The Magazine from Trelleborg Sealing Solutions

in the groove

The world of seals and service

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e-MOBILITY

The e-Team

A rapid response engineering team solves e-Mobility challenges with new innovative products

OIL & GAS

Two Heads are Better than One

Trelleborg helps LB Bentley enhance performance with a new rotary gate valve

AEROSPACE

Aircraft Interior Sealing

See where Trelleborg products enable safe and comfortable air travel

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The e-Team

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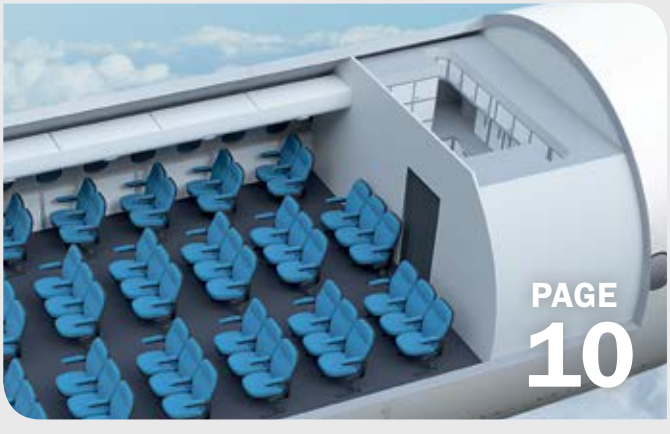
OIL & GAS

Two Heads are Better than One

Close co-operation with Trelleborg helped LB Bentley achieve their performance objectives in a new rotary gate valve.



AEROSPACE

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NEWS

EVENT

Showcasing Innovation

Every two years, a two-day customer event is held by Trelleborg Sealing Solutions. In September 2018, Stuttgart in Germany was the venue for the fourth German and the second European event. The presentations and the evening events were held in the Werkzentrum Weststadt in Ludwigsburg, the former industrial site of the electrical appliance manufacturer Eisfink, and on both days a tour of the new Trelleborg Sealing Solutions Innovation Center in Vaihingen was given to guests. These included selected customers and partners from all sectors of industry, both in the German and European markets and over 500 guests attended the Innovation Days.

MATERIALS

Zurcon® Z53 and Zurcon® Z54: Successful, New Polyurethane Compounds

Two cast polyurethane materials, Zurcon® Z53 and Zurcon® Z54, have successfully replaced the well-known compounds Zurcon® Z51 and Zurcon® Z52*. These two new compounds were developed in our facility in Denmark during an intense two-year material project and launched in 2017.

Superior performance
Performance of the new materials is on par with that of the materials that they have superseded. And in some areas, including extrusion resistance, wear performance and resistance to hydrolysis, performance is superior.

Despite being new, demand for the materials is equal to that of its predecessors. The success of the new compounds comes as a result of excellent performance characteristics and support in transitions from previous formulations.

* Zurcon® Z51 and Zurcon® Z52 production ceased due to REACH regulations.

HEALTHCARE & MEDICAL

Healthcare & Medical Capabilities Expanded

Trelleborg finalized its acquisition of Sil-Pro, LLC., a U.S.-based, privately-owned, contract manufacturer of high-tolerance silicone and thermoplastic components that offers assembly for medical devices, on January 2, 2019.

Sil-Pro delivers custom silicone and thermoplastic solutions for complex engineering challenges and brings more than 20 years of experience partnering with medical device companies. Its product offering compliments the existing portfolio of Trelleborg Sealing Solutions, including the capabilities added following the 2016 acquisition of SSF (Specialty Silicone Fabricators).

Sharing and collaboration
“We’re looking forward to being able to leverage and share our expertise in custom silicone and thermoplastic solutions,” says Brian Higgins, Director of Business Development for Sil-Pro. “We’re also excited to be a part of the larger Trelleborg Group and collaborating with its other facilities. We see this being of mutual benefit to both our customers and the Sil-Pro team.”

Ursula Nollenberger, Product Line Director for Global Elastomer Operations at Trelleborg Sealing Solutions, says: “Sil-Pro bolsters our existing manufacturing footprint with enhanced capabilities in medical silicone and thermoplastic processing, component machining and assembly. We have great synergies on the engineering side with outstanding expertise in product and process development, tool making, and automation. We share a mindset of solving customers’ application challenges with innovative high-quality and cost-effective engineered solutions.”

NEW FACILITIES

Improving Service for Customers in Brazil

Closer to the customer
The Trelleborg Sealing Solutions marketing company in Brazil recently inaugurated its new office in São Paulo. “Our new offices bring us closer to most of our clients,” explains Luis Fronterotta, General Manager of the Trelleborg Sealing Solutions marketing company in Brazil. “Due to the better regional infrastructure, it is now much easier for us to travel to customers and for them to come to us. One highlight of the new office is our training facility to support customers with in-depth information on sealing technology.”

Lean manufacturing
In January 2019, the new manufacturing site in São José dos Campos celebrated its opening. This site specializes in the production of engineered plastic seals. “The new facility enables us to better support our customers with an optimized and sustainable structure that follows lean manufacturing best practices. It will guarantee us better performance, economy of resources and harmony with the values of our company,” says Renan Mello, the site’s Finance & Operations Manager.

SUSTAINABILITY

A Greener Way to Work

Trelleborg Sealing Solutions in Stuttgart, Germany, is encouraging its over 500 employees to leave their fossil-fueled cars at home and use alternative methods to commute to work. In addition to sponsored tickets for public transportation and a bonus for those who walk or bike, employees also benefit from e-bike subsidies and an app to facilitate car-pooling.

Lowering the number of cars on the road
“Commuting by car is becoming more and more difficult in Stuttgart due to restrictions aimed at reducing smog and traffic problems,” says Carsten Stehle, General Manager of the Trelleborg Sealing Solutions marketing company in Germany. “That’s why, as part of our move to the new Innovation Center, we’ve developed a mobility concept that will help us promote more environmentally friendly alternatives to a single person travelling by car to the office.

“Thanks to the new concept, our employees will be able to get to work faster, more cost-effectively and healthier than before. Now, just under 20 percent of employees leave their cars at home and use buses, trains, bicycles or walk and we expect this number to increase in the future. In this way, we are saving resources and making a contribution to the environment. “

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Experience our Capabilities

Trelleborg Sealing Solutions is on the road again! Our teams of experts visit trade shows across the globe to give you a closer look at the broad range of products, solutions and services that we offer.

FRANCE
Paris Airshow 2019

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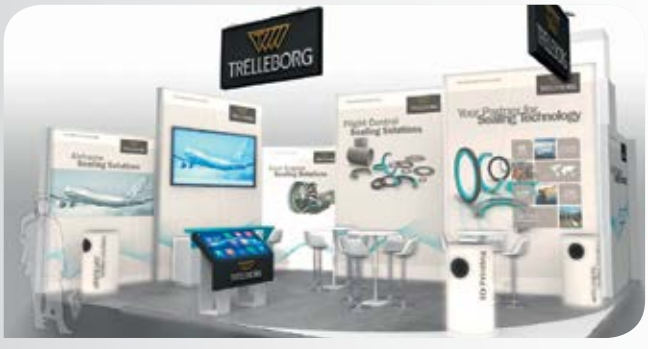

The International Paris Airshow is the aviation and space industry's largest dedicated show, featuring over 2,000 exhibitors and nearly 150,000 visitors. Once every two years, the airshow offers a chance to discover the market's latest innovations and developments. Every afternoon, 40 of the most modern aircraft perform flying displays for attendees.

Trelleborg Sealing Solutions has developed an exciting new AR app for use at the show that will guide customers through the wide range of products for helicopter applications.

As usual, Trelleborg will also be displaying a host of solutions for aerospace, such as Turcon® Varilip® PDR HiSpin®, a specialized e-Mobility seal, and A320 door seals.

US
OTC 2019

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It's OTC's 50th Birthday! An opening session on the 6th of May on 'OTC: The next 50 years" will explore how companies will prepare for the brave new world of automation, digitalization and machine learning. Industry leaders from around the globe will be discussing new licensing and business opportunities and advancing technologies that have been introduced.

This will be Trelleborg's 46th years of participation at the event and the stand theme this year is 'Going the Distance: Connecting our past to the future'. The stand will feature a timeline that includes firsts from the oil & gas industry, OTC, and Trelleborg. On this journey through time, Trelleborg visits historical moments that can be looked back on to gain insights into what the future of the offshore industry could be and how it can be shaped for coming generations.

TAIWAN 6
Taipei International Cycle Show

TAIPEI CYCLE

Taipei International Cycle Show is one of the most famous cycle shows in the world, featuring both complete bicycles and their components. Last year's show included a cycle demo day, allowing the general public to ride new cycles from 40 brands along scenic riverways, and a Cycle Forum that addressed hot-topics in the cycle industry.

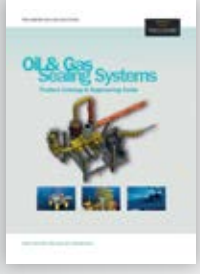
2019 Exhibitions

MD&M West	1	Anaheim, CA, USA	February 5 – 7
Subsea Expo	2	Aberdeen, UK	February 5 – 7
Pharmapack Paris	3	Paris, France	February 6 – 7
Labquality Days	4	Helsinki, Finland	February 7 – 8
Taipei International Machine Tool Show	6	Taipei, Taiwan	March 4 – 9
JEC World	3	Paris, France	March 12 – 14
Aerospace Forum	5	Birmingham, UK	March 19 – 21
Semicon	7	Shanghai, China	March 20 – 22
PCH B2B Meeting	8	Lyon, France	March 20 – 21
Electrosub	9	Budaörs, Hungary	March 27 – 30
Taipei International Cycle Show	6	Taipei, Taiwan	March 27 – 30
OMC	10	Ravenna, Italy	March 27 – 29
Medi'Nov B2B meeting	8	Lyon, France	April 3 – 4
Subsea Valley	11	Oslo, Norway	April 10 – 11
OTC	12	Houston, USA	May 6 – 9
BCA	13	Rzeszow, Poland	May 21 – 23
Nor-Shipping	11	Lillestrøm, Norway	June 4 – 7
Le Bourget (Paris Airshow)	3	Paris, France	June 17 – 23
BioTaiwan Exhibition	6	Taipei, Taiwan	July 25 – 28
Aqua Nor	11	Trondheim, Norway	Aug 20 – 23
Taipei Intern. Automation Exhibition	6	Taipei, Taiwan	Aug 21 – 24

Hot Off the Press

Find out about the latest literature from Trelleborg Sealing Solutions.

Oil & Gas Sealing Systems Product Catalog and Engineering Guide Updated and New Capabilities Brochure



As well conditions become harsher and more difficult to exploit, it's important to work with a seal supplier who understands emerging requirements, existing trends and market standards and legislation. Trelleborg Sealing Solutions has been involved in the Oil & Gas industry for over 45 years and is a leading supplier to companies globally.

As the de facto resource for Oil & Gas sealing solutions, the guide gives detailed information on everything from standard and custom solutions to surface finishes and installation guides, making it an essential resource for every engineer's technical library. Discover solutions for downhole drilling motors, subsea valves and refinery separation equipment that optimize performance, reduce downtime and reduce costs.

The new update brings with it the very latest engineering developments, innovative products, and best-in-class materials to excel in today's challenging Oil & Gas market.

To complement this, a new brochure on Oil & Gas Sealing Capabilities has been published, giving a rundown of NORSOK M-710 compliant materials, downtime-reducing services and products by application.

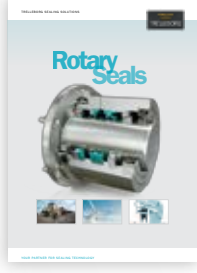
The revolutionary SealWelding™ service offering is highlighted, demonstrating how FPSO downtime can be dramatically reduced by eliminating the need for vessels to return to shore when seals must be replaced.

Visit www.oilandgas-seals.com to learn more about solutions for the Oil & Gas Industry.

ROTARY SEAL CATALOG AND PRODUCT RANGE UPDATES

One of the Trelleborg Sealing Solutions core catalogs and the full product range brochure have been improved and reworked to keep customers up-to-date with the newest products on the market.

Rotary Seal Catalog



Trelleborg's rotary and shaft seals keep lubricating fluids in, while preventing the ingress of mud and water in oscillating or rotating applications. The portfolio of sealing solutions within the Rotary Seals catalog has been expanded again, with new Turcon® Roto Glyd Ring® variations, innovative Cassette Seal designs and a reworked Mechanical Face Seal offering, extending the limits of performance and lifetime in a range of different industries.

Product Range

The product range shows the entire portfolio of standard products and gives information on capabilities for custom solutions, all bundled together in a convenient package. The updated version now also features the new products added to the Rotary catalog, as well as other innovative solutions, and serves as a handy quick reference guide - giving an overview of Trelleborg products across all industries and applications at a glance.

Included within the catalog are the full range of Trelleborg Sealing Solutions rotary products, such as Radial Oil Seals, Cassette Seals and Turcon® Roto Glyd Ring®.

Welded PEEK Products Flyer

Typically, large diameter PEEK products are formed through compression molding, a slow and costly process requiring large industrial equipment. Whenever a new size is required, new molds must first be manufactured accurately and to tight tolerances, further increasing the cost.

Using an innovative welding process, Trelleborg engineers are able to now produce large diameter PEEK rings, ready for machining into a range of products, which when combined with other large diameter Turcon® products offers the same performance as a compression molded Back-up Ring at a lower cost.

New Kantseal Catalog

A square-shaped alternative to the O-Ring, Kantseal ensures its shape remains constant and there's no twisting in the groove, even under high pressures. Now with new materials available and an extended set of standard dimensions, a stand-alone Kantseal catalog has been developed.

When sealing flanges, valves, plates and locks, and requiring high leak-tightness, long service life and outstanding sealing behavior, Kantseal can operate as an effective static axial seal.

HiSpin® HS40 and HiSpin® PDR RT Flyers

Electric drive units for e-Mobility applications not only require high rotational speeds, but must guarantee effective lubrication of the gearbox while the motor remains dry. Two new HiSpin® products enter the market to cope with the increasing speed and temperature requirements.

HiSpin® HS40 is manufactured from proprietary XLT fluoroelastomer, and features hydrodynamic design features to reduce frictional torque. Meanwhile, HiSpin® PDR RT can endure higher speeds, up to 60 m/s, and is capable of operation in dry, moist and lubricated environments. Tested under extreme conditions, these seals offer superior, cost-effective performance and reliability.

For further information on these two seals, read the article on e-Mobility on page 22.

MORE INFORMATION

To view the brochures and flyers, go to www.tss.trelleborg.com and visit the "Catalogs & Brochures" section under "Tools & Resources"

Turcon® Variseal® NW Flyer

When operating in aggressive semiconductor and hygienic processing environments, exceptional resistance to chemicals and temperatures is a requirement. By fully encapsulating an energizing-spring within a premium Turcon® MF flange seal, applications can benefit from the performance advantages of a Variseal® product, but with extended lifetime and extended resistance. It can provide a more cost-effective alternative to FFKM O-Rings and is ideal for food, beverage and semiconductor processing.

Sealing Solutions for Aircraft Interiors

Trelleborg Sealing Solutions has pioneered the development of innovative aerospace solutions for decades. From airframes to engines and actuators to landing gear, Trelleborg products can be found improving performance and ensuring safety in nearly every part of a plane.

Using cutting-edge manufacturing techniques and supported by the material expertise of the Trelleborg Group, our solutions for aircraft cabin interiors includes:

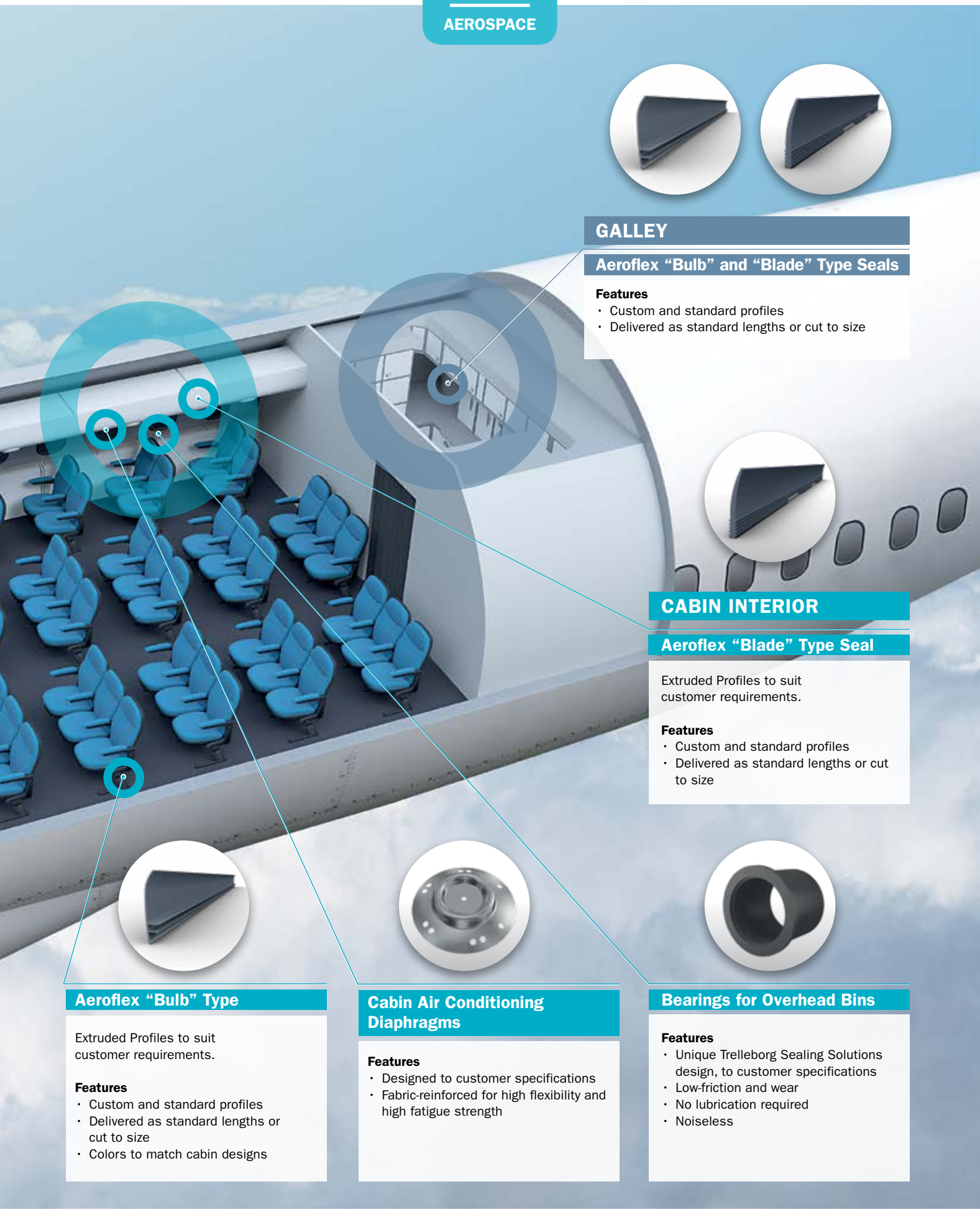
- Sealing profiles for cabin interiors and seats
- Bearings and wear pads for overhead bins and chairs
- Diaphragms for air-conditioning systems
- Galley interior sealing profiles
- Seals with global and regional regulatory approvals
- Seals for sanitation and drains
- All seals approved to international smoke and toxicity standards

TOILET

Fluid Water and Waste Sealing System

Features

- Custom parts and standard O-Rings
- O-Rings with FDA approval
- Compatible with both clean and waste water



GALLEY

Aeroflex “Bulb” and “Blade” Type Seals

Features
- Custom and standard profiles
- Delivered as standard lengths or cut to size

CABIN INTERIOR

Aeroflex “Blade” Type Seal

Extruded Profiles to suit customer requirements.

Features
- Custom and standard profiles
- Delivered as standard lengths or cut to size

Aeroflex “Bulb” Type

Extruded Profiles to suit customer requirements.

Features
- Custom and standard profiles
- Delivered as standard lengths or cut to size
- Colors to match cabin designs

Cabin Air Conditioning Diaphragms

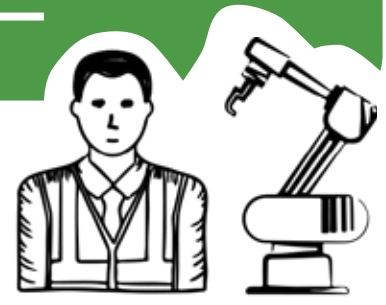
Features
- Designed to customer specifications
- Fabric-reinforced for high flexibility and high fatigue strength

Bearings for Overhead Bins

Features
- Unique Trelleborg Sealing Solutions design, to customer specifications
- Low-friction and wear
- No lubrication required
- Noiseless

How to Make a Difference

Companies across the globe are struggling to find the right engineering talent. In the UK, the Royal Academy of Engineering and the industry are working to promote engineering careers by showing that behind every YouTube designer or heart surgeon there are cool engineers creating the necessary tools.



By **RHYS MORGAN**, *Director of Engineering and Education, Royal Academy of Engineering*

IT MIGHT BE EASY ENOUGH to find engineering talent if your logo says Google, Spotify or Facebook. In the UK market, huge and well-known international manufacturing companies such as Airbus, Rolls-Royce and Jaguar still have a lineup of eager applicants.

Where we see a critical shortage is particularly in smaller companies. Even in attractive companies there will be a shortage due to an aging workforce, and in growing sectors like aerospace and automotive we still need engineers and technicians that support the skilled engineers."

Attracting young engineers

The Royal Academy of Engineering, in cooperation with major engineering organizations and with funding from the industry, has initiated a social media campaign called "This is Engineering", targeting young people aged 13 to 18.

The "This is Engineering" campaign started in January 2018 and has attracted more than 20 million views, making it an unparalleled social media campaign to promote engineering specifically to teenagers in the UK. Short YouTube videos introduce viewers to engineers like Josh, who calculates the best way to get casualties out of collapsed buildings; Chris, who makes wearable robots and prosthetic limbs; and Sonya, a visual effects artist who creates special effects in blockbuster movies.

Other industries, like the fashion business, have been very good at promoting themselves to young people. Architecture, law and finance have also been good at branding themselves, but engineering has been very slow to follow.

To attract young people it is essential to understand their aspirations and attitudes toward life — such as an interest in flexible working, opportunities to travel and making a difference.

Engineering is important

The campaign is about getting them to recognize the importance of engineering for, among other things, solving some of the world's future challenges. It might be in terms of building sustainable cities with electric cars, addressing water shortages or improving communication across the world. Kids interested in helping people often say they want to become a doctor, but most advances in medicine in recent years are actually all about engineering, like MRI scans, ultrasound or hip implants.

The UK has among the lowest proportion of female engineers in Europe, only 12 percent, and we are working hard to address that issue as well. Getting more female students is critical to filling the skills shortage. Engineering companies

BIOGRAPHY

Rhys Morgan

TITLE: Director of Engineering and Education, Royal Academy of Engineering
WHERE HE LIVES: London
EDUCATION: Bachelor's degree in engineering, PhD in additive manufacturing from Liverpool University
WORK AND CAREER: Academic researcher and industry R&D engineer. Joined the Academy in 2009 to increase the number of young people in engineering
FAMILY: Married with two daughters. The elder says she wants to be an engineer, while the younger wants to be a farmer
INTERESTS: Walking and cycling, kitchen science activities with the kids
HIDDEN TALENT: Created a formula for winning at the game of Poohsticks
WHAT DRIVES HIM: A passion for amazing engineering and wanting more young people to enjoy an exciting and creative career in engineering

work to serve people, communities and societies. If their workforce doesn't properly reflect societies, those services and products will not be as inclusive as they could be.

Diversity is a goal

Companies will also miss out on a diversity of thinking around the product solutions. That goes for different ethnic minority groups and people from different strata of society as well. If you have a very homogenous white middle-class engineering workforce, which we largely do in engineering in the UK, then you miss out on many potential business opportunities and opportunities to serve society.

The speedy developments in artificial intelligence mean that a lack of diversity is a concern. It's a very live issue in the UK. How do we make sure that there aren't just white male engineers programming their unconscious bias into the algorithms they are creating? And again, a more diverse workforce will help to negate that.

A turning tide

It's too early to see the long-term effect of "This is Engineering." Through our own surveys we can see that young people who have seen the campaign are considering engineering as a career choice. So we see green shoots of optimism and hope the tide is turning. But it will be a while before we see the impact on the profession. It's like an oil tanker — it takes very long time to turn.

Anne Russo, Program Manager at Trelleborg Sealing Solutions in Albany, New York, US, is passionate about advocating for women and girls in science, technology, engineering and math. She has been a member of the Society of Women Engineers for the past 15 years.

What made you choose a career within engineering?

As a child, I always loved math — my parents got me to eat my peas at dinner by asking me to count the number in each spoonful I ate! I also loved building with K'NE X or Erector sets and doing science experiments. In high school, I particularly enjoyed chemistry and calculus classes. My mom saw that I loved problem solving, and encouraged me to pursue engineering.

What would you say to a high school girl who hesitates if she should go for a career in engineering?

My advice to high school kids considering engineering is to talk to as many different engineering professionals that you can and ask a lot of questions. There are many different types of engineering, and one may fit your interests more than another. Look for opportunities to job shadow, so that you can see a day in the life of an engineer. Engineering is a fulfilling career since it enables you to make an impact in your community and the world.

What is the best part of your job?

My favorite part of my job as an engineer at Trelleborg Sealing Solutions is that many of the products we make are custom or prototypes. Since each project is unique, there is always a new problem to solve. I enjoy seeing the whole process: from engineering design to manufacturing to testing and validation of a product.

Globe Trotting

After relocating from India to England, Inderjeet Singh has shifted his focus from seals with complex designs to seals made of innovative materials. But he says the principles of product management are the same the world over.

By Donna Guinivan

AS THE UK EXPERIENCED THE HOTTEST SUMMER on record last year, Inderjeet Singh may not have felt out of place in Tewkesbury, England, after relocating from Bengaluru, India, where the average summer temperature tops 30 °C.

Inderjeet now works as product manager for the sealing solutions manufactured at the Trelleborg Sealing Solutions facility not far from Birmingham, England's second-largest city. In Bengaluru, he was involved with the setup of radial oil seal production at the Trelleborg site there.

"In Trelleborg, networks are very important," he says. "So although I was based in Bengaluru, I also worked within global teams. I already know all the people I am working with here well. Even though I'm somewhere different, it feels like I'm home. Working in Trelleborg is like being part of one big family, so the transition is effortless." →

IN SHORT

1. Inderjeet Singh has relocated from India to the UK
2. He discusses the similarities and differences between working in Bengaluru and Tewkesbury
3. He is now responsible for promoting Isolast® globally within Trelleborg Sealing Solutions

Filling an empty shop floor

When he joined Trelleborg six years ago, Inderjeet was charged with supporting the development of radial oil seal production capability in India. Over an 18-month period, an empty shop floor was filled with tooling, machines, technology and know-how. After that, he could concentrate on product management.

> "I've had to go back to school and dust off my old chemistry books so I can more effectively liaise with the material experts who are supporting me."

INDERJEET SINGH
Product Manager at Trelleborg Sealing Solutions

Inderjeet is on a mission to break misconceptions down with regard to Isolast®

ISOLAST® MATERIALS

Isolast® materials are the gold standard among elastomers. Differing from other rubber compounds, they are chemically resistant to virtually all media while demonstrating outstanding performance.

The benefits of perfluoroelastomers (FFKMs) can outweigh their often seemingly higher cost as they can operate at temperatures up to +320 °C / +608 °F for long periods in the harshest of process media. These include the aggressive chemicals employed in the cleaning and sterilization regimes used in food production that can potentially destroy a standard seal in hours.

In many cases, FFKMs are the only option in critical aerospace or oil and gas applications. And with the ability to manufacture and pack in class 100 and class 10000 cleanroom environments, seals can be supplied to meet super-clean requirements, such as for semiconductors, where the slightest contamination can destroy an electronic product.

"Our team has been so successful that the radial oil seal facility has outgrown its allotted space, and manufacturing has moved to a larger site," he says.

Product management is key

"In Trelleborg, the role of the product manager is an important one. We are responsible for spearheading new product development that will bring sales and growth for the manufacturing sites we are responsible for. We formulate strategies for segments, regions and even specific customers or applications.

"Supporting the marketing companies in their outreach is vital. We provide them with material to promote our products, educate them and back them up when tackling issues. That means we have to be flexible, ready to visit a customer in the US, China or elsewhere, as required."

The same principles

Although the products Inderjeet is managing are different now, the principles of product management are the same.

"The only thing is I have to be a bit more polite in England than India," he jokes. "The processes in Tewkesbury are virtually like-for-like compared to those in Bengaluru."

Guy Fowler selects an individual mold tool cavity from the Isolast® tool carousel that contains over 4,000 tools. Computer controlled, the cavities are easily found via a control panel that rotates the carousel to the correct shelf.

This may seem a little surprising, as people usually imagine that manufacturing in India, which is thought of as a low-cost manufacturing country, would be manual, while in Europe production would be automated.

Automation globally

"Trelleborg differs from some other manufacturers in that we produce in Asia primarily to meet the needs of international manufacturers who are based there, as well as indigenous companies, rather than using the facilities to produce components cheaply to ship out of Asia," Inderjeet says.

"If a product can be effectively manufactured manually, we may consider doing that. But as soon as this method hampers quality or consistency, then automation is adopted. It's about the correct balance in production."

Complex materials

The one big difference between radial oil seals and the products Inderjeet now manages is that radial oil seals are complex in their design, whereas the seals at Tewkesbury can also be complex in their material makeup.

> "We've established a very strong O-Ring and Engineered Molded Parts business in the aerospace, CPI and oil & gas markets. Now we're set for the next big step to drive the business forward into other demanding markets such as semiconductors."
>
> **INDERJEET SINGH**

"I've had to go back to school and dust off my old chemistry books so I can more effectively liaise with the material experts who are supporting me," he says. The main product line for Tewkesbury is the proprietary range of Isolast® perfluoroelastomer sealing materials, elastomers that are extremely chemically resistant, making them compatible with virtually all process media. →

Inderjeet finds the principles of product management the same in the UK and in India.

"In Isolast®, Trelleborg boasts one of the best ranges of perfluoroelastomers on the market," Inderjeet says. "We've established a very strong O-Ring and Engineered Molded Parts business in the aerospace, CPI and oil & gas markets. Now we're set for the next big step to drive the business forward into other demanding markets such as semiconductors."

Not just O-Rings

"For me as a product manager, it's about breaking misconceptions down with regard to Isolast®. As perfluoro-elastomers are so chemically resistant, people don't think that you can bond them to metal or other substrates. In fact you can, and we have perfected the techniques to do this. Also, O-Rings are generally thought to be the only choice. Again this is not true. Perfluoroelastomers can be injection-molded into intricate geometries. Both these manufacturing options extend design possibilities, meaning that we can meet ever more demanding higher volume requirements and offer real benefits in terms of accelerating our customers' performance."

INDERJEET SINGH

Inderjeet Singh is product manager for the sealing solutions produced at Trelleborg's manufacturing facility in Tewkesbury, England, where he recently relocated from Bengaluru, India. He did his mechanical engineering degree and MBA in India and has spent over 14 years in the sealing industry.

He is married, with an eight-year-old daughter and a five-month-old son. He and his wife have lived in England and Germany, so he does not see the transition as too difficult for the family.

Inderjeet likes cooking, although sourcing vegetables for some of the dishes he cooked at home in India may mean trips to specialized supermarkets or adapting recipes to local produce. He also follows cricket and plays badminton, and he plans to join a badminton club in the Tewkesbury area.

Service PLUS

SIMPLIFY YOUR BUSINESS.

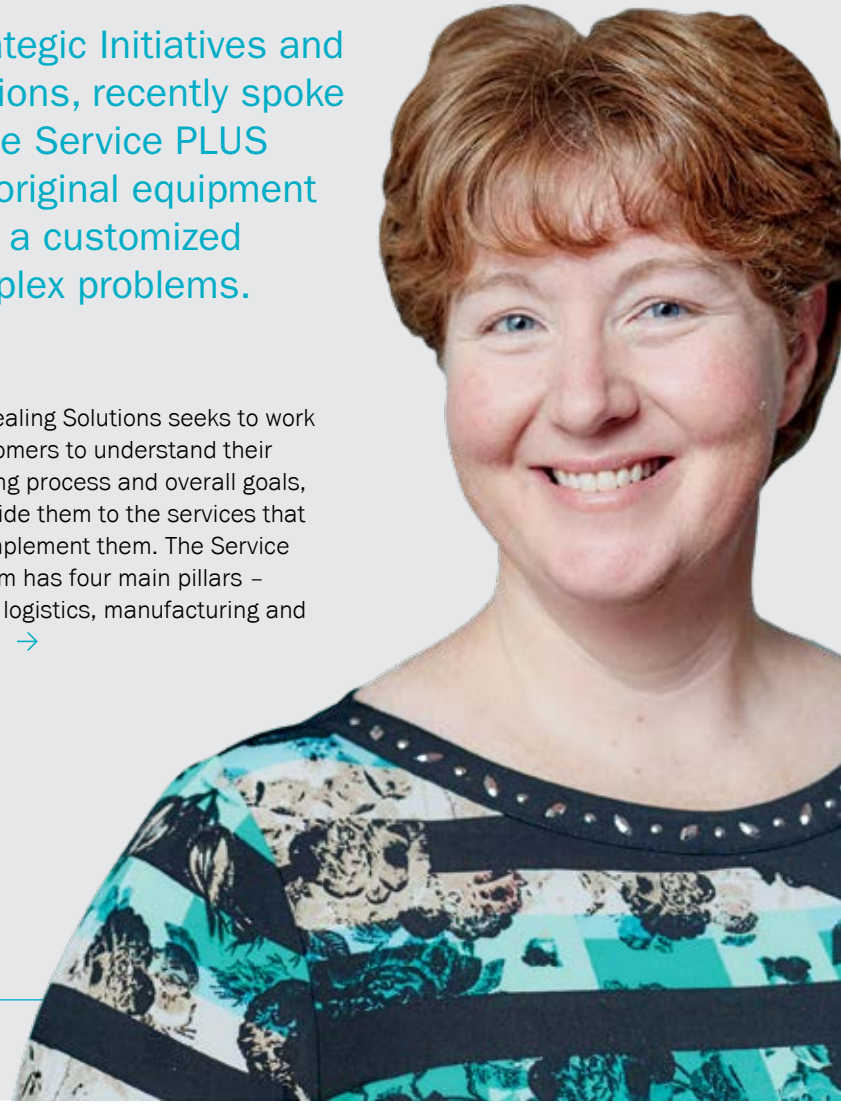
Trelleborg Makes Business Easier for its Customers with Service PLUS

Heather Castleman, Director of Strategic Initiatives and Services at Trelleborg Sealing Solutions, recently spoke to Rubber & Plastics News about the Service PLUS program, which is designed to give original equipment manufacturers across all industries a customized approach to solving their most complex problems.

All about the customer

"It's designed to help customers simplify their processes in every part of their value chain," said Heather. "It's all about the customer and our ability to help add value to them as they accomplish their goals and objectives for their businesses."

Trelleborg Sealing Solutions seeks to work with its customers to understand their manufacturing process and overall goals, then help guide them to the services that will best complement them. The Service PLUS program has four main pillars – engineering, logistics, manufacturing and aftermarket. →



HEATHER CASTLEMAN
Director of Strategic Initiatives and Services at Trelleborg Sealing Solutions

Packaging to meet specific customer requirements is part of the Service PLUS offering

Improving total cost of ownership

"We're helping the customer improve the total cost of ownership of our product while also increasing their throughput within their own manufacturing processes so they can deliver more value to their business quickly," Heather said. "It's not a one-size-fits-all approach. Every customer is different and as a result we have different services that different customers would find valuable."

On the engineering front, Trelleborg provides easy access to information about the different applications for Trelleborg's sealing products. Heather said this includes digital tools, rapid prototyping and other support to make the front-end design process and new product development more efficient.

Lots of engineering support

"Customers get functional samples quickly so they can prove out their design process and bring their products to market in a more optimized and efficient way," Heather said. "We can do a variety of simulations that show how sealing systems perform within an application, as well as in-house lab testing. There's a lot we can do on the engineering side that can help customers bring new products to the market more quickly."

With logistics, Trelleborg optimizes the customer's internal supply chain by simplifying the replenishment process. Heather said this can occur by consolidating vendors and having Trelleborg manage different vendors and stock levels.

Integral to manufacturing processes

Trelleborg also offers a seal scan system that allows customers to replenish based on usage.

"As customers' production schedules change, they can be assured that the products that they need for their line are available and ready to use," Heather said. "It gives the customer a lot of flexibility in their manufacturing processes overall."

Trelleborg takes on some of its customers' manufacturing process internally through sub-component assembly. Heather said rather than just providing seals, gaskets or bearings – whatever the product may be – and having the customer install them, Trelleborg will assume that responsibility by taking their components and install its seals, delivering a finished sub-assembly to the customer's production line.

Vendor reduction

"That gives the customer the ability to manage a single supplier," Heather said. "The seal installation can be tricky. Since we have that knowledge, we make sure that they get the highest quality. They have a single vendor and a single SKU to manage, and they can be confident that the quality of that installation is correct."

The final pillar is aftermarket support – Trelleborg assists its customers in better controlling their aftermarket. Heather said this includes doing some private branding and specialized packaging solutions.

SERVICE PLUS:

Want to find out more about Service PLUS? Read the brochure at www.tss.trelleborg.com/literature or visit www.tss.trelleborg.com/serviceplus

Packaging Solutions

"We have a variety of different packaging solutions," Heather said. "We're mindful that our customer's customer is often in environments that are potentially dirty or have a contamination component to them. Our ability to provide packaging that's resistant to these environmental conditions helps ensure quality as repairs are being done."

Heather said the program is constantly evolving as Trelleborg continues to expand its capabilities through acquisition. Most of the capabilities it offers through the Service PLUS program have come from many of the deals it's made in the last decade.

Delivering to customer needs

The firm's 2007 deal to acquire the Trelleborg Sealing Solutions business area gave Trelleborg deep insight into advanced delivery systems. Heather said adding Anderson Seal – a deal completed in 2017 – helped the firm learn more about just-in-time delivery and additional component assembly.

"We want to take the best of both organizations – the legacy Trelleborg organization and the newly acquired business – and create scalable solutions that enables us to serve all of our customers. Service PLUS is a great example of that." finishes Heather.

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OUR SERVICE CAPABILITIES

Service PLUS unites various enhanced solutions across the entire value chain, simplifying the processes of engineering, logistics, manufacturing and aftermarket for the customer. Beside Advanced Delivery, these components are part of the Service PLUS concept:

Special Handling: Refers to the numerous individual packaging solutions on offer, as well as additional surface treatment or marking options. This not only includes special protective packaging or replacement part kits, but also streamlining measures, such as vendor reduction or reducing warehouse stock.

QuickSeal: Covers short-notice needs for seals; depending on material these can be manufactured in one day of order.

Assembly: Trelleborg is willing and able to offer pre-assembled parts put together by specially trained staff, delivered directly to the customer.

Digital Tools: Online resources and apps developed to make an engineer's life easier.

Engineering Support Services: World-class engineering solutions and supporting services – from extensive design & compound competence, to ample product testing, Trelleborg provides expert support for your engineering needs.

Further pillars will be added to the Service PLUS concept in the future.

IN SHORT

1. A major obstacle to widespread electric vehicle adoption is being unable to achieve the same range as gasoline-powered cars.
2. Trelleborg Sealing Solutions assembled an agile rapid-response team of engineers and other experts to address growing customer demand.
3. Two new products specialized for e-axle applications have been released – HiSpin® PDR RT and HiSpin® HS40 – the result of the team's work.

The e-Team

Traditionally, product development can be a slow process. But when supporting manufacturers to make electric vehicles travel further became a priority, an agile team of experts were asked to come up with a solution rapidly that could stand up to the high rotational speeds involved in e-Mobility applications.

By Donna Guinivan

THE FIRST ELECTRIC CAR WAS INVENTED in 1828 by Hungarian Ányos Jedlik. Since then the desire has existed to power vehicles with electricity. However, mass adoption remains a pipe dream. That is, until a viable technology can provide the same mileage as a tank of gasoline from a single battery charge to give car drivers the independence they are used to.

Electric will be the norm

Now though the pressure is on to find a solution, as the quest for ever-lower CO_2 emissions hots up and the desire to retain vehicle access in some of the world's most-populous cities becomes paramount. Electrically driven vehicles therefore need to become the norm, not a novelty.

According to a report by the International Energy Agency (IEA)*, there were 3.1 million electric vehicles on the roads globally in 2017. However, this is expected to grow exponentially to at least 125 million and potentially 220 million, by 2030.

Eliminating range anxiety

One of the keys to this growth is that components are available that allow electric vehicles to operate effectively and in particular give car drivers the independence they are used to from traditionally fuelled vehicles. Overcoming 'range anxiety' is critical to mass adoption of electric vehicles. →

* https://www.iea.org/gevo2018/

THE E-AXLE

Often described as eAWD, the e-axle is an electro-mechanical propulsion system contained in an axle structure housing an electric motor, the power electronics and some form of gearing/differential.

Scan the QR Code to find out more

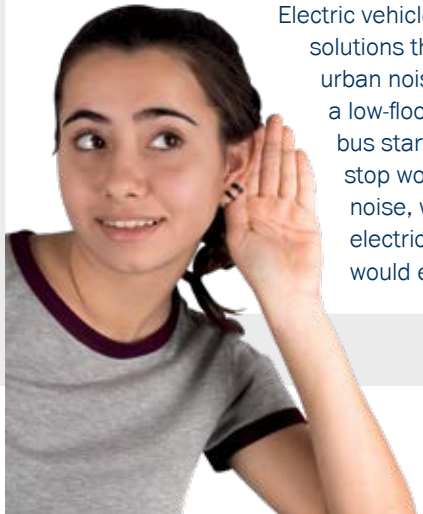
"With gasoline or diesel vehicles, people know they will get where they want to get to. The infrastructure is there and filling up the tank is never an issue. When people drive an electric vehicle they worry if they will have enough charge to arrive at their chosen destination, and a lack of charging points and the time taken to charge a battery, make them nervous," says Jan Zumbach, Head of Business Development for e-Mobility. "The solution to this is to install a charging infrastructure and increase battery capacity to extend the distance that can be travelled on one charge."

Sealing challenges

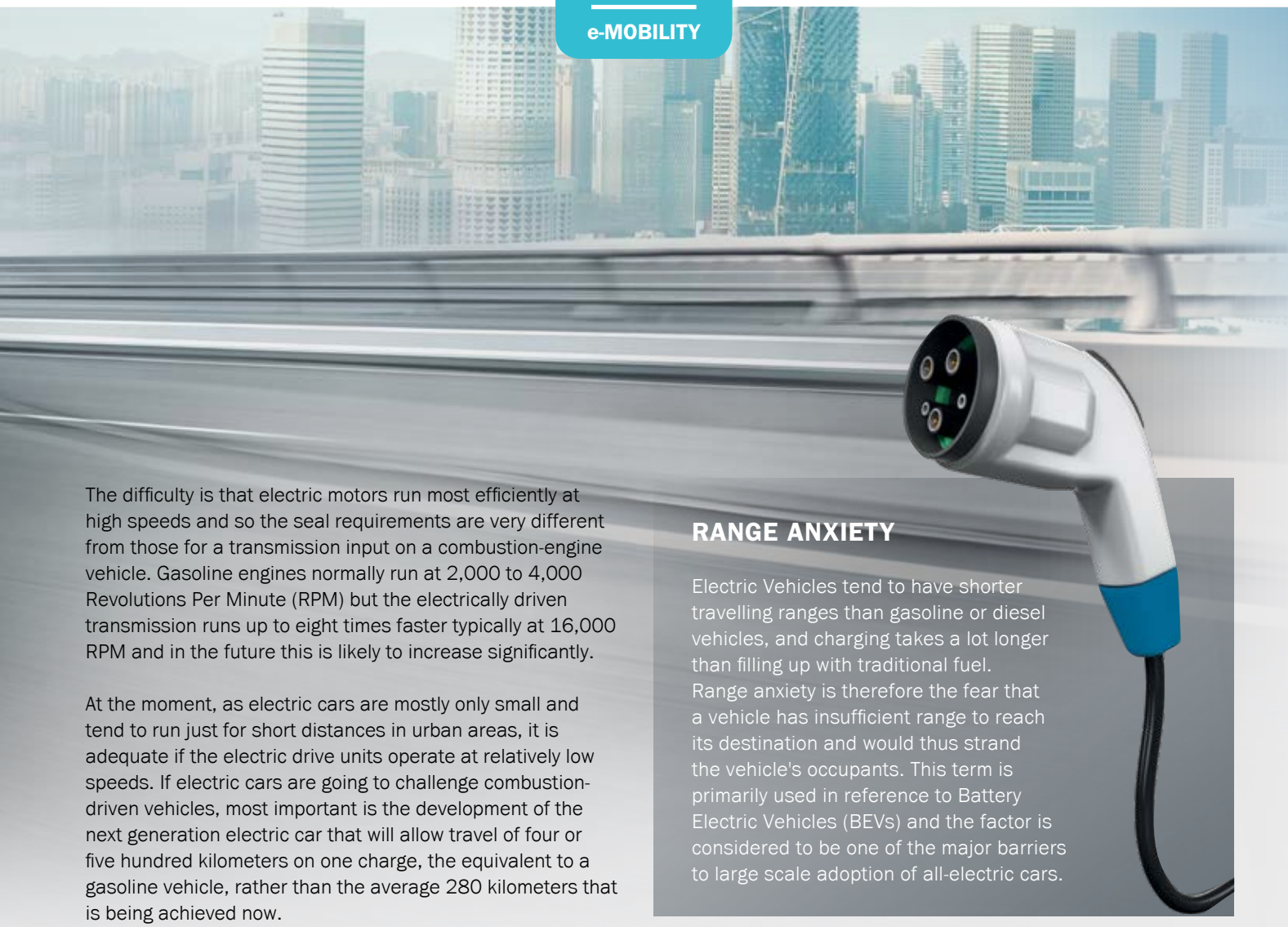
A major technology in electric vehicles is the e-axle, a combined electric motor and gearbox that fits within the traditional engine space. The motor and gearbox are directly coupled, but while the gearbox requires efficient lubrication, it is essential that the motor remains dry and so a highly reliable seal is required between these two components.

THE SOUND OF SILENCE

The advantages of electric vehicles are not just confined to sustainability but health protection too. Though limited international statistics exist, according to the World Health Authority about 40% of the population in EU countries is exposed to road traffic levels exceeding 55 db(A), while 20% is exposed to 65 db(A). These noise levels are considered detrimental to health.



Electric vehicles are one of the solutions that could cut down urban noise. For example, a low-floor, diesel-driven bus starting from a bus stop would emit 72dB of noise, while the equivalent electrically driven vehicle would emit 56dB.



The difficulty is that electric motors run most efficiently at high speeds and so the seal requirements are very different from those for a transmission input on a combustion-engine vehicle. Gasoline engines normally run at 2,000 to 4,000 Revolutions Per Minute (RPM) but the electrically driven transmission runs up to eight times faster typically at 16,000 RPM and in the future this is likely to increase significantly.

At the moment, as electric cars are mostly only small and tend to run just for short distances in urban areas, it is adequate if the electric drive units operate at relatively low speeds. If electric cars are going to challenge combustion-driven vehicles, most important is the development of the next generation electric car that will allow travel of four or five hundred kilometers on one charge, the equivalent to a gasoline vehicle, rather than the average 280 kilometers that is being achieved now.

Component development is important

"The rotational speed limit for traditional seals in the e-axle of today's electric cars is around 30 meters per second," says Paul Taylor, Product Line Director. "The theoretical optimum rotational surface speed of the e-axle would be greater than 60 meters per second to maximize efficiency, a speed that is currently impossible to achieve.

"Our aim for the new e-Mobility seals was therefore to increase operating rotational speed to at least 40 meters per second. Friction capabilities needed to be optimized too as they are a contributing factor to system performance."

Overcoming minimal lubrication

In the gearbox side of the electric drive system, lubrication can be very limited; there is usually just a mist of lubricant. When there is little or no lubrication, sealing is more challenging. In these conditions, rotating seals will be subject to high frictional forces and stick-slip after periods of rest, potentially causing wear and shortening the life of a seal, as well as power loss, lowering the travelling range of the vehicle. →

RANGE ANXIETY

Electric Vehicles tend to have shorter travelling ranges than gasoline or diesel vehicles, and charging takes a lot longer than filling up with traditional fuel. Range anxiety is therefore the fear that a vehicle has insufficient range to reach its destination and would thus strand the vehicle's occupants. This term is primarily used in reference to Battery Electric Vehicles (BEVs) and the factor is considered to be one of the major barriers to large scale adoption of all-electric cars.

ELECTRIC – IS IT REALLY A NEW IDEA?

Introduced in the 1940s in response to a shortage of cart horses and a need for increased efficiency, the electric milk float became a welcome and familiar sight in the streets of the U.K. In August 1967, the U.K. Electric Vehicle Association put out a press release stating that Britain had more battery-electric vehicles on its roads than the rest of the world put together and almost all of those were milk floats.

Diversity of lubricants in the electric drive system is also an issue and not all sealing materials are compatible with or operate effectively in the media involved. In addition, the trends in lubricants used could bring up unknown challenges when water-based, dielectric and lower viscosity media come into play.

Successful rapid product development

In response to rapidly growing market demand from electrically driven vehicle and e-axle manufacturers, a rapid response project team was put together by Trelleborg Sealing Solutions. It practiced Agile Product Development to, in an accelerated way, develop an effective sealing solution for the demanding conditions of the e-axle.

"Testing of our chosen solutions was extremely positive," says Matthias Keck, Director Technology & Innovation at Trelleborg Sealing Solutions in Germany. "There was zero leakage for both seals despite the very demanding sealing conditions and HiSpin® PDR RT recorded, a 75% reduction in friction versus a standard PDR seal and proved to be capable of operating at 60 meters per second."

> "Our aim for the new e-Mobility seals was therefore to increase operating rotational speed to at least 40 meters per second."
>
> **PAUL TAYLOR,**
> *Product Line Director at Trelleborg Sealing Solutions*

"The two solutions are being launched together as HiSpin® PDR RT and HiSpin® HS40," says Sergio Amorim, Team Leader Innovation Management at the European Automotive Hub. "They both have exactly the same function but dependent on the operating parameters of the electric drive system and the customers' preferences, one is likely to suit a system better than the other. We're more than willing and able to support engineers and designers to ensure that they specify the optimum seal for their application."

Agile Product Development

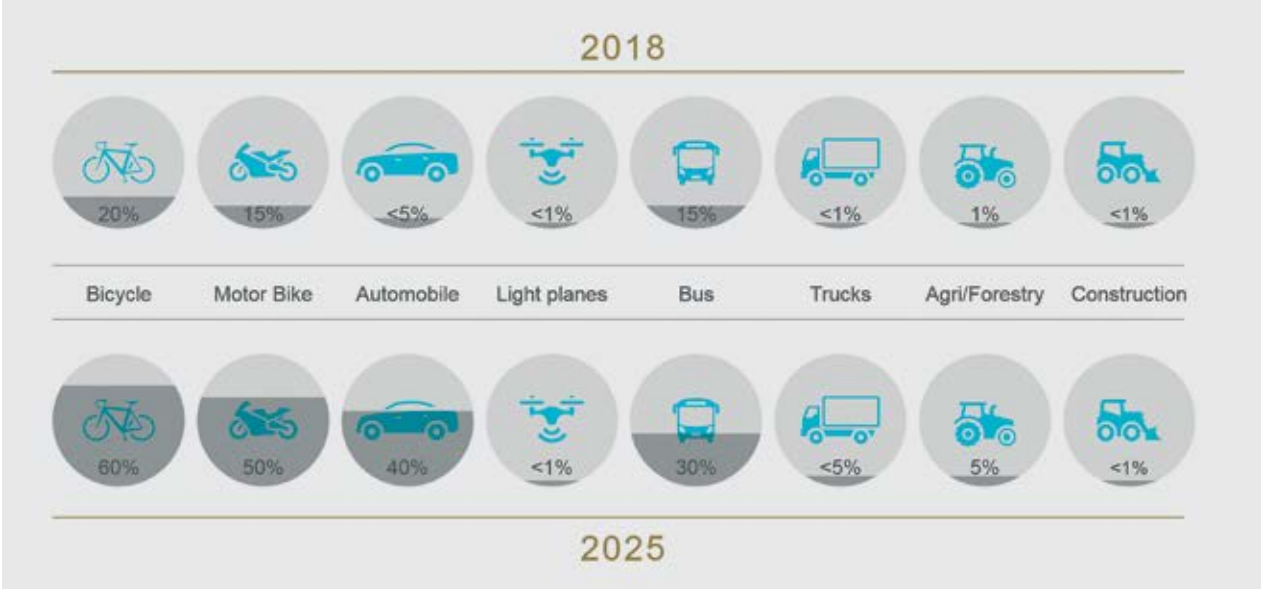
Trelleborg Sealing Solutions has been involved with electric vehicle development since their inception. Working closely with our customers, Trelleborg realized there was a need for specialized sealing solutions that could help increase the distance per charge of an electric vehicle.

The e-Mobility seal project was convened in November 2017 and a special multi-disciplinary team involving R&D, engineering, product management, manufacturing and sales was put to task to rapidly find a solution that could support the evolving electric vehicle sector. This was ready for launch in July 2018.

Clear goals

"A key to the success of the quick response team was the fact that we started off with clear, narrow goals that were defined early, including an aggressive manufacturing cost target to meet market expectation," says Colin Macqueen, Director of Strategic Initiatives - Global R&D, who headed up the seal development program.

MORE THAN JUST CARS



Most of the talk about electric vehicles focuses on the car, but e-Mobility is more than this one form of transport. At the moment, less than 5% of cars are electric, but in 2018, 20% of bicycles and 15% of motorcycles are electrically driven already. Buses are the other big early adoption success with 15% of these vehicles silently operating in urban areas, exhibition grounds and airports. Though electric cars are expected to see an unprecedented rise to make up 40% of the total global vehicle population by 2025; 60% of bikes, 50% of motorcycles and 30% of the world's buses will also be electrically driven.

Consultation with customers was vital before any designing began and a full program of detailed market analysis and customer interviews was undertaken.

"Gathering all the research results together, we identified the overall market requirements for the specialized e-Mobility seals," continues Colin. "The proposed 27 candidate ideas that were initially considered were whittled down to seven for quick screening."

Then the two most promising candidates underwent in-depth testing, which to speed the process up, took place concurrently in three R&D sites around the world; Stuttgart, Germany, Fort Wayne, in the US and Bridgwater in the UK.

Meeting market requirements

"We know that the demand is really there for this e-Mobility sealing solution and importantly, this project was grounded with a view to volume manufacturing from day one. A complete investment plan has been put in place for one million plus production volumes at target cost, so that we can ramp up to meet the rapid growth in electrically driven vehicles that is expected," concludes Colin.

MORE INFORMATION

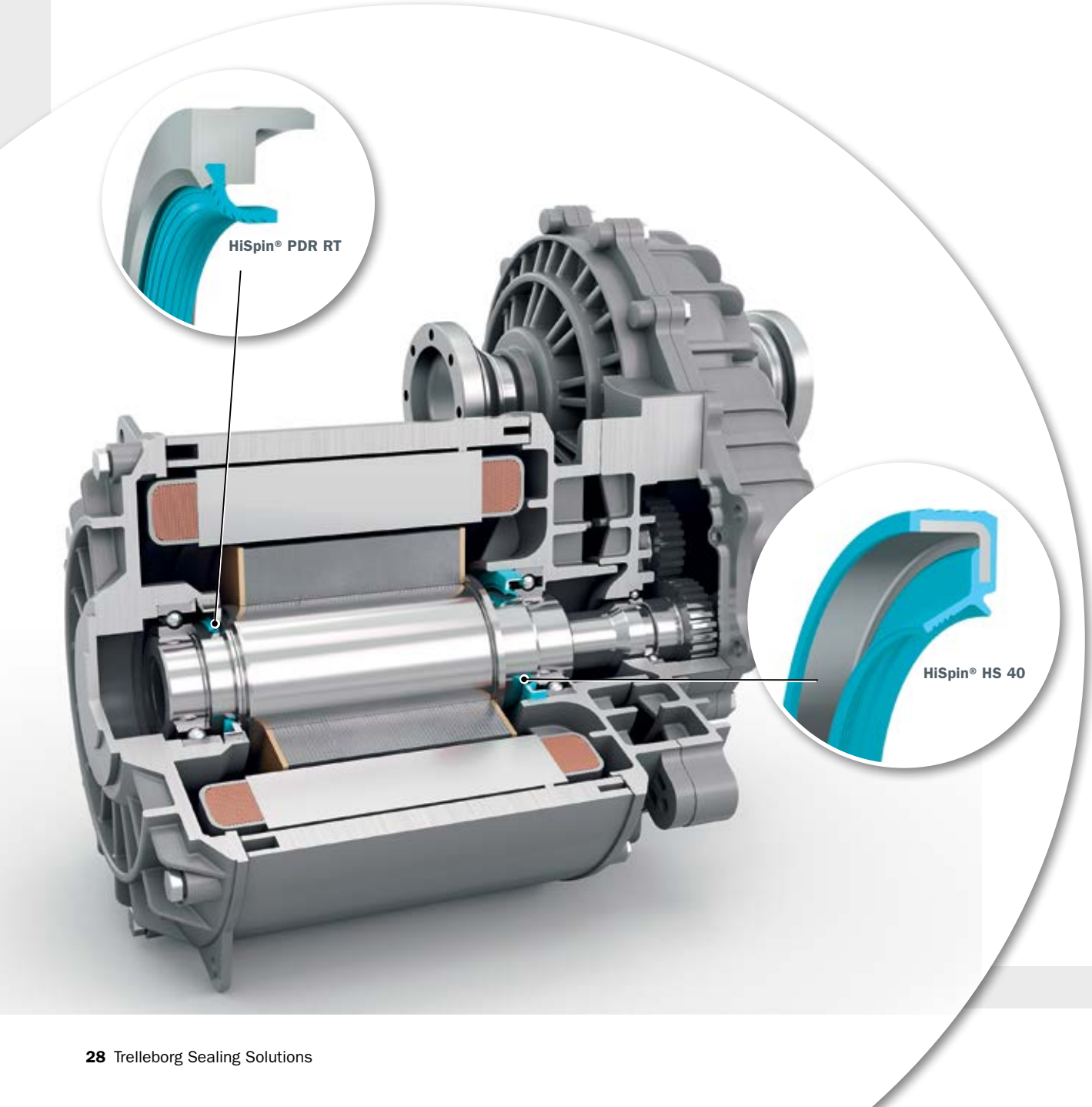
Tech Talk: HiSpin® for e-Axles

Check out the newest addition to our Technical Library: a Tech Talk on High Speed Rotary Seals for Electric Drive Units. Our online Technical Library features a collection of in-depth lectures, webinars and whitepapers on innovations in sealing technology.

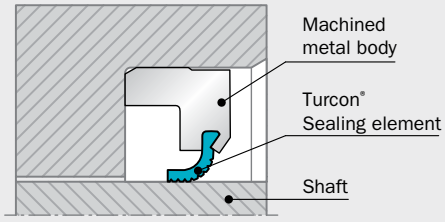
Specialized e-Mobility Sealing Solutions

Trelleborg Sealing Solutions has developed two high performance seals specifically for the e-axle in electric vehicles, a combined electric motor and gearbox that fits within the traditional axle/ differential space. The motor and gearbox are directly coupled but while the gearbox requires efficient lubrication, it is essential that the motor remains dry and so a highly reliable seal is required between these two components.

The two seals have exactly the same functions and the choice between the correct seal to specify is dependent on the operating parameters of the e-axle system.



HiSpin® PDR RT



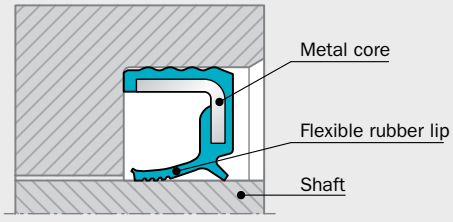
Key characteristics

- Constructed from two parts: a precision manufactured metal body and a mechanically retained Turcon® sealing element
- Custom-designed Turcon® lip with concentric slit features to improve performance of lip laydown profile on shaft, crimped into a precision machined body
- Combines the advantages of Trelleborg's proven Turcon® grade PTFE materials and proprietary RT Technology

Benefits

- Capable of speeds of 60 meters per second and beyond
- High and low temperature capability
- Ability to handle pressure
- Universal chemical capability
- Low friction coefficient
- Capable of dry running
- Prototypes available rapidly
- Available in a conductive polytetrafluoroethylene (PTFE) based grade

HiSpin® HS40



Key characteristics

- Familiar product type to automotive customers
- Unique bi-directional hydrodynamic lip feature with negligible frictional torque at high speeds
- Rubber lip geometry and flexible design for optimum lip contact on the shaft as a result of extensive FEA studies
- Manufactured using proven proprietary XLT Fluoroelastomer (FKM) compounds to meet higher speeds and a wider operating temperature range and increasingly aggressive synthetic Automatic Transmission Fluids (ATF)
- Produced using proven conventional high volume manufacturing processes

Benefits

- Capable of speeds up to 40 m/s
- Proprietary XLT FKM material provides excellent low and high temperature characteristics
- Excellent chemical resistance
- Elastomer sealing lip ensures optimum static and dynamic sealing performance
- Non-contacting dirt exclusion lip
- Ability to handle run out
- Easy to install
- Available in different outer diameter configurations, such as partially rubber covered for better assembly forces and static sealing

Optimum seal choice

Both HiSpin® PDR RT and HiSpin® HS40 are equal in terms of the performance against the important and most critical factor of torque and power consumption. Though HiSpin® HS40 operates up to 40 meters per second, HiSpin® PDR RT can operate at speeds up to 60 meters per second. Other parameters that should be considered are run out, dry running, fluid compatibility, operating temperatures and ability to handle pressure. If dry running, a wider fluid compatibility, higher temperatures and pressures are issues, then HiSpin® PDR RT should be considered as the best option. If better run out and ease of assembly are factors, then HiSpin® HS40 may be the best option. In all cases, for specific applications consult your local Trelleborg Sealing Solutions marketing company.

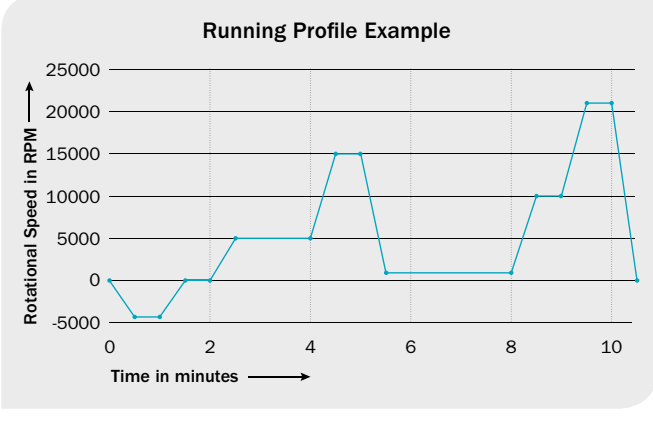
Differentiating factors	HiSpin® PDR RT	HiSpin® HS40
Surface speed	60 m/s	40 m/s
Ability to handle runout	0.05 max	0.1 max
Dry running	+++++	+++
Range of fluid compatibility	+++++	++++
Ease of assembly	+++	+++++
Temperature range	-55 °C to +260 °C	-45 °C to +200 °C
Torque/power consumption	+++++	+++++
Ability to handle pressure	+++++	+++

Outstanding test results

To ensure tests were meaningful and completely reflected market requirements, test procedures were based on multiple customer interviews and reviews of many sets of application data, as well as discussions with major Automatic Transmission Fluid (ATF) and bearing manufacturers to determine key parameters. It also involved planning for consistent testing at three locations; Stuttgart, Germany, Fort Wayne, in the US and Bridgwater, UK.

Seal Test Specification

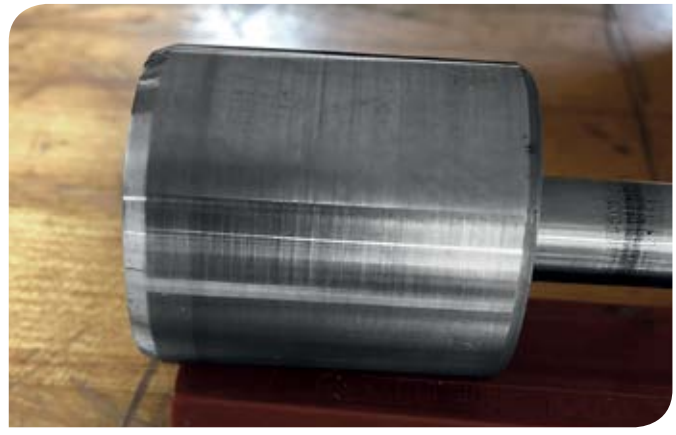
Seals were tested on a 38 millimeter shaft at rotational speeds of up to 21,000 RPM or 40 m/s in temperatures ranging from -40 °C up to +150 °C in ATF in oil mist conditions for a duration of a 500 hour accelerated load cycle test that represented real motoring conditions from reversing, city driving, cruising on an A-road, stop start in a traffic jam and on the freeway. In addition to the 500 hour cycle test, each seal has also passed over 3,000 hours in endurance testing.



Profile of 500 hour cycle test

Surface finish test results

Both HiSpin® PDR RT and HiSpin® HS40 passed the accelerated load cycle test with no leakage and no wear on sealing lip or shaft. In fact, the wear on the running surface was barely noticeable and Finite Element Analysis (FEA) results all proved positive.

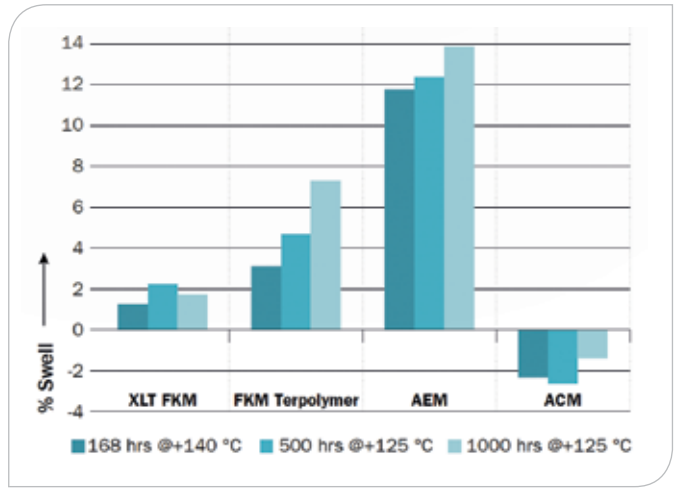


A seal test shaft following completion of a 500 hour accelerated load cycle test looks almost new

Material test results

As HiSpin® PDR RT is made of Turcon® QD1, which is compatible with virtually all media, no additional material tests were required for the project.

HiSpin® HS40 is manufactured from proprietary XLT FKM elastomer. This underwent long term immersion in ATF commonly used in electric drive systems for 168 hours at +140 °C and, 500 and 1,000 hours at +125 °C. Compared against terpolymer FKM, ethylene acrylic rubber (AEM) and acrylic rubber (ACM) materials, the XLT FKM demonstrated significantly less volume change with excellent retention of chemical and mechanical properties.



Aging in Mobil LV ATF HP - Volume Change (%)

Two Heads are Better than One

In oil and gas exploration, avoidance of downtime is critical, which is why equipment manufacturers are continually looking to enhance the solutions they offer to operators. Rather than working alone, these manufacturers use the specialized expertise of suppliers to stretch the performance boundaries of their equipment. And that is exactly what LB Bentley did when it developed its latest rotary gate valve.

LB BENTLEY IS A SPECIALIST IN CREATING SMALL BORE VALVES for subsea applications that introduced the now standard subsea rotary gate valve into the market in 1998. As subsea oil and gas exploration becomes increasingly challenging, the company realized a highly specialized gate valve that met a wide range of extreme working pressures and operating conditions was needed and development has resulted in its new Medium Duty Rotary Gate Valve.

Custom solution

On this valve, LB Bentley worked in close partnership and with support from Trelleborg Sealing Solutions. To meet demanding requirements, Trelleborg developed a custom version of Turcon® Variseal® MC with high pressure extrusion resistance and back-pressure protection in NORSOK M-710 compliant PTFE and PEEK materials to provide the main stem sealing function. In order to cater for subsea use, Trelleborg's Turcon® Glyd Ring® T was selected as a contaminant exclusion seal. The solution demonstrates pioneering stem sealing technology that reduces the risk of contamination and failure while maintaining a high level of reliability.

TURCON® VARISEAL® MC

The seal was developed to replace multiple chevron seals or V-Stack type products in subsea valve stems that require a high-integrity sealing capability. It includes a series of single-acting spring-energized seals housed within a U-shaped Turcon® polytetrafluoroethylene (PTFE) based material seal profile. The unique single-piece design significantly improves sealing integrity and leak tightness in high-pressure applications by providing higher contact force across multiple seal hardware interfaces.

Turcon® Variseal® MC advantages and benefits:

- Good static and semi-dynamic sealing effect
- Reduced friction under high loads
- Almost universal chemical compatibility
- Permanent elasticity unaffected by contact with chemicals
- Available with anti-extrusion Back-up Rings for service in extreme conditions where single or double extrusion gaps are present
- Withstands aggressive and abrasive process media
- Unlimited shelf life
- Compact form and single piece installation, ideal for replacing multi-piece packing and sealing systems
- No external preload required
- Resistant to compression set and the need for re-tightening
- Special sizes and geometries available

"Throughout the development process, we constantly had to think about safety issues and challenges that are frequently faced when working with vital subsea equipment," says Antoine Charrier, a Key Account Manager at Trelleborg Sealing Solutions "We pride ourselves on innovation and relished this opportunity to work with LB Bentley, developing innovative stem sealing technology that reduces the risk of contamination and failure."

A key partner

LB Bentley works hard to meet its customers' needs, striving toward continuous improvement. "That means the qualification status of our products is constantly developing. This enables us to offer an expanding range of fully qualified products and we're immensely proud of the Medium Duty Rotary Gate Valve that Trelleborg has been a key partner in helping us to develop," says, Noelle Sears, Design Engineer at LB Bentley.

INNOVATOR IN GATE VALVES

LB Bentley is based in Stroud, England, and introduced the now standard subsea rotary gate valve into the market in 1998. Since then, the gate valve has gained universal acceptance throughout the industry and has become the product of choice globally, with many customers preferring and trusting this design over traditional needle, ball and slab type gate valve designs.

With an unparalleled experience in the design and manufacture of rotary gate valves, together with a simplicity of operation, LB Bentley's gate valves have been proven to be hugely reliable in service. A wide range of sizes, pressures, materials and interfaces are available from 3/8 inch through to 1 inch nominal bore, up to 15,000psi (1,034 bar) in both FF and HH trims. Designs are qualified to API 6A 20th Edition and API 17D 2nd Edition for the temperature range -29 °C to +150 °C, to a water depth of 10,000 feet.

The innovative Medium Duty Rotary Gate Valve, developed with the support of Trelleborg Sealing Solutions, incorporates minimal moving parts and an efficient quarter-turn mechanism that is operated manually. It exceeds the requirements of the two key industry standards of API6A and API 17D.

TURCON® GLYD RING® T

This seal is the one recommended for double-acting sealing for hydraulic components and is particularly suited to heavy duty and large diameter applications. Within the seal, both lateral profile flanks are inclined so that the seal profile tapers toward the seal surface. It can therefore retain the typically robust and compact form of piston seals without losing any of the flexibility required to achieve a pressure-related maximum compression.

The edge angle created by the cross-sectional form of Turcon® Glyd Ring® T permits an additional degree of freedom of movement and enables slight tilting of the seal. The maximum compression is thus always shifted toward the area of the seal edge directly exposed to the pressure. On the lower-pressure edge of the seal, the Glyd Ring® T exhibits only zones with neutral strains without compressive or shearing loads. This effectively reduces the danger of gap extrusion.

Turcon® Glyd Ring® T advantages and benefits:

- High sealing efficiency with low wear and long service life
- High operational reliability with low friction and stick-slip-free operation
- Simple groove design suitable for easy installation even in narrow grooves
- Design flexibility – adaptable for almost all groove sizes
- Custom designs available
- Bi-directional seal
- Very good static leak-tightness
- Increased clearance possible of approximately 50 percent, depending on the operating conditions

Growing with the Customers

The Trelleborg Sealing Solutions facility in Shanghai, China, is looking to expand as more business comes in. The site is already preparing to increase its floor area and there could be more to come.

Text: Jan Hökerberg, Photo: Marcos Romano

SINCE THE INAUGURATION OF TRELLEBORG'S SEALING SOLUTIONS FACILITY in Shanghai in 2006, the company has steadily expanded its business, growing it almost ten-fold. However, Managing Director Oliver Chan, who has been the head of the marketing operation since start-up, and General Manager, Tony Yin, who has spearheaded the facility's manufacturing for almost ten years, are not settled with that. Instead, they are targeting further expansion.

Expanding production

"We have several options for the future," says Yin. "One is to expand within our own facility, and that is already happening, another is to expand in the neighborhood of our site. A third option could be to set up a second facility somewhere in central China."

Preparations are already in place to increase the floor area of the current Shanghai facility by 30 to 40 percent.

"Several high-end industries that are located in Shanghai are expanding very quickly, so we need to have more space when we bring in more production equipment here for the aerospace, the polytetrafluoroethylene (PTFE), the healthcare & medical, and air compressor businesses," says Yin.

Many of the customers in these segments are located in or nearby to Shanghai. →

IN SHORT

1. Trelleborg Sealing Solutions in Shanghai, China, was inaugurated in 2006
2. Since then it has changed and grown to meet customer requirements
3. With many opportunities, further expansion is planned

> "We have now trained a lot of people in our Shanghai facility and they are one of the most valuable assets in the company."

TONY YIN,
General Manager, Trelleborg Sealing Solutions in Shanghai

Shanghai is a hub

"Location is important in China," Chan says. "The brand of the city correlates to the brand of the company. Shanghai is the number one city in China and it has a strong industrial history. It is also the hub of the eastern part of China. Many of our customers are nearby and it is rather easy to find talent here."

However, over the past couple of years, many Chinese companies have moved from the east to central China because of the lower labor cost there.

"Shanghai remains a strategic position for us, we need to be here. But customers within, for example, infrastructure and railway have now moved to central China, so one consideration for the future is if we shall follow them there," says Chan.

Meeting local customers' needs

The Trelleborg Sealing Solutions facility in Shanghai was inaugurated in 2006. It was Trelleborg's first greenfield site in China.

At the beginning of the operations, Trelleborg went through a process of establishing the right products for the facility. Product lines were tried and phased out while others were brought in that fitted the local customers' needs better.

The customers have also changed. In the beginning, they were mainly from the automotive and industrial sides. Over the past two or three years, the aerospace business has grown very quickly, both for global and local customers.

> "Recently, it has been a really successful expansion for us in aerospace in the China market."

OLIVER CHAN,
Managing Director, Trelleborg Sealing Solutions in Shanghai

GROWING WITH THE CUSTOMERS

Since the inauguration of Trelleborg's sealing solutions facility in Shanghai in 2006, business has expanded almost ten-fold. But Managing Director Oliver Chan, head of marketing operations since start-up, and General Manager, Tony Yin, head of manufacturing for almost 10 years, want to expand further. Preparations are already in place to increase the floor area of the current Shanghai facility by 30-40 percent. Other options, including another facility somewhere else in China, are being considered. Meanwhile, the Trelleborg facility has gradually been moving to more automation to optimize production efficiency, while also maintaining its focus on cultivating human talent.

New opportunities

"Recently, it has been a really successful expansion for us in aerospace in the China market. The same thing goes for healthcare and medical, in which we have invested resources," says Chan.

"We also see new opportunities, such as in the semiconductor industry," he adds. "At the moment, we are moving along with the government policy to build competence and find people suitable for this industry. In China, it is important to understand the country's growth initiative and always try to grow with the country."

Over the years, the Trelleborg Sealing Solutions facility has gradually been moving to more automation with the ambition to optimize production efficiency as well as process control.

People are key

"However, for the expansion plans, one critical point is people. We have now trained a lot of people in our Shanghai facility and they are one of the most valuable assets in the company. They are not easy to replicate if you set up somewhere else," Yin says.

Skill is important since, as Chan says, "we'd like to be a problem solver for the customers. When customers need to upgrade their products they need support from us and then we bring our local R&D team there to look for solutions."

Digital Update

Tour our Facilities

Manufacturing facilities are fascinating places – filled with different technology and machinery; the place where product designs turn into reality.

We want to make it possible for customers to visit our manufacturing sites virtually and to see how products are made and offer several films on various manufacturing facilities. Why not take a tour?

Newest addition: Trelleborg Sealing Solutions Malta
Our manufacturing facility in Malta specializes in O-Rings and Engineered Molded Parts. In this film, you'll learn about the processing capabilities and services we offer to deliver the product you need.

This inside view guides you through the manufacturing process from start to finish, beginning with the mixing facility and laboratory for the development of new material compounds, through to the coating facility, in which advanced coatings are applied to reduce friction and ease assembly.

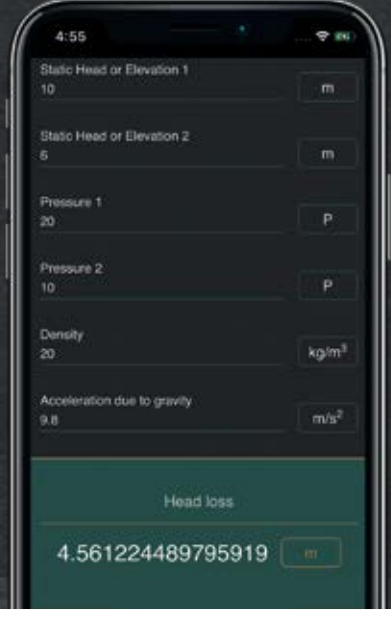
Not quite as many films as Netflix, but we're trying!
We've produced an extensive number of films including some cool animations on our products and industries. You can find them all at www.tss.trelleborg.com by going to Films & Animations under "Films & Resources".

Fluid Mechanics Calculator App Now at Your Fingertips!

We've launched the Fluid Mechanics Calculator App to support fluid thinkers such as students, engineers, analysts, researchers or those curious to learn about fluids. This app will help you find information on a variety of topics as well as help in analysis, design, maintenance and operation of fluid related systems.

Frequently used in automotive, aviation, geology, space, biological applications, petroleum, marine systems, and cylinder manufacturing, this app will provide results for different fluid mechanics, civil, structural, pipe flow and engineering parameters.

The app allows you access more than 130 formulas as well as over 360 methods of calculation, with the ability to change the subject of the formula based on the variable you are calculating. The formula applied is then displayed in the app. You can also easily calculate answers. Just key in the numbers, set units and see results.



The app accepts your input and will provide results to the highest mathematical precision and in up to three conversion units. Finally, you can make easy markups to recall information in the favorites section and seamlessly hop between the metric and the US (inch) unit systems.

The Fluid Mechanics Calculator App is available for download for iPhone and iPad and Android. (Currently not available on Android tablets)

Access a Variety of Whitepapers, Lectures and Webinars in our Technical Library!

Easily accessible on the Trelleborg Sealing Solutions website, the Technical Library offers a collection of lectures, whitepapers, technical articles and webinars covering various industries and sealing technology topics.

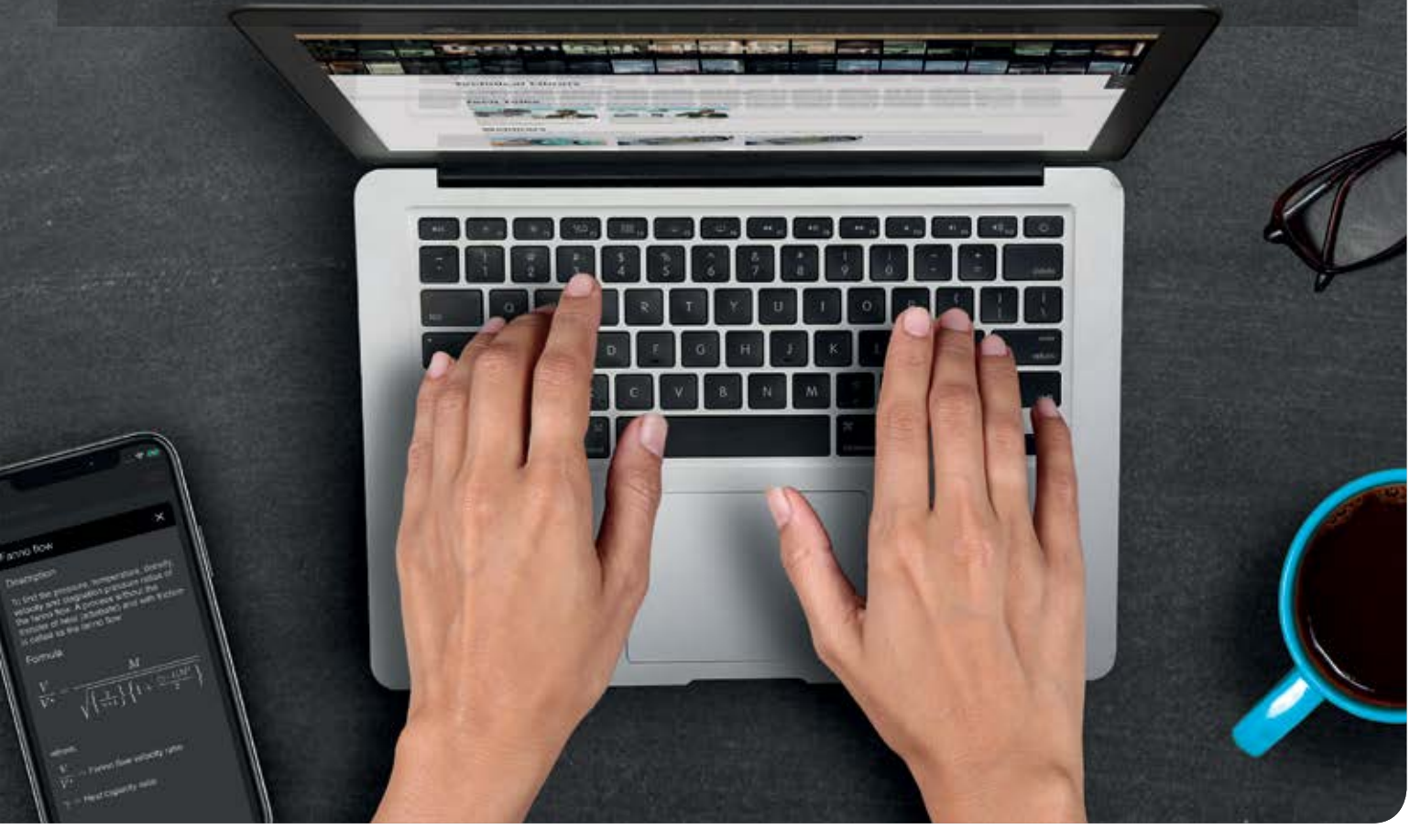
- **Tech Talks**
  The latest addition to our Library are Tech Talks. These feature sealing technology experts holding lectures on the latest industry innovations. One highlight is the talk on HiSpin® for e-Mobility, innovative seals that aim to extend the traveling range of electric vehicles.

- **Whitepapers**
  When you are looking to learn more about innovative sealing technology developments and engineering products, this is the right place for you. Some examples of our latest whitepapers include topics such as: Lubrication Management, Drug-Eluting Devices and Testing of HFC Fluids.

- **Technical Articles**
  Our Technical Articles section focuses on expert articles on a variety of sealing technology topics.
  Some of the publications featured in this section include Medical Design & Outsourcing, Hydraulics & Pneumatics, Flow Control among others.

- **Webinars**
  An education resource on a variety of topics in sealing technology this section covers targeted topics taught by experts in their field.
  Some of the topics covered in the webinar section include Cassette Seals and Lubrication Management Webinars.

To browse our collection of tech talks, whitepapers, articles and webinars, go to www.tss.trelleborg.com. You'll find the Technical Library under "Tools & Resources"



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Find out more by visiting www.tss.trelleborg.com/accelerate or scanning the QR code.

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