

Innovation drivers



Rubber manufacturers to the fore in enabling the automotive industry to enhance the safety, performance and sustainability of vehicles

Automotive industry demand for new safety technologies, particularly in the battery compartments of electric vehicles (EVs), is driving innovation and business strategies among rubber component and systems manufacturers.

At the forefront of this trend,

Freudenberg Sealing Technologies (FST) is ramping up production of its pressure compensation elements, designed to enhance the safety of EVs – a move in response to substantial new orders for its DIAvent HighFlow elements.

FST started developing the DIAvent range in 2017 to provide intelligent pressure compensation elements that merge pressure-equalisation and emergency degassing into a single unit.

The range extends from basic light-ventilation to 'high-flow' elements that integrate bi-directional pressure-compensation

with emergency degassing into just one component.

The high-flow unit is said to be unique in the industry: balancing air pressure variations in the battery housing and ensuring degassing in cases of thermal runaway.

Also, according to FST, the component occupies 50% to 70% less space than similar solutions and is significantly lighter due to its plastics housing.

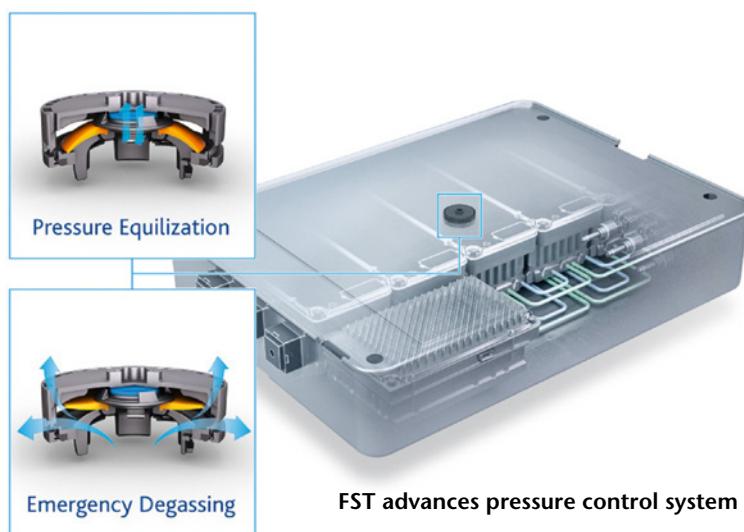
In addition to being more cost-effective than traditional parts, the component is also claimed to simplify installation and reduce supply-chain complexity.

Moreover, it supports the use of batteries with higher power-density: helping to meet demands for enhanced range, performance and safety in battery-powered vehicles.

In order to meet "huge demand" – including a particularly large order from a major Asian player and another from a US automotive group – FST said it "rapidly tripled" production capacities for DIAvent products.

"We are particularly thrilled about [the] series production order from the US, which is unprecedented in DIAvent's brief history," commented Ralf Schmid, SVP special sealing division.

FST launched its first fully au-



tomated high-tech production cell for the 'high-flow' product in Reichelsheim, Germany at the beginning of 2023. A structurally identical twin followed in December at the same production hall.

Due to space constraints in the location, a third DIAvent production line will be operational at FST's Berlin facility, in the first half of 2024.

The German sealing specialist also aims to start up "at least one additional production line" in early 2025 at its North American site in Shelbyville, Indiana, to fulfil the large US order.

EV sealing advances

Altdorf, Switzerland-based Datwyler has highlighted its newest sealing technologies for e-powertrains, with particular focus on three specific products: a housing gasket, an oil baffle and an LSR 2K gasket.

The new technologies have been developed in response to the increasing global demand for EVs and ramp-up in industry investment focused on the e-powertrain.

The Swiss polymer group has now developed a range of two component (2K) housing gaskets, providing 'high quality sealing solutions' for e-powertrains.

The housing gasket is a key part of the e-powertrain, serving a number of purposes such as sealing the transmission and preventing the release of oil.

It also separates sections of the upper and lower housing of the invertor to prevent contamination from external particles or liquids.

Produced to customer specifications, Datwyler's housing gas-



Datwyler develops new sealing technologies for EVs

kets include "customised full-rubber gaskets, LSR 2K gaskets, and edge-bonded gaskets".

Edge-bonding, Datwyler explained, involves bonding an elastomer seal to an aluminium or steel carrier, forming a robust part that ensures a longer lifetime than traditional rubber gaskets.

Edge-bonded gaskets also offer "a compact sealing interface", where a recess for a press-in-place gasket is not possible, the Swiss manufacturer added.

Another key component of an e-motor on which Datwyler is focusing is the oil baffle, which controls the flow of oil within the powertrain.

Working together with the housing and rotor, it distributes oil through small holes in its plastic ring to increase lubrication, decrease noise, and reduce the temperature of the e-motor.

Inside each oil baffle, Datwyler noted, there are two rubber seal-

ing rings that enable the oil within the chamber to achieve the required pressure.

"These sealing rings need to be highly resistant to temperature as well as oil to provide long-term reliability," it explained.

Furthermore, the Swiss supplier has invested heavily in liquid silicone rubber 2K parts, which is a "relatively new" sealing technology that eliminates the requirement for rubber and plastic components to be assembled.

This reduces the time needed for manufacture of the e-powertrain as well as the costs and number of suppliers in the supply-chain.

A combination of plastic and rubber moulded together tightly, LSR 2K parts can be cost-effective and lightweight, while being 'highly rigid'.

This, according to Datwyler, makes assembly quicker and more

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accurate in automated systems to reduce potential errors.

To conclude, Datwyler noted that without a "flawless performance" of these sealing solutions, the e-drive 'is not ensured, which could lead to high costs of failure and major risks for drivers and passengers.'

Circular suspension

Meanwhile, Trelleborg and Celanese have developed a new jounce bumper to meet the sustainability and circularity requirements of the automotive industry in terms of current regulatory and consumer demands.

The Hytrel thermoplastic elastomer suspension component, they said, can integrate up to four parts into one, making it both durable and recyclable at the end of a vehicle's life.

"During the past year we've



Trelleborg, Celanese introduce sustainable suspension unit

seen increasing numbers of our customers come to us to see if we have new solutions to help them be more sustainable," said Thomas Leblois, who heads up the Trelleborg boots operation.

According to the Trelleborg offi-

cial, an area of the car that is now subject to manufacturers' sustainability ambitions is suspension.

Jounce bumpers are components within the suspension system that absorb impact and dampen noise and vibration.

Dielectric elastomer link-up

Automotive applications are among the target areas for Swiss group Datwyler, which has linked up with materials supplier Momentive and German computer company BSC Computer to develop dielectric elastomer-based industrial actuators.

Until now, said Swiss engineering group Datwyler, the technology based on electroactive polymers (EAP) was primarily "known only in the research environment."

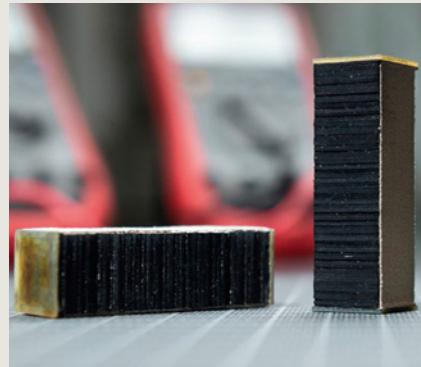
The collaboration between the three industrial partners "will provide an avenue to transfer the technology into serial production in 2024", added the group's 5 March release.

Working with key customers, the trio have paved the way to integrate EAP technology into applications, such as energy-efficient, robust, and sustainable linear actuators.

As part of the roll-out, the partners presented a development kit for dielectric elastomer actuators for the first time at CES 2024 in Las Vegas, Nevada, in January.

The base EAP material was developed and is now being produced at Momentive's site in Leverkusen, Germany.

Manufacture of the DEA stacks, based at Datwyler's Schattendorf, Switzerland unit, is slated to ramp up by



mid-2024 on an automated in-house developed production line.

Meanwhile, Allendorf, Germany-based BSC Computer is manufacturing the electronic control units that 'optimally supply the actuators with the necessary high voltage'.

The control units are also designed to provide an "easy-to-integrate digital interface" between the linear actuator and the application.

In addition, BSC Computer is supporting end-users with mechatronic integration of the EAP actuators for market applications.

Explaining the technology, Datwyler said the solution digitises EAP technology, using data obtained via the control unit and through IoT networking of products.

"This facilitates continuous and sustainable optimisation of end products – from the base material to the stacks and the end customer application," Datwyler stated.

Advantages, it noted, include: low energy consumption, reduced mechanical parts, lower component weight and volume, robust design, silent and controlled actuation operation.

The collaboration will help Datwyler industrialise "elastomer-based sealing solutions", commented Dr. Anette Wiesmath, head of the EAP unit at Datwyler.

For Holger Albrecht, VP head of the elastomers division at Momentive, the collaboration is providing insights into the use of dielectric elastomers in end-customer applications.

"In the medium term, networking EAPs with the IoT can be the cornerstone for the digitalisation of our business models," Albrecht commented.

The partnership is "closing the gap between basic EAP technology and real applications", said Joerg Hofmann, managing partner of BSC Computer GmbH.

Customers, suggested Hofmann, could include OEMs in the industrial, automotive and medical industries.

They prevent metal shock absorber springs from fully compacting during impacts caused by potholes or sharp manoeuvres, thereby preventing damage to the car.

Jounce bumpers are usually made up of crosslinked polyurethane foam, Trelleborg explained in a 15 Jan statement.

But the new solution from Trelleborg and Celanese uses a blow-moulded, hollow Hytrel thermoplastic elastomer.

The product does not require a separate base cup or ring and has integrated dust protection, Trelleborg stated.

It has a snap-fit assembly for greater durability and eliminates contact with the strut, so there is no added friction, abrasion, or noise, the company added.

In tests, the product has been shown to perform with a high level of consistency over temperatures ranging from -40°C to +140°C, while retaining its compression.

Trelleborg claims vehicle comfort, safety and handling remains "just the same" as traditional jounce bumpers.

Celanese developed the material and designs and holds a patent for the technology.

Trelleborg said that it has the expertise and machinery to manufacture the parts at scale.

Finding brands to adopt the new technology will be the next challenge, according to Leblois.

Though eager to find new solutions, the industry is generally risk averse and conservative when it comes to the adoption of new products, he noted.

"Convincing OEMs to move to a new technology is always challenging, but as soon as you open the door the rest of the industry tends to follow," said the Trelleborg manager.

With sustainability demands "now so serious", Leblois concluded by saying that he is confident that the new technology will find adopters.

Cool integration

Automotive fluid handling systems supplier Cooper Standard has developed the 'integrated coolant flow manifold' (ICFM), designed to make EVs affordable and help increase vehicle range.

The "streamlined solution" in-



Streamlined coolant system

tegrates fluid tubing, adaptors and connectors into a compact module, thereby reducing the number of parts and eliminating "up to 11 customer assembly connections."

The ICFM is stated to improve fluid-handling efficiency and performance, while occupying 50% less packaging space compared to traditional fluid routing products.

Additionally, this design alternative provides enhanced customer assembly through improved operator access, reduced connections and ergonomics, continued Cooper Standard.

"Over 1.6 metres of tubing and associated fittings are eliminated, leading to significant weight savings from the actual components," said the company, adding that the design reduces excess coolant fluid mass by over 0.34kg.

ICFM, it concluded, "distinguished itself from a 'one-size-fits-all' approach by offering a customised solution that is specifically designed to meet customers' unique application needs and engineering challenges."

Recycling guaranteed

Back on the sustainability front, Kraiburg TPE of Waldkraiburg, Germany has developed a range of thermoplastic elastomers (TPEs) that contain at least 73% recycled content.

The new 'recycling content TPE for automotive' series has been designed to fulfil "a variety of technical applications," said Kraiburg TPE in a press statement.

The recipe developed by Kraiburg TPE combines various recycled raw materials, which the compounder says "guarantees at least 73% recycled content over a range of hardness ratings (20 to 95 Shore A)".

Compared to equivalent virgin compounds, the compound represents a 25% reduction in carbon footprint, Kraiburg TPE added.

Other beneficial properties include "a soft-touch surface and controlled level of emissions and odour, making the range suitable for automotive interiors."

The compounds are also claimed to meet the requirements of other automotive interior, exterior and powertrain applications – including inlays/anti slip mats, cowls, running-board mats and air-guide elements.

In its announcement, Kraiburg TPE said it had signed a supply agreement with e-mobility supplier Tessi Supply, which will use the grades to produce inlay cases and floor mats.

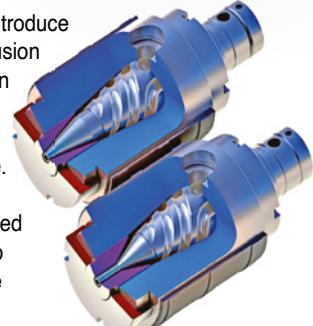
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The latest material will replace current 'interior PIR TPE ranges' this year and be available to customers in the Europe, Middle East and Africa region.

According to Kraiburg TPE, all recycled raw material components have been "carefully researched and developed to provide more sustainable gains without sacrificing on performance."

The new elastomers are said to respond to demands from automotive manufacturers facing increasing regulatory and public pressure to switch to sustainable materials.

For instance, said the company, new EU regulatory proposals on circular vehicle design and end-of-life vehicle management target a recycled-material average of 25% per car.

This should also include a 6.25% content from closed-loop post-consumer recycled (PCR) sources, added Kraiburg TPE, noting that it also provides carbon footprint values for such materials.

C0₂ footprint tracker

Suppliers of moulded rubber products to the automotive industry could benefit from a new app developed by Desma to give moulders a detailed overview of the factors that determine the CO₂ footprint of individual moulded rubber articles.

The Desma PCF Navigator Ecos also shows which measures can be used to achieve which reduction effects, says the rubber injection moulding machine maker.

The specially developed app "thus makes an important contribution to understanding the connection between all influencing factors," according to an article on the Desma website.



New TPE to meet recycled-content requirements

The technology, it added, enables quick decisions to be made "on the optimum production process [with information] on the range in which the individual CO₂ footprint of the article to be produced will be."

In addition to the specific data of the respective machine type,



Desma's new CO₂ tracker

the PCF Navigator Ecos contains a database with suggested values for a wide range of elastomer types.

The Desma CoolApp is fully integrated to verify the use of cold runner technology, so that the actual material and cycle time savings can be taken into account as realistically as possible.

Calculations depend on the selected nest layout and the selected cold runner, said Desma, adding that the additional energy consumption due to both cold runner operation and its production is also taken into account.

Additional input fields for manual data entry are provided in order to take into account any upstream or downstream production steps and their CO₂ impact.

Zhongding starts up auto parts plant in Brazil

Chinese automotive components major Zhongding Group has signed an agreement to build an R&D centre and a chassis production plant in the central Chinese city of Xi'an.

To be carried out by subsidiary Anhui Zhongding Sealing Parts, the project will be located at Xian Economic and Technological Development Zone and will involve an investment of Yuan2 billion (€257 million).

The intelligent chassis parts production project will focus on air suspension systems, body bushings, suspension isolation, sealing systems and other rubber parts.

The project is intended to help accelerate the growth of the automotive industry chain in the region, said Xi'an's local government in a 3 Feb statement.

The statement did not provide de-

tails on the capacity or the size of the plant.

The R&D centre will be focused on "matching design, parameter optimisation, R&D and trial production of lightweight forged aluminium steering knuckles."

The centre will also work on other multi-system control units to provide overall chassis solutions that offer "stability, safety and comfort."