformation of a vulcanised material. It thus represents one of the most important material properties which the

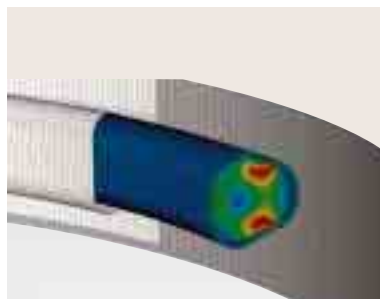


Fig. 1: Deformation under pressure occurs as a rule with O-rings: the FEM analysis indicates the loading



Compact

- The compression set is one of the most important parameters for material assessment
- The lower the value, the better suited is the elastomer for the seal
- The compression set depends on a large number of parameters
- Depending on time and temperature, for static seals a value of 20 to 25 percent represents a good value

Contact: meike.rinnbauer@freudenberg.de

product developer must know before using the seal. With the help of the compression set, the quality of the rubber mixture and its suitability for dynamic or static sealing applications can be determined.

Determination of the compression set

While a high compression set value for new samples is an indication for the insufficient vulcanisation of the elastomer, during ageing processes oxidation processes also occur in the elastomer, resulting in the continuous fall-off of the compression set value. The determination of the compression set therefore

serves to indicate the extent to which the elastic properties of elastomers remain intact following longer periods of subjecting to pressure at the pre-defined temperatures. The determination follows DIN ISO 815. The test procedure is mainly used for elastic samples with a hardness of 40-90 IRHD. For the determination of the compression set, cylindrical test bodies are deformed by 25% (for hard elastomers with > 80 IRHD by 15%, for very hard elastomers

with 90-95 IRHD by 10%) and stored over a specified time (for example 72 hours) at pre-defined temperatures. The samples are then relieved and the residual deformation measured after 30 minutes. The compression set is specified as a percent and results from the formula shown in Figure 2. A compression set of 0% means that the specimen has completely reverted to its original thickness. In practice, however, this is virtually impossible, because the specimen

no longer possesses restoring forces. During testing, it is permanently deformed. For static seals, as a rule the suitability of the respective material for seals increases with decreasing compression set. A compression set value of 20 to 25%, depending on time and temperature, can be regarded as a good value.

Compression set and temperature

Under these conditions, a pre-loaded O-ring in the housing retains its restoring capability and therefore its sealing effect even after a long time. For O-rings, it is also necessary to determine whether the respective cord strength affects the compression set (Figure 3). The smaller the ratio of free surface to volume, the better the restoring capability and therefore the compression set. The determination of the compression set can be carried out at both cold (down to -100°C) and elevated (up to +250°C) temperatures (e.g. 100°C for NBR and 200°C for FKM materials). However, there is no simple relationship between the compression set at room temperature and at cold or elevated temperature. For higher temperatures, other factors, such as the diminished thermal stability of the network or the increasing surface oxidation of the elastomer (Figure 4) also play a role. For every material, the compression set as a function of temperature shows a characteristic "U" shape, uniquely defined by the recipe composition (elastomer type, ageing protection, softener, etc.)

Compression set - an important criterion

The complex relationships make clear how important a role the compression set plays in sealing technology for the assessment of elastomer properties and the development of new components.

Determination of the compression set

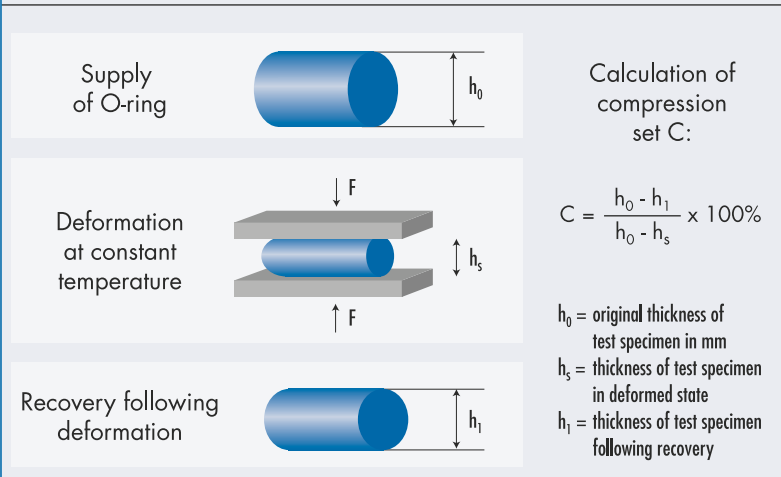


Fig. 2: For the determination of the compression set cylindrical test specimens are deformed by 25%

Compression set as a function of cord strength

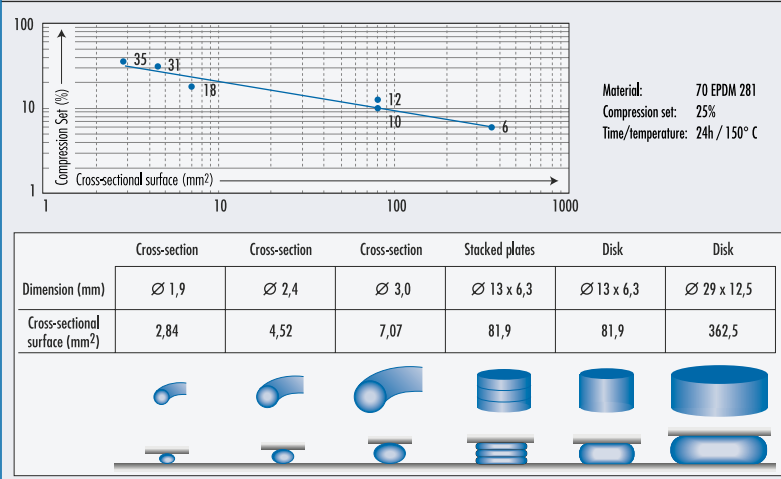


Fig. 3: The ratio of free surface to volume determines the restoring capability

Increase in compression set at low and high temperatures

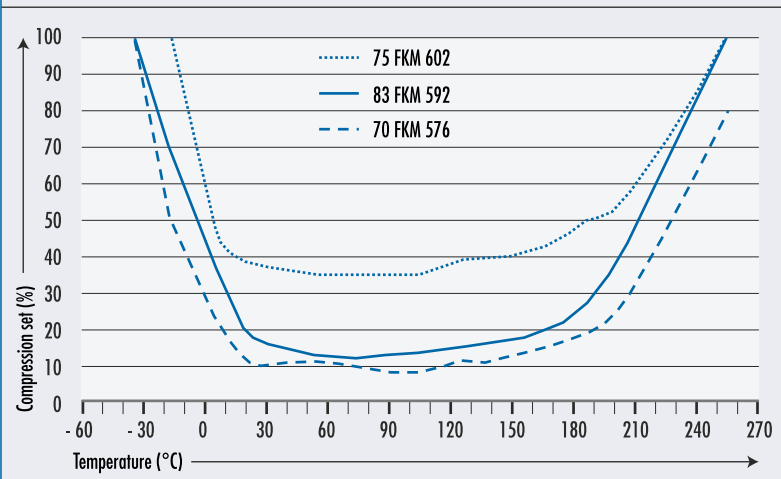


Fig. 4: At high temperatures other factors also influence the compression set

