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Unravelling the **SOFTWARE** labyrinth inside vehicles

## PCTC LINE

for the whole family

expands into finished vehicle logistics

# ER&D

services companies helping OEMS to rapidly transform

## Partnerships and collaboration needed for transition to electric vehicles



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"Suppliers producing plastic components for automotive applications need to help their talented materials engineers acquire the new knowledge necessary to develop materials specific to electric vehicles."

- Martin Jung, president of BASF Performance Materials. Page 6

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# Contents

### Consumers opting for intelligent suspension for smoother ride

Page 16

| Intro – Be nimble to survive4  |
|--|
| BASF - Making eMobility a Reality6   |
| Hexagon - Adapting to the new manufacturing world order                                  |
| Harman - Personalized and enhanced in-car media for the whole family                     |
| DOMO – DOMO Service Hub  |
| Tenneco - Consumers opting for intelligent suspension for smoother ride                  |
| DSM - Consumers will dictate technological developments in mobility18                    |
| Speira – Aluminum holds the key to lithium-ion battery cells                             |
| Hydro Extrusions - Covid boosts demand for aluminum22                                    |
| HARTING – the power behind the brand24   |
| L&T - ER&D services companies helping OEMS to rapidly transform                          |
| BorgWarner - Managing the globally uneven transition from ICE to EV28                    |
| Rohde & Schwartz - Testing automotive ultra-wideband applications of the future30        |
| Sallaum Lines - PCTC line expands into finished vehicle logistics                        |
| Port of Koper - Value-added Mediterranean port gateway for Far Eastern vehicle exports34 |
| Xperi - In-car safety systems a priority for new vehicle buyers                          |
| SIKA - Sustainability and innovation complement each other                               |

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intro

Business consultants and strategists have coined the phrase "only the nimble survive". It should be on the wall of OEM bosses around the world.

# Be nimble to survive

Contributors to this issue of Automotive Industries point out that traditional market leaders are being overtaken by more nimble newcomers which do not have the corporate baggage and systems built up over 100 years of technical improvements and innovation. The automotive industry thrived within its own ecosystem.

So much so that most countries which have auto industries put it in a separate manufacturing category. It enjoys special treatment and incentives because of the value it adds and the jobs it supports.

The cozy relationship with governments has come to an end, however. Regulators around the world are forcing the industry to go green and to replace the internal combustion engine with electric or fuel cell power trains.

More than 14 countries, as well as parts of China and 20 cities globally, are in the process of banning the sale of vehicles powered by fossil fuels. Recently, the U.K.

#### **Editor, Ed Richardson**

announced that the sale of vehicles running purely on petrol or diesel would be banned 2030. A total ban on fossil-fueled vehicles is planned for 2035. In May 2021 the governors of 12 states urged the U.S. President to take "bold federal leadership" to ensure all new cars sold from 2035 were zero-emission, according to Steve Bell of the Informa Technology Automotive Group.

Change and disruption have aroused the interest of the investment community.

McKinsey & Co researchers Russell Hensley, Kevin Laczkowski, Timo Möller and Dennis Schwedhelm estimate that, since 2010, investors have funneled US\$280 billion into innovative automotive hardware and software solutions.

Almost half of this investment, about \$115 billion to \$120 billion, has gone to electric vehicles (EVs).

Traditional OEMs and component suppliers provided weighted average total shareholder returns (TSR) of 79% between March 2020 and January 2022. In contrast, the "relatively new kids on the block such as NIO, Tesla, and other EV start-ups" returned a TSR of 278%.

McKinsey projects that worldwide demand for EVs will grow sixfold from 2021 through 2030, with annual unit sales going from 6.5 million to roughly 40 million over that period. PWC Strategy & Consulting, predict that sales of EVs, including hybrid models, will see a 466% increase by 2027.

There are, however, a number of caveats. The first being the availability of "green batteries". Materials used in the current range of electric vehicles are mainly mined in regions

> where the environment and health and safety are not a priority. In addition, a large carbon footprint is left behind through the transport of the minerals for processing.

Then there is the very real likelihood of supply disruptions due to black swan events such as floods and other natural disasters, the global Covid-19 pandemic, and Russia's invasion of Ukraine.

Hydrogen fuel cells would seem to overcome many of these challenges, particularly as the number of "green" hydrogen producers increases. Namibia, for example, is using its ample

supply of sun energy to produce hydrogen and ammonia for export to the world.

Given that the necessary support systems are not in place in most major markets for either large-scale electric vehicle or fuel cell vehicle adoption, the race for dominance as the powertrain of the future is wide open. It may well end in a tie.

What we do know is that nimble start-ups are disrupting the automotive sector. OEMs are in danger being left behind with their five-year development plans. They need to dig deep into their corporate gene pool to reignite the innovation which made them such disrupters a century ago.

AUTOMOTIVE INDUSTRIES and Rutgers, the State University of New Jersey, have put together a digital library of back issues of AI from the early 1900's (high res and low res) of approximately 230,000 images of the print publication. This archive, which documents the birth of the auto industry to the present, is available to AI subscribers. Go to AI's homepage **www.ai.com** and click on the **"AI Library"** link or visit **www.ai-online.com/100YearLibrary** 

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Virtual vehicle design showing position of battery pack feeding both front and back axles.

# Making eMobility a reality By: Martin Jung, president of BASF's Performance Materials

The widespread adoption of electric vehicles will have lasting effects on every segment of the automotive industry, from suppliers to consumers.

For over 100 years, many suppliers designed parts specifically for internal combustion engines. Now they must shift from tradition to design parts for batteries.

A recent report by BloombergNEF found that, in 2021, global passenger electric vehicle sales grew by 103% to almost 6.6 million vehicles. While this eMobility evolution brings challenges, it also provides great opportunity for suppliers to create new business and change the transportation industry holistically to become more sustainable.

Martin Jung, president of BASF Performance Materials

#### **Transportation Transformation**

The shift to electric powertrains and a greater emphasis on sustainability means automotive suppliers must take an all-encompassing approach to sustainable transportation. Tier suppliers, OEMs, and other players must work more closely than ever throughout the value chain to create solutions that meet changing performance requirements, ambitious CO<sub>2</sub> fleet management goals, recycling targets, and regulations.

As a leading chemical supplier to the automotive industry, BASF is committed to working alongside suppliers and OEMs to create solutions that deliver on the promise of eMobility and a sustainable future. We create products for every part of the electric vehicle and for the charging infrastructure, while working to reduce our overall carbon footprint and therefore that of these vehicles.

With over 30 years of experience in sustainability work, BASF continues making strides to be ecofriendly throughout the supply chain and in our operations. We developed a biomass balance approach, replacing fossil resources with bio-based, renewable materials in the first stage of chemical production. This approach enables automakers to use more sustainable biomass and reduce emissions within their existing supply chain since the

exchange of resources begins with our raw materials.

#### **Shifting Priorities: Engine to Battery**

Transitioning to eMobility will take time as suppliers convert their productions from internal combustion engines to electric vehicles and, in doing so, they are facing some strong headwinds including further developing the right talent, rising costs, and safety issues.

Suppliers producing plastic components for automotive applications need to help their talented materials engineers acquire the new knowledge necessary to develop materials specific to electric vehicles. For example,

plastics engineers who used to design materials for combustion engines may now find themselves in the department for battery components.

Another dilemma impacting the whole automotive industry, from raw material producers to OEMs: the increased cost of raw materials, plus exploding energy and transport prices. For suppliers, this is especially problematic as there is no opportunity to pass on the increasing costs to OEMs because of long-term supply contracts. Due to that fact, some suppliers are already in a critical business situation. A close partnership of the whole industry is essential. Otherwise Tiers will disappear from the market. That will impact the whole automotive supply chain.

This eMobility transition also comes with safety concerns that need specific considerations in the design phase. While electric vehicles carry a small risk of catching fire, lithium-ion batteries that power most EVs now in development are susceptible to heat and can ignite if they get too warm – unlike gasoline-powered vehicles that require a spark or flame to ignite. Preventing the battery from leaking is key in reducing the risk of battery fires. There are different ways to do this: innovative cooling concepts, high-temperature-resistant barrier materials, exhaust systems. Some automakers may use flame-retardant materials, but there are other technically constructive solutions to consider.

With a challenge this complex, collaboration will be the key to success. That is why BASF works in close partnership with our customers to tackle these issues together. We work with customers to develop and produce eMobility solutions specific to their individual needs. Suppliers with decades of experience in developing material solutions know that there is no one-size-fits-all solution to every problem. An innovation-oriented approach with strong R&D and open-mindedness will help drive eMobility forward.

#### The Key to Sustainable Mobility: eMobility + Renewable Energy

Modern vehicles must be built more efficiently and with a lower environmental impact, and with this transformation to electric powertrains, chemistry will play an even greater role in sustainable mobility. There are different demands on components due to new architecture and platforms for electric vehicles. OEMs are looking for new designs and material properties, and electrification is only one piece of the puzzle.

The other piece? Renewable energy and resources. At the start of the automotive value chain, suppliers source energy and materials used during production from renewable resources. Climate change is a major global challenge, and many automakers are targeting net zero  $CO_2$  emissions. To hit this target, the industry needs to become more efficient in automotive production and energy usage, increasing use of renewable energies and accelerating the development of new  $CO_2$ -free processes to produce chemicals.

The key to achieving clean, green mobility goes beyond suppliers simply designing environmentally friendly solutions. As an industry, the focus needs to be on ensuring that every step of the value chain is sourced responsibly. To achieve this, suppliers must encourage circular economy initiatives that go beyond the conventional take-make-dispose approach. Creating entirely new business models allows automakers to separate growth from raw material consumption and to use resources in the most environmentally friendly way across the entire value chain.

#### **Drive Forward – Together**

The success of this transformation requires the entire industry to work together. Catena-X, for example, is a network comprised of automotive manufacturers and suppliers, dealer associations, and equipment suppliers. Its goal is to create a uniform standard for information and data-sharing along the automotive value chain.

As the automotive world puts more emphasis on eMobility being the future of transportation, suppliers, OEMs, and other industry partners must continue investing in the technology, talent, and expertise to ensure electric vehicles will indeed result in a sustainable future for all.

Martin Jung is president of BASF Performance Materials



# Adapting to the new manufacturing world order By: Nick Palmen

After revolutionizing social, economic and physical landscapes through its introduction 100 years ago, the car, and how its produced, is once again reshaping life as we know it.

That is the prediction by Steve Bell, Principal Analyst at the Informa Technology Automotive Group. In a Hexagon-commissioned white paper titled "The Electric Vehicle Pivot: Why Smart Manufacturing, Not Scale, May be the Key to Success," Bell writes "according to PWC Strategy & Consulting, it's anticipated that EVs, including hybrid models, will increase 466% by 2027. However, the challenge is profitability which is being squeezed by the required investments in electric and autonomous cars, and the impact of a shifting product mix with higher cost and lower margin EVs".

At the same time, "the dazzle of all electric manufacturers continues with the market capitalization of Tesla reaching new highs, and multiple EV vendors, including

Ignazio Dentici, VP Global eMobility Practice Lead at Hexagon's Manufacturing Intelligence division.

Lucid and Arrival, using blank check companies or special purpose acquisition companies (SPACs) as vehicles to list and be traded on the financial markets.

Automotive Industries asked Ignazio Dentici, VP Global eMobility Practice Lead at Hexagon's Manufacturing Intelligence division, whether traditional auto OEMs risk being blindsided by new entrants from consumer tech industries.

**Dentici:** These new players come from industries where the technology cycles are much faster than in the traditional automotive industry. They are setting new benchmarks for development and technology support, as well as manufacturing models and time to market. Basically, it is because they think differently. They start from a blank sheet. A completely new skateboard platform with a total new approach to the cost of the vehicle itself.

So, they are agile. They can easily adapt to fast-changing market demands. The market is changing because consumers are changing. Their driving style is changing. There is less emphasis on performance, and more on a seamless driving experience. Smart manufacturing technologies are enabling this new world order.

Traditional OEMs need to speed up and keep pace by focusing on digital transformation as part of the process. They need to move away from technology and supply chain silos to creating ecosystems that encompass every element of design and manufacturing.

> Al: Is the automotive industry going to increase investment in smart manufacturing?

**Dentici:** The point is not whether traditional OEMs want to invest because there is a new world order emerging. It is not that they have not seen the change coming. Our experience is that they have been monitoring developments for some time, to identify potential new revenue sources.

What the industry was unprepared for is the approach being used by new vendors. They are applying different business models. They are disrupting the industry. So, the challenge for OEMs

is to recover their position. They need to change their business models and invest in digitalization and accompanying technologies. More than ever, they need the right people and organizational culture to take full advantage of the new opportunities. It is not an easy job to adopt the new technologies and change your mindset in order to catch up with new entrants.

Al: Will speed replace scale?

**Dentici:** It's a way to measure progress. Digitized development cycles reduce both time and cost. Fewer physical prototypes are needed as they are replaced by digital simulation models. For example, we have a customer which was building physical prototypes during the design phase of a component. Now **•** 



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Electric mobility in the automotive sector – our solutions for a better environment. Find out more: speira.com they have approached us to help them move away from physical prototypes, because they don't have the time to build them. They can easily save costs by digitizing the components and shortening the development time of the component. Using digitization, the development cycle is reduced from years to months.

At the same time, they are designing for the production which must follow. Production lines need to be flexible in order to provide economies of scale. We have a great example of this with one of our customers, which has reduced the time required inspection of the line from several days to four hours. Basically, that an inspection is done with robotic automation software. The setup time for a new component or model is a few hours rather than weeks or months.

#### Al: Will micro manufacturing replace mass manufacturing facilities?

**Dentici:** I wouldn't say they are going to replace the mass manufacturing facilities. I'd rather see them as a new concept. And this is a concept of a modular, scalable and flexible cluster that is ready to scale up to meet demand but can still provide customization at the same level of efficiency.

Al: How can OEMs overcome shortages of components such as semiconductors?

**Dentici:** We're seeing a lot of partnerships and some consolidation to help mitigate chip supply issues, but this

working on the core technologies which support all our solutions. And then we have our solution teams which can dedicate their time to supporting customers. And the result is that basically, we leverage the data within the workflow of the customer to achieve the biggest possible efficiency and productivity per employee.

#### Al: Will the new approach affect the global economy?

**Dentici:** The change we are bringing the market and the outcomes can have a really deep and profound effect. More than 90% of the global domestic product flows through our customer systems. That means the outcomes of the changes we are bringing to the market can have a really profound effect on the sustainability of the world economy.

#### Al: What is next for Hexagon?

**Dentici:** Hexagon is positioning itself as a long-term partner for our customers in order to embrace the future and face the challenges. We recognize the need to continue to invest, in order to ensure that we can support our customers today and into the future. In the auto industry we are already seeing greater cooperation between the engineering design and manufacturing teams.

We have a full design chain. With our software, robots and toolsets we cut design costs by more than 70% and reduce the time to market. The design starts with the manufacturing process, and we determine what is required for flexible manufacturing and

#### Automotive ecosystem investment in smart manufacturing and Industry 4.0 strategies



Source: Wards Intelligence 2021 data for Hexagon emobility.hexagonmi.com

#### The biggest risk to the automotive industry of pivoting from ICE to electric vehicles



Source: Wards Intelligence 2021 data for Hexagon emobility.hexagonmi.com

could also accelerate the consolidation of functions on a single piece of silicon.

If you look more broadly at automotive development and manufacturing, the solution will come from investing in end-toend solutions to manage that supply chain. Companies like us can help OEMs build upon supply chain management to enable greater visibility and problem-solving between suppliers and inhouse teams through managing design chain workflows.

Al: How does Hexagon use data to boost efficiency, productivity and quality?

**Dentici:** We have a portfolio of sensor and software solutions supported by nearly 4,000 R&D employees. We have teams

fast set-up before we begin the design phase. We optimize the production flow.

The design is geared to optimize manufacturing through automated inspection which enables our cloud solution to control the process parameters to ensure the right cycle times and quality. So, we basically follow the chain from the concept design to manufacturing.

We are also customers address design for sustainability from the initial concept. The procurement and manufacturing process must form part of a sustainable ecosystem. We will continue help our customers to embrace these complex challenges through digitization.

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# Personalized and enhanced **in-car media** for the whole family By: Nick Palmen

A shift in emphasis from the technical aspects of in-car entertainment to consumercentric problem-solving has led to HARMAN's development of Ready Together and Software Enabled Branded Audio: two solutions that allow in-vehicle communication and entertainment content to become more personal.

Launched in early 2022, Ready Together and Software Enabled Branded Audio aim to elevate the in-car experience for everyday drivers and their families.

"HARMAN is delivering new in-car solutions that seek to solve entertainment, communication and productivity pain points for drivers and passengers, while delivering the technology that consumers expect from their vehicles today," said Christian Sobottka, Automotive President at HARMAN International. "Consumers expect their vehicles to mirror their technology habits outside the car with experiences that are hyper-personalized and deliver new

> Riley Winton, Manager, UX Concept, EPIC Experience Team at HARMAN.

levels of connectivity, productivity, and safety. Our market-ready solutions will help OEMs deliver on these evolving expectations and continue defining what's possible in mobility."

Ready Together uses sound zone technology to enable each occupant to personalize their media, while also communicating more effectively with each other. It is being offered with a Personal Audio Headrest unit developed in collaboration with automotive interior and seating system supplier Grammer, which has undergone ergonomic and efficiency design improvements since its first showing in 2021. The platform is now available for integration into vehicles, according to HARMAN.

Launched alongside, Software Enabled Branded Audio can upgrade an existing system to a high-quality HARMAN-branded audio experience which also integrates into the OEM's e-commerce and cloud platforms. Currently available for Android, the core app features added layers of personalized audio and entertainment and customizes the sound experiences based on user input around their listening style and preferences, according to HARMAN.

Automotive Industries (AI) asked Riley Winton, Manager, UX Concept, EPIC Experience Team at HARMAN, how the company is identifying the needs of users.

**Winton:** Our perspective has changed. In the past the focus was on delivering exceptional audio experiences. And we found

a lot of ways to do that. Basically, we have proven we can deliver a really good audio experience in a scalable manner, all the way from top to bottom.

> More recently the focus has evolved from not just delivering great audio, to also using our acoustic expertise to solve real-life problems for drivers and passengers. We looked for ways to make the daily lives of car users better with audio. With Ready Together we've combined multiple technologies and fields of expertise into one clean, cohesive system with an easy-to-use interface that delivers in both areas.

Al: What are the challenges in providing the whole family with their own personal content and space?

**Winton:** Most of it is technical. Just bringing all these technologies under one hood and making them easy to use is a challenge. It also has to be flexible because the OEMs will want to determine how their own system operates. It also must be possible for passengers to plug their Android tablet into a USB. So, we have everything from Bluetooth to old-school aux cables to consider, plus some proprietary wireless audio. The exciting part is giving people freedom of choice once they're in the car to do their own thing and still be together as a family.

#### Al: What about sound quality?

Winton: At the epicenter of Ready Together is our latest stereo sound technology. Over the years we've introduced

different types of sound zone experiences. For 2022, HARMAN has introduced a solution that gives every person stereo content, as well as better separation between the different zones.

#### Al: How does the Ready Together platform enhance invehicle communication and entertainment?

**Winton:** Our innovation process includes reaching out to consumers and users to test concepts from inception. The ideas that rise to the top are refined into prototypes and tested again as part of the process. This gives us a high degree of certainty that we are solving a problem for users.

An example is an in-vehicle intercom system. Parents in our user research process told us that they wanted to be heard by the children in the back seat. Nowadays, kids are wearing headphones and engrossed in the content on their tablet or phone, so it's very difficult to get their attention without yelling.

In response we developed a system which, at the touch of an intercom button, communicates with everyone in the vehicle. It pauses the music. It pauses the movie – just the same as when a captain's announcement on an airplane pauses the entertainment. If you just want to chat, we have a separate communication mode where everyone can talk to each other, while still watching a movie or listening to music.

We've made the experience feel organic. When someone talks, the media automatically turns down slightly. We have included voice enhanced technology where microphones pick up each person's speech and broadcasts it throughout the car. So, mom doesn't have turn around and shout to be heard in the third row. She can just talk comfortably. can deliver an enhanced audio experience. So, it's a lower cost solution than introducing new hardware. The expectation is not for it to match the experience of a full-blown high end audio system like a Mark Levison or Revel, but it does deliver a noticeably improved experience that hits a sweet spot for the segment of drivers that may not have the option of checking the box for a high-end system in the vehicle they are purchasing. At the end of the day, we are able to get more people exposed to good audio, which is a win for everybody.

### Al: Are the new technologies ready for in-vehicle integration?

**Winton:** Yes, they are. Software Enabled Branded Audio is already in a production head unit. Ready Together was introduced in February 2022. We will have a system which is production-ready in the first half of the year, and the plan is for future enhancements to be introduced over time.

### Al: How do you address complexity if we're talking about electric vehicles?

**Winton:** Software Enabled Audio is probably the most appropriate answer for that, because again, we're eliminating all these different configurations that the OEM would typically have to manage. With Software Enabled Audio we can deliver one footprint, one architecture, and one set of speakers for every model in a range. It gives the OEM the choice to scale it for different levels of luxury.

It also can give the end users choice. For example, the system may allow the vehicle owner to evaluate an advanced audio option. If they like it, they can enable it as an optional extra.



### Al: How does Software Enabled Branded Audio upgrade an existing base audio system?

**Winton:** We've proven that we can deliver really good audio experiences from entry to very high-level content which includes lots of speakers. Software Enabled Branded Audio makes good quality audio more accessible. It solves a number of OEM pain points such as managing 100 different part numbers for speakers and wiring. Using existing headsets and speakers, our software

#### AI: What's next for HARMAN?

Winton: We are working on some exciting concepts. Every year we assess and refine new ideas. We have learned that consumers expect the automotive experience to follow the consumer electronics world. People want the same type of features, and the same type of experiences – even in a car which is five years old. That is what the team I am part of is looking to deliver, based on user research, and not just guessing or making assumptions.



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# DOMO SERVICE HUB

**By: Nick Palmen** 

#### Advanced simulation services at the DOMO Service Hub in Ghent, Belgium, improve reinforced polyamide component design processes for increased sustainability in automotive applications.

The development of electric vehicles is leading to a complete rethink in concepts. Totally new platforms are being designed to optimize electric drive technologies and associated electronics. More than ever, lightweighting across all elements of the vehicle is critical to its success. Lightweighting is a cost-effective solution obtaining maximum range and improving overall sustainable performance.

DOMO, a long-time leader in simulation services for polyamide 66 (PA66) materials, which it brands as TECHNYL A, can provide design support from the very beginning of the process of development of new components and systems. Through the DOMO Service Hub, the company supports customers throughout the development phase, including material selection, simulation, prototyping and part testing to develop more customized, sustainable and light applications.

Recently, DOMO enlarged the scope of its simulation services to cover PA6 solutions, branded TECHNYL C, as well as to more sustainable materials containing recycled polyamide (TECHNYL 4EARTH). Since February of this year, the entire TECHNYL portfolio is exclusively produced and commercialized by DOMO worldwide.

DOMO provides support in defining not only the right material, but also the right part design by simulating the material behavior and developing a functional prototype on which to perform the necessary application tests.

Simulations are carried out using DOMO's MMI, a multiscale modelling, mechanical calculation, and injection molding simulation software that supports manufacturers in understanding the real-world behavior of materials before moving forward into production. This tool grants unparalleled quality of the materials' anisotropic data for the TECHNYL product family, making it easier to fully exploit key material properties to optimize designs and reduce time to market.

The advanced predictive simulation tool helps OEMs and parts suppliers develop stronger, lighter, more cost-effective parts injection molded in glass reinforced grades of DOMO's TECHNYL A and TECHNYL C materials. They can confirm the technical feasibility of their applications with a high degree of predictability and limited cost compared to the expense and time of actual testing through trial and error.

This solution is allied with an extremely comprehensive materials database, and it allows for a wide range of calculations when integrated with injection process modelling. Together, they present a powerful and high-performance package that makes it possible to accurately predict the performance of injectionmolded parts made from TECHNYL materials, thereby rapidly tailoring your solutions with confidence in practical performance.

The integrated technology is powered by the Digimat suite of software from Hexagon e-Xstream; material modelling technology that speeds up the development process for composite materials and structures by providing accurate and robust finite element analysis. MMI was created in a development partnership between DOMO and Hexagon e-Xstream.

For fiber reinforced materials, advanced mechanical simulations consider the orientation of glass fibers induced by the injection molding process. DOMO teams have significant expertise in integrative simulation for the TECHNYL A range of PA66-GF materials, enabling more precise simulation results. MMI material cards lead to the most accurate and robust finite element analysis available today. Now, thanks to a concerted R&D effort on PA6-GF materials, material cards are also available for the TECHNYL C range.

MMI material cards are now available for PA6 on a wide array of glass fiber concentrations and temperatures, as well as for elastic and elastoplastic models with failure indicators. These comply with the state-of-the-art tools available in Digimat and lead to the same accurate results as those obtained for PA66 compounds. Soon, crash-dedicated and thermal models will be added to the database, as well. The new material cards are available on request in the Digimat MX application.

Materials and properties are carefully measured under a wide range of conditions, including strain rate, tensile, shear, compression, temperature and humidity. An in-house methodology for identifying polyamide matrix parameters is employed based on glass fiber measurements, covering fiber orientation and fiber length distribution. Machine learning is then harnessed to improve the efficiency of the various models, while also providing up to 15% greater accuracy compared to standard reverse engineering.

Equipment used for the specially developed tests is monitored using a video extensioneter that pilots the testing devices at constant strain rates, measuring true stress and strain. A CT scan is also utilized to check the complex interior microstructure and determine the fiber alignment. Metamodels are employed to reduce the number of tests required while retaining the high level of measurement accuracy, which otherwise would represent years of testing.

The metamodel methodology enables excellent reliability since it is based on polymer physics, considering the effects of temperature, humidity and strain rate. Moreover, the database is updated regularly to maintain its high level of quality, accuracy and exhaustiveness of the physical modelling to address the most demanding applications of DOMO customers.

DOMO has built one of the largest databases in the industry, with over 42,000 files in the MMI repository, covering more than 50 grades of PA6 and PA66. Moreover, these material cards

grades compounded using 100% post-industrial recycled PA66, reinforced with 30, 35 or 50% glass fiber.

Once a formulation has been selected for a particular application, the next step is to optimize the design to increase the rigidity of the product. Then, an assessment is made to determine the best injection molding parameters for optimal load-adapted glass fiber orientation, and any other customer criteria, to optimize the outcome.

With MMI predictive simulation, it is possible to create TECHNYL parts that are lighter, safer and less costly. Customers benefit from shorter development times, with better control over internal costs. Gilles Robert, Material Expert at DOMO explains "Material models are the end of a chain where each link has been optimized to achieve maximum accuracy. Tests are optimized to maximize precision, with material modelling relying on specifically designed procedures and meta modelling technology. This provides a higher level of accuracy than is possible with material models based on standard tests and models."

The metamodel methodology enables excellent reliability since it is based on polymer physics, considering the effects of temperature, humidity and strain rate. Moreover, the database is updated regularly to maintain its high level of quality, accuracy and exhaustiveness of the physical modelling to address the most demanding applications of DOMO customers.

The MMI suite represents a fully industrialized process covering testing, reverse engineering, and smart model management. This

#### TOPOLOGICAL OPTIMIZATION OF DESIGN



are not only limited to static load and failure, but also cover tests on a wide scope of dynamic parameters. These include impact, crash, vibration, modal frequency analysis, NVH, damping, fatigue, thermal dilation and warpage, moisture or glycol effects, and more. The files from this advanced database are made available to DOMO customers that have access to Digimat MX, and DOMO can perform simulation support inhouse on their behalf.

To support the wider adoption of recycled polyamides, DOMO has also created around 700 models for various TECHNYL 4EARTH grades in Digimat. These grades are heat-stabilized

tool set is particularly appreciated when it comes to the complexity of metal replacement, notably in the case of electric vehicles. Reduction of noise and vibration are of utmost importance especially in EV and polyamide-based components can support the automotive industry to improve the passenger experience.

To show the power of its materials and the MMI suite, DOMO engineers took a motor mount originally made in diecast aluminum and redesigned it in a TECHNYL MAX polyamide compound containing a high level of glass reinforcement. The result was a part weighing 40% less, but with similar tensile strength values as the die cast version and up to 100 times better acoustic damping.



CVSA2/Kinetic® technology offers exceptional comfort both on and off-road.

# Consumers opting for **intelligent suspension** for smoother ride and greater safety By: Nick Palmen

There is a growing demand for supercars, light trucks and SUVs equipped with advanced suspension systems that combine impressive on-road handling with exceptional performance and agility in a wide range of road environments.

According to the US-based Specialty Equipment Market Association (SEMA), a growing number of consumers is purchasing vehicles that enable them to combine daily use, utility, and adventure, including off-road driving, or "overlanding," where the journey is as much the point as the ultimate destination. In both new vehicle purchases and in the aftermarket, offroad equipment retailers have seen robust demand throughout the pandemic.

Henrik Johansson, Vice President and General Manager, Tenneco Advanced Suspension Technologies.

Vehicle manufacturers and suspension suppliers such as Tenneco have responded to the increased demand with an array of new off-roadequipped internal combustion engine (ICE) and battery electric vehicle (BEV) models. A BEV startup recently introduced an off-road-ready electric pickup that offers a 300-mile operating range, 11,000-pound towing capacity and is equipped with Tenneco's Monroe<sup>®</sup> Intelligent Suspension (MIS) CVSA2/Kinetic<sup>®</sup> suspension technology.

This trend towards intelligent suspension holds true for ICE and BEV vehicles, providing potential growth opportunities for Tenneco's Advanced Suspension Technologies (AST) business, which offers an array of semi-active suspension solutions covering virtually all passenger vehicle segments.

"CVSA2/Kinetic is an ideal response to rising demand for pickups, SUVs, and other vehicles that can operate without compromise in virtually any driving environment," says Henrik Johansson, vice president and general manager, AST.

> "As CVSA2/Kinetic-equipped vehicles become more prevalent around the world, they will help change consumers' perceptions of what they can do and how much enjoyment they can gain in their driving adventures."

CVSA2/Kinetic<sup>®</sup> technology offers exceptional comfort both on and off-road. It also provides enhanced handling behavior/ control during dynamic road events and ensures excellent stability and traction when carrying heavy loads or towing a trailer to take your vehicle through the most demanding off-road terrain.

Continuously Variable Semi-Active Suspension (CVSA) with external valve technology senses the road and driving conditions to independently adjust four dampers in real time for a more comfortable and controlled ride.

An externally mounted electronic valve is linked to the vehicle's driving mode control, so the system can perfectly match the driver's needs. CVSAe technology allows drivers to switch between driving modes on demand to bring a more comfortable - or adventurous - ride experience.

CVSA2 is the latest generation of Tenneco's suspension range with lightweight, semi-active dampers. Each damper features two electro-hydraulic valves. They control rebound and compression motions independently, delivering a larger tuning range for even higher levels of comfort and control. CVSA2 is scalable to the more advanced Kinetic<sup>®</sup> suspension system.

The CVSA2/Kinetic<sup>®</sup> suspension system delivers the lowest energy consumption in the high performance vehicle market, according to Tenneco. Its Kinetic<sup>®</sup> roll control system eliminates the need for roll bars, reducing car weight while giving superior drive performance. The system's handling of roll and traction makes it the ideal solution for the demands of the off-road SUV and sports car drivers. The weight saving also makes it suitable for the new generation of BEVs.

CVSA2/Kinetic suspension provides continuously controlled damping along with high roll-control forces without the need

of conventional roll bars. As a result, the technology provides significantly better handling for both heavier and taller vehicles, including battery electric SUVs and pickups.

CVSA2 technology comprises lightweight semi-active dampers equipped with two externally mounted electro-hydraulic valves that independently control rebound and compression, providing an unmatched ride experience in a variety of driving conditions. The suspension can be adjusted to driver preferences, such as greater comfort for longer trips or tighter control in dynamic driving situations.

In addition to helping reduce vehicle weight through the elimination of conventional sway bars, the technology decouples single-wheel disturbances, providing better comfort and contact to the road. The Kinetic system has been used in World Rally Car (WRC) and Dakar rallies.

# Mercedes-AMG SL equipped with intelligent suspension



Mercedes-Benz has selected two of the latest intelligent suspension technologies from Tenneco's Monroe<sup>®</sup> Intelligent Suspension portfolio for the 2022 Mercedes-AMG SL-Class of luxury roadsters.

The new models, representing the eighth generation of the iconic SL range, will be offered with Tenneco's CVSA2 semiactive suspension or integrated CVSA2/Kinetic<sup>®</sup> suspension. Both systems for the Mercedes-AMG models are in production at Tenneco's recently expanded ride performance manufacturing complex in Gliwice, Poland.

2022 Mercedes-AMG SL roadsters to offer Tenneco's CVSA2 semi-active suspension or integrated CVSA2/ Kinetic<sup>®</sup> suspension.

Available as an option on the SL 55 but standard equipment on the range-topping SL 63, the CVSA2/Kinetic suspension



combines all the benefits of CVSA2 technology with an innovative, active roll control system that reduces vehicle weight by eliminating the need for anti-roll bars. Together the systems provide exceptional traction, steering response, brake balance and comfort as well as front lifting functionality for increased ground clearance.

"This has been an exciting project for our Advanced Suspension Technologies organization," said Henrik Johansson, vice president and general manager, Advanced Suspension Technologies, Tenneco. "These impressive new models take the storied SL-Class to impressive new heights in terms of driving enjoyment."

In addition to the new SL-Class, CVSA2 technology has enjoyed considerable recent success on Mercedes-AMG models, including the G-Class SUV and the AMG GT Black Series.

"We have identified three key drivers – **safety, lightweighting** and **sustainability**."

# Legislation will drive technological developments in mobility By: Nick Palmen

Original equipment manufacturers and Tiers need a new generation of advanced materials as they switch from total reliance on internal combustion engines to electric vehicles.

Research shows it is important that the technology development is informed by consumer preferences.

Automotive Industries (AI) asked Tamim Sidiki, Global Marketing Director Mobility, DSM, to share what trends the company's research has identified.

**Sidiki:** There have been multiple in-depth discussions about electric vehicles (EVs) with a number of OEMs, Tiers and consumers. We have identified three key drivers – safety, lightweighting and sustainability.

Specifically, we are looking at EVs from the perspective of the consumer. From a safety perspective an EV must be treated as an unattended appliance

> Tamim Sidiki, Global Marketing Director Mobility, DSM.

product, like a washing machine. Where a washing machine runs on around 220 volts, EVs are charged at 400 volts, with some now at 800 volts. It would be a catastrophe for everyone, including the owner of the vehicle, the OEM and the image of EVs if they spontaneously catch fire while parked in the garage.

Lightweighting is already reducing fuel consumption. It will be more important for EVs which are around ~400 to 500 kilograms heavier than the comparable ICE car, due to the weight of the battery pack. No consumer wants to drive a car which feels like a tank, and everyone wants a long driving range.

Sustainability is driven by legislation, the positioning OEMs and increased consumer pressure.

Al: Would you like to elaborate on lightweighting?

**Sidiki:** Plastic components are typically about 50% lighter than metal equivalents. They also offer greater design flexibility

and a cost saving of some 20%. Our portfolio of bio and recycled plastics for injection molding and composite structures can reduce the carbon footprint vs. metal components and alternative mineral oil-based plastics by up to 80%.

Having replaced many "easy" aluminum parts, the next challenge is to replace magnesium and structural steel components. We are working on plastic and metal/plastic hybrid designs in applications such as the car crossbeams, front end module, engine mounts and air springs. Gas and clutch plastic pedals are already standard. For

EVs, we now see the replacement of steel brake pedals with full plastic or metal/plastic hybrid designs. Regenerative braking results in 1-pedal driving, reducing the longterm load forces on the pedal.

Al: Please tells us more about your EV applications.

Sidiki: It is all applications linked to the high voltage system, starting from the charging station through the cable and charging plugs to the vehicle socket, and from there to the battery, inverter/converter and ultimately the motor. We have a complete portfolio of flame retardant materials with highest comparative tracking indexes to support this system, all of which have technical approval and are available in the market.

Al: What about fuel cell and hybrid vehicles?

Sidiki: One of our key focus areas is hydrogen and gasoline tanks, for which we developed Akulon<sup>®</sup> Fuel Lock which offers the industry's lowest gasoline and hydrogen permeation rates. We support every component in a fuel cell system from the manifold to the auxiliary components attached to the fuel cell. For the batteries and e-motors we assist with dedicated Xytron PPS thermal management compounds to ensure peak performance and longevity in the e-water pump or cooling valves. Xytron PPS compounds have the lowest ionic leaching amongst various engineering plastics and are at the same time optimized for mechanical strength, especially along the weld line. Various OEMs already have xEVs on the road with Akulon Fuel Lock or Xytron components.

#### Al: What is special about Akulon® Fuel Lock?

**Sidiki:** It replaces materials like HDPE for both hydrogen and gasoline tanks. It offers the ability to design tanks with thinner walls. Tanks with 2 mm wall thickness molded from Akulon Fuel Lock perform at an evaporative emission rate of 80% below the U.S. EPA and CARB regulation limits.

#### Al: What are the trends in high voltage charging?

**Sidiki:** The first main driver behind high voltage charging is reducing the time taken to recharge. 800 volts can reduce charging time for an 80% battery load from currently 40 to 60 minutes down to only 15 to 30 minutes. Multiple studies have found that consumers find a recharge time of around 15 minutes acceptable.

The second main driver is that higher voltages also simplify the design of electrical components. You can increase power supply through higher current or higher voltages. For higher currents you need thicker copper cables. If you keep the current low but increase voltage you can use the same or thinner cables, saving on weight and costs. We are the first in the market with PA66 and also PPA materials with a CTI of 750V and 850V to safeguard such high voltage charging.

### Al: What does DSM offer designers of semi and fully autonomous cars?

Sidiki: They are all controlled by various electronic control units (ECUs) or by one fusion high-performance computer fed with information from numerous ADAS sensors. We work to replace the metal housings of such components. There are mechanical requirements such as protecting it from dust and moisture, but also functional requirements such as conducting heat away from We have developed a ForTii Ace (PPA) JTX8 compound, the only MSL JEDEC1 polyamide to avoid any blister formation during reflow PCB assembly. It enjoys infinite shelf lifetime for the resin as well as molded connectors and other components. Color consistency and stability is excellent.

AI: Please tell us more about your fuel cell applications. Sidiki: Xytron<sup>™</sup> G4080HRE, a glass reinforced polyphenylene sulfide (PPS), has the highest weld strength of all PBSs and is also impact modified. DSM's tailor-made PPS is the purest material solution on the market today and offers the lowest ion leaching up to 120°C. Ion leaching is important for commercial applications such as trucks and buses as it affects performance over time.

### Al: What makes automotive companies want to do business with DSM?

**Sidiki:** All companies in the supply chain have focused on replacing metals with plastics for a number of years, so all the easy applications have been done. For me, what makes DSM pretty special is that we are a very flexible, innovative, agile and fast company. Many clients tell us they see us being fully integrated in their design cycle. We start with a cost analysis using a set of tools we have developed to compare a plastic component against the metal equivalent. The project only continues the total cost is lower using plastic.

We then provide support all the way from part design, CAE simulations through to prototype development, with a focus on reducing costs, weight and carbon footprint. Our goal as a development partner is to make the process as smooth as



the sealed box. There also needs to be radiation shielding of the chips in the processor. Dedicated thermally and/or electrically conductive compounds allow effective passive cooling as well as EMI shielding well in the range of 50-60dB protecting application from emitting EMI as well as getting disturbed by EMI.

We also provide a full material portfolio for connectors required to link the processor to the sensors and the rest of the vehicle such as FAKRA, HSD or header connectors.



**ABOVE:** Fuel cell bus from SAIC.

**LEFT:** All the plastic parts on the fuel cell for an electric bus are made from Xytron 4080HRE.

possible and to reduce delays and costs by getting it right first time.

#### AI: What is next for DSM?

**Sidiki:** The Mobility segment will continue to be one of our key focus areas. The market is dynamic, with many exciting new technologies and applications on the horizon. We are extremely well positioned from a material perspective, and from the way we tackle joint application development with customers.





### speira

# Aluminum holds the key to lithium-ion battery Cells By: Nick Palmen

Aluminum properties such as high thermal and electrical conductivity, low density, high formability, strength and recyclability have established it as a material of choice for various components within high-energy lithium-ion battery (LIB) cells and battery packs.

Automotive Industries (AI) asked Dr. Hartmut Janssen, Head of New Business Development & Innovation at Speira, to provide us with some background into new developments.

Janssen: We started developing material for automotive batteries 10 to 12 years ago, and now

Dr. Hartmut Janssen, Head of New Business Development & Innovation at Speira.

offer a full portfolio for a range of applications from cell to pack level. We are convinced that the complexity of battery systems and aluminum products is tackled best in a process of cooperation and co-creation with OEMs and Tier 1 and Tier 2 suppliers. Hence, we set a big focus on partnerships, be they scientific partnerships or partnerships with our customers.

#### Al: What is your R&D focus?

**Janssen:** We are one of the biggest suppliers of material for prismatic housings and supply some of the world largest

battery producers with our battery electrode foil. In addition, we have a range of material solutions covering cell housing, electrical conductors, heat exchangers and vehicle integration ready for market.

With cell housings, there is a divide in technology and corresponding material selection. For instance, pouch cells consist of laminated materials, which are a mix of plastics and aluminum. Prismatic cell technology uses only aluminum, while

> cylindrical batteries rely on nickel plated steel (NPS). We believe that cylindrical cells, and in particular largeformat cylindrical cell like Tesla's announced 4680 cell, would benefit from aluminum cell housings. Tesla's decision to move from the 2170 cell size to 4680 has led to reconsideration of cylindrical cells within the automotive industry, but it comes with challenges such as thermal management. From our perspective aluminum is a key element of the solution. That is why we commissioned a big study into the technology of aluminum for cylindrical cell housings, which was recently published as a white paper.

Larger LIB cell formats require significantly better heat conduction as well as reduced internal resistance. Therefore, the low thermal and electrical conductivity of nickelplated steel become limiting factors. LIB cell housings made from aluminum alloys featuring about 4x higher electrical and about 3x higher thermal conductivity can help to overcome these challenges. We have developed material solutions for aluminum housings of cylindrical cells and evaluated the potential impact of NPS substitution in co-operation with universities, research institutes and industrial partners.

The next focus area is battery design concepts, but this depends on what the OEMs and battery manufacturers decide about switching from the current modular design to cell to pack technology. We have material solutions for all the emerging technology.

#### Al: What are the advantages of aluminum?

**Janssen:** High performance automotive batteries rely on optimization at every level, from inside the cell to the battery pack. Some components are structural and hence require mechanical properties, while others require certain chemical and physical properties. It's the versatility of aluminum which makes it appealing for cell design specialists as well as mechanical and electrical engineers who are pushing the limits of battery technology.

What has been evident from the first EV generation is the weight-saving potential of aluminum in battery packs and crash structures. Reducing weight to increase the range of electric vehicles was the starting point for greater use of aluminum in vehicles.

However, diving deeper into the pack and the cell reveals aluminum materials provide additional characteristics. For instance, aluminum is widely used for electrical connection of the individual battery cells due to its excellent electrical qualities. While copper is a better conductor, aluminum provides the combination of lower weight combined with good electrical and thermal conductance. This is particularly important for fast charging. Aluminum also provides the perfect combination of electric and thermal conductivity for other conductor applications and heat exchangers.

Another interesting example is the prismatic cell housing, which demands extreme formability during production and mechanical strength and electrolyte compatibility in service. In addition, reliable and fast laser welding is key for product quality and productivity.

On top this the next market trend consists in circularity and sustainability of batteries, which comes along with increased use of recycled material, and this is where aluminum has a number of advantages.

#### Al: Is this why you are acquiring Real Alloy Europe?

**Janssen:** Real Alloy is the biggest third-party recycler in Europe. The acquisition will enable us to close the loops to help our customers to further decarbonize their manufacturing activities. Real Alloy's employees also add the right knowledge and expertise on top of the production capacity needed.

### Al: How does this match the latest European trends in EV development?

**Janssen:** The market is really driven by governments. So, there is a strong push for e-mobility, which will see it being the leading technology in future. Also, the latest statistics show one in three vehicles in Europe is now electric. In addition, EU legislation and customer expectations are challenging the industry to be more sustainable by using green energy and reusing or recycling. These trends match Speira's ambitions, as we are committed to producing low-carbon aluminum and creating closed loop material flow.

#### Al: How is Speira responding to the market needs?

Janssen: We have been monitoring developments and positioning ourselves since we saw the first drive towards

e-mobility. There are two different focus areas. One is the classic automotive applications such as the body and frame. In this sector, we don't see much change.

The difference lies in battery integration. We have differentiated between the battery technology and the integration of batteries into the vehicle structure in the form of what we call battery boxes.

For battery boxes, the focus is crash performance and thermal management. Modern battery systems provide optimal performance and service life between approximately 20°C and 40°C. Thermal management systems keep the batteries in this range. Speira materials for heat exchangers in battery applications guarantee efficient thermal management, whether it's during fast charging or out on the road.

At cell and module level we have developed new materials like electrode foils, which serve as a carrier material for the active mass of a lithium-ion battery, connector materials, solutions for cell and module housings etc. Each of these developments has been guided by in-depth evaluation of the application and close cooperation with both industrial and scientific partners.



Speira aluminum alloys in the modern battery pack.

#### Al: What's next for Speira?

**Janssen:** Mobility and battery technology represent the biggest technological transformation we have seen over the past 20 to 30 years. The next big challenge is energy in general, which will be with us for a number of years to come.

Do we still rely on oil and gas? How do we drive renewables? Does wind or solar technology old the greatest promise? Or is it liquid natural gas? Aluminum is used in all these applications.

Let's not forget that we are living in a world where we currently face a two-degree Celsius increase in average temperatures. The Paris agreement aims to reduce this to 1.5 degrees. So, we are looking at the big picture where we are working very hard to provide solutions that support decarbonization to slow global warming. We want to do our part to contribute to meeting the goals of the Paris agreements as a responsible corporate citizen.



# Covid contributes to boosted **demand for aluminum** extrusions

**By: Nick Palmen** 

### Consumer opinion is driving demand for aluminum in automotive applications.

It gained momentum early in the Covid-19 pandemic. A March 2020 study by Kearney found that 48% of consumers were more concerned about the environment due to Covid, while 55% reported that their pandemic experience had made them more likely to purchase eco-friendly products. These findings were supported by the Kantar "Who Cares,

Paul Warton, Executive Vice President and Head of Hydro Extrusions

Who Does?" 2020 report, which found that 59% of global consumers considered themselves to be eco-active. Kantar's consumer trends tracker Global MONITOR shows that people blame business for society's environmental challenges: 79% of people globally hold large corporates responsible.

Automotive Industries (AI) spoke to Paul Warton, Executive Vice President and Head of Hydro Extrusions, and Piotr Chmielewski, VP Automotive for the Extrusion Europe business unit.

Al: Is this sentiment being translated into greater demand? Chmielewski: Aluminum is gaining market share against other materials.

Hydro provides components such as crash management systems, roll-over bar protection systems, structural parts, and side sills. We also supply high and low voltage electrical cables for electric vehicles.

> The demand is there despite high inflation, increased energy costs and conflict around the globe. Manufacturers have full order books. They can sell more than they can make at the moment. In addition, there's many new models coming off the drawing boards which have a growing percentage of aluminum components.

The focus now is on sustainability, with the automotive sector driving the charge to reach carbon neutrality by 2050. There are OEMs which are targeting 2030 for bringing emissions down to zero.

This creates upstream and downstream challenges for the industry. We need financing to execute on the conversion technology required to do this.

Al: What is the role of aluminum extrusions in this? Warton: There is a continuous lightweighting trend now in

22

combination with sustainability such as reducing  $CO_2$  emissions and increasing use of recycled materials. When it comes to lowering the overall  $CO_2$  emissions along the total value chain, I think Hydro is in a strong position to assist OEMs to meet their sustainability goals because we have control over the full value chain.

#### Al: What about electric cars?

**Warton:** There are two answers to the question. The first is about reducing weight and the second safety. Aluminum is being used to extend the range of electric vehicles by making them lighter. We are working very closely with customers on their new platforms in what we like to call partnerships. They see aluminum as the master material which is helping them to reduce weight, and us as the partner able to help them with design and other solutions.

OEMs are now looking beyond product performance, lightweighting and cost competitiveness. The focus has shifted to emissions during the vehicle's use phase and end of life recycling. It is estimated that there is 1.2 million tons of aluminium scrap leaving Europe annually. This is not processed in Europe because it is contaminated, so the cost is too high and the necessary sorting technology is not in place. It is excluded from the value stream.

We are working on designs with the OEMs to ensure that at the end of life we have a component that is cheap to disassemble, to return and to recycle. Much more emphasis is being put on end-oflife recycling during the design stage.

With aluminum, only 5% of the energy is required to produce a recycled aluminum part compared to that needed for one from virgin material. This is significant, not only because of the cost of energy, but also the contribution to sustainability. The power can be supplied by renewables, which is the route to zero carbon. So, we to develop the competence to process the contaminated scrap.

A good example is Hydro's recycling division, where we're doing much more sophisticated shredding and are able to sort lower-grade scrap, and contaminated scrap. We are using this material to produce primary and secondary foundry alloys and value-added products like extrusions.



The new all-electric Ford F-150, for which Hydro supplies aluminum components for.

Al: Is aluminum safer than metal components?

**Warton:** Categorically, yes. Because the OEMs come to us with a performance specification of what that bumper system needs to do on the different crash scenarios. The amount of testing they do on crash management systems now is unbelievable. And

they absolutely love the energy absorption capability of the aluminum crush cans, as well as the beams. They get superior safety performance while reducing weight.

> Piotr Chmielewski, VP Automotive for the Extrusion Europe business unit

Al: How does Hydro help automotive designers reach their carbon emissions targets? Chmielewski: We provide design solutions to meet specifications. Some customers are specifying a minimum scrap percentage. One of the biggest challenges with producing low-carbon aluminum is a shortage of scrap. Hydro is able to reduce the CO<sub>2</sub> emissions produced throughout the aluminium production value chain through our own direct and indirect emission controls within our plants. We are therefore on track to reduce our own emissions by 10% by 2025 and 30% by 2030 from a 2018 baseline. We are committed to net-zero emissions by 2050 or earlier. Combine this with superior performance compared to other materials, and we have a strong package of sustainability, performance and cost competitiveness for the OEMs.

Al: What is the importance of transparency about content and carbon footprint?

**Chmielewski:** It's all about traceability, transparency, and certification. We work with a number of bodies to certify our materials. Controlling the entire aluminium value chain, from mine to aluminium components, helped us obtain Aluminum Stewardship Initiative (ASI) certification. The ASI certification is given to companies that have a demonstrated commitment to social, environmental and ethical standards. Full traceability audited by external certification bodies and our customers ensures we can guarantee the solutions we offer are low carbon.

Al: What's next for Hydro Extrusions?

**Warton:** We have to invest in capacity and to reduce our carbon footprint. In the last 12 months we signed off 4 billion NOK (US\$426 million) in capex, which is almost double our historic rate of capital expenditure. This will see expansion of manufacturing and recycling capacity on three continents. A fair proportion of that investment is for the automotive sector.

Hydro has demonstrated that we are committed to investing in automotive, with sustainability a top priority. What we take as read is being 100% on time, having an ingrained zero-defect mentality and being fast and responsive to very demanding customer base.

Our operations will also have to become more automated in order to provide more advanced solutions and products to the automotive industry. We are gaining momentum to reach a super high level of automation, which is the global standard in manufacturing. Through automation we will be able to align and standardize our operations between the United States, Europe and China.



HARTING - the power behind the brand

**Bv: Jon Knox** 

#### There is way more to a brand than merely the name or the design of the logo. Brand integrity and therefore value comes from the consistency and quality of the product or service provided in the name of the brand.

Writing in the Harvard Business Review of January 2000, Kevin Lane Keller writes "In strong brands, brand equity is tied both to the actual quality of the product or service and to various intangible factors". In a white paper on business to business (B2B) for B2B International, Paul Hague writes: "Branding is just one aspect of marketing. But if a company gets its industrial brand right, the likelihood is that all the other parts of the marketing mix will fall into place. Branding sits at the core of a company's philosophy because a company's brand is what that company is".

#### Margrit Harting, Member of the Harting Board

One of the companies well known in the automotive sector which has been getting its brand "right" is the HARTING Technology Group. It is one of the world's leading providers of industrial connection technology for the three "lifelines" of data, signal and power. Products include electromagnetic actuators for automotive and industrial series use, charging equipment for electric vehicles, as well as hardware and software for customers and applications in automation technology, mechanical and plant engineering, robotics and transportation engineering.

## <u>Awards</u>

Member of the Board, Margrit Harting has been responsible for the image and good reputation of the Technology Group for the past 35 years.

Automotive Industries (AI) asked her how she became part of the HARTING team over 35 years ago.

Harting: When I graduated from high school, I wanted to pursue oceanography as a career. But, my father, who was the founder and director of a private business school (Dr. Kohlhase) in Herford and Rahden.

decided that I should instead study business administration with the prospect of becoming the future head of his schools.

I complied, became a commercial teacher and a senior teacher. In 1971 I married Dietmar Harting and took on the role of housewife, mother and educator of son Philip and daughter Maresa. I gained an insight into

the family business at meals with my motherin-law Marie Harting, who had headed up the company since 1962.

In 1987, after my mother-in-law fell seriously ill, Dietmar asked me to help. March 1 was my first day at work as managing director.

#### Al: What has been the growth since?

Harting: In 1987 HARTING had about 1,300 employees and a turnover of DM 148 million. Todav it has 14 production plants and 44 sales companies, with around 6,200 employees and a 2020/2021 financial year turnover of EUR 869 million.

Margrit Harting has received many awards for her achievements, including the Cross of Merit with Ribbon in 1998 (together with her husband), the Federal Cross of Merit First Class in 2009, and the honorary citizenship of the town of Espelkamp in the same year.

Leibniz Universität Hannover awarded her honorary citizenship in 2018.

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caring is our formula

# ER&D services companies helping **OEMS** to **rapidly transform** By: Alan Tran

#### OEMs are turning to specialist engineering companies with footprints outside of the traditional automotive sector in order to speed up development of electric and autonomous vehicles.

In January 2022, Bangalore (India)-based L&T Technology Services Limited (LTTS) announced that it had signed a US\$45 million deal from a US-based, automotive Tier I company.

Under the deal, LTTS has been named as the strategic engineering partner for the auto company's electric vehicle (EV) portfolio. The five-year agreement will see LTTS work with the customer to deliver solutions that leverage its e-mobility technology competence. With this partnership, LTTS also marks its expansion into Eastern Europe. It will hire 300 engineers working from its Krakow, Poland center over the next three years.

LTTS says that since 2021 it has been recognized for its proficiency in the electric, autonomous and connected vehicle (EACV) space by global

> Amit Chadha, CEO & Managing Director, L&T Technology Services.

analysts. LTTS has been lauded as a leader in the Everest Group's Autonomous, Connected, Electric & Shared Mobility Automotive Engineering study. Zinnov Zones ER&D Services Report rated LTTS as a Leader in Telematics and ADAS as well as an overall Leader in the Automotive vertical. ISG Group also rated LTTS as a Leader in Smart Manufacturing Services for Automotive domain.

LTTS is the leading global pure-play engineering services company.

A listed subsidiary of Larsen & Toubro Limited focused on engineering and R&D (ER&D) services, LTTS offers consultancy, design, development and testing services across the product and process development life cycle. With a customer base of 69 Fortune 500 companies and 57 of the world's top engineering research and development companies. Its clientele is spread across industrial products, medical devices, transportation, telecom and hi-tech, and the process industries.

LTTS also takes pride in its strong industry-academia collaborations. One such collaboration was with UK's Coventry University in 2021 to build and deliver new generation engineering solutions for the automotive and manufacturing sectors. Research undertaken by this partnership will be in the autonomous mobility and vehicle dynamics segments with the aim to strengthen LTTS' technology capabilities for their global customers. In particular, LTTS

and Coventry University will collaborate towards developing technologies and deepening skillsets in autonomous driving, EVS and software-defined vehicles.

> LTTS is focusing on "six big bets" (Electric Autonomous Connected Vehicles, 5G, Digital Products and Al, Digital Manufacturing, Med Tech and Sustainability). Guided by this vision it is concentrating on both the electronic air control valve segment as well as 5G technology and its applications.

Towards this, LTTS announced a triparty partnership with Mavenir and NVIDIA, to accelerate adoption of the industry's first converged Al-on-5G. Under the agreement, LTTS will support Mavenir with customization, integration

and deployment of AI applications for deployment on NVIDIA's AI-on-5G Platform. LTTS says that as AI is already transforming many industries across the globe, combined with the power of 5G networks, the two technologies will enable powerful new use cases in a quick, secure, and cost-effective manner.

NVIDIA's AI-on-5G platform is a unified platform that brings together developments at the edge to accelerate the digital transformation of enterprises across all industries. 5G provides the underlying connectivity for billions of devices, extending AI's reach to all connected objects and enabling new use cases and new markets. AI-on-5G is supported by a large ecosystem of partners offering a range of GPU-optimized applications and by NVIDIA SDKs, toolkits, and APIs.



Automotive Industries asked Amit Chadha, CEO & Managing Director, L&T Technology Services, how the deal with the US-based Tier I automotive supplier will support the company's vision to develop vehicles of the future.

**Chadha:** We have been investing in electric, autonomous and connected vehicle (EACV) as part of our six big bets and our engineers have developed several new scalable e-mobility solutions that can accelerate global automotive players' EV development journey.

This landmark deal reinforces that our strategic investment is paying off and establishes LTTS' dominant position in the EACV landscape. The Krakow R&D center will serve as a nearshore facility to Western European and North American clientele across verticals.

Al: How important is the electric vehicle space for OEMs? Chadha: OEMs and Tier 1s face increasing pressure to accelerate EV production to meet the global demand for greener mobility solutions. With the ever-changing EV manufacturing landscape, agility is vital to establish a scalable, reliable, safe, and cost-effective design. At L&T Technology Services, end-toend e-mobility solutions such as electric powertrain, design and development of high-voltage battery management system, and applications for power electronics are taking center-stage.

Our wide range of e-powertrain systems, technologies, and solutions for varied applications and vehicle platforms – from EV to HEV to PHEV, help customers get ahead in the e-mobility race. With hands-on experience in power electronics, software development, and state-of-the-art lab for powertrain component testing, we help customers reduce costs and accelerate the EV development journey.

#### AI: What has LTTS strategy been in the sector?

**Chadha:** To stay relevant in the marketplace for the coming years, LTTS has identified six strategic investment areas, one of these being EACV. As a pure-play ER&D services company, LTTS is seeing demand acceleration in this area since auto companies are going through rapid transformation. LTTS is partnering with major players around the globe in the domain of electrification and connected vehicles. We want to highlight and showcase our growth in this ever-growing, innovation-led segment.

Al: What are some of the in-house technologies that have emerged in the EACV sector that you are particularly proud of?

**Chadha:** We are proud of all our in-house technologies and solutions as they are a testament to our success and growth as a leader in ER&D segment. More recently, we designed and developed the e-VOLTTS platform – a scalable and modular high-efficiency reference platform for EV system and component development that can be easily customized for use in a wide-range of vehicle segments such as passenger vehicles/cars, commercial vehicles, off-highway vehicles, 2/3-wheelers, and so on.

It also serves as a reference design that is both reusable and customizable, thereby enabling faster EV product development across vehicle segments.

With the launch of e-VOLTTS, LTTS' position is further solidified as a best-fit, one-stop-shop for e-mobility solutions, with expertise spanning from concept-specification-definition-design-build to vehicle level integration.



LTTS Headquarter and facilities in Vadodara (Gujarat), India.



BorgWarner AKASOL cell-agnostic battery packs for use in buses and commercial vehicles.

# Managing the globally uneven transition from ICE to EV By: Clinton Wright

Tier suppliers are reimagining their business models and product portfolios as the shift to electric vehicles gains momentum.

One of the technology leaders which is making the transition is BorgWarner. The group has unveiled "Charging Forward", which is its plan to grow revenue from electric vehicles to approximately 45% of total revenue by 2030 from less than 3% in 2021. The plan comprises three pillars: organic EV growth, EV focused M & A and optimizing the company's combustion portfolio through the planned dispositions of businesses with between US\$3 billion and US\$4 billion in aggregate revenue.

Automotive Industries (AI) spoke to Frédéric Lissalde President and Chief Executive Officer of BorgWarner, and Dr Stefan Demmerle,

Frédéric Lissalde President and Chief Executive Officer of BorgWarner

### President & General Manager PowerDrive Systems at BorgWarner.

We asked whether the switch to electric vehicles going to be this quick. 2030 is just eight years away.

**Demmerle:** No one can say with absolute certainty when this transition will happen. And the reality is that every region in the world is in a different stage of this journey. BorgWarner bases our plan on robust market data and analysis and close customer relationships to partner together. We expect 45% of our revenue to come from EVs in 2030. Al: What are your predictions for the less industrialized world where the electric grids cannot cope with existing demand?

**Demmerle:** There is still a lot of technology and advancement in internal combustion engines (ICE). In less industrialized areas of the world, BorgWarner can still provide support. We expect 45% of our revenue to come from EVs in 2030, the remaining 55% from combustion and hybrid.

Al: How is BorgWarner going to remain profitable during the transition period?

Lissalde: BorgWarner is currently and always has been focused on financial strength and discipline. This is why we've been around for over 100 years. We are laser-focused

> on delivering strong margins and free cash flow. Portfolio management plays a key part in this.

Al: BorgWarner speaks about "organic" and "inorganic" growth. Please explain the difference and how they will be achieved.

**Lissalde:** Organic growth refers to new products or systems solutions that evolve from in-house research and development and go into production.

We've achieved organic growth with new products like the high voltage eFan and high voltage coolant heater (HVCH). The eFan's efficient

and robust 40kW system combines a cooling fan, electric motor and inverter. The eFan is going into production in 2024 with a European battery electric heavy-duty long-haul

in 2024 with a European battery electric heavy-duty long-haul truck manufacturer.

The HVCH controls the battery's thermal management and cabin heating and contributes to significantly enhancing the driving range and durability of the battery. The HVCH is going into production with the BMW Group's iX and i4 fully electric architecture.



Inorganic growth refers to product line growth the company achieves through acquisitions.

For example: In February 2022, BorgWarner finalized the acquisition of AKASOL AG, a designer and manufacturer of customizable, cell-agnostic battery packs for use in buses and commercial vehicles. AKASOL is expected to significantly strengthen the company's commercial vehicle and industrial electrification capabilities, which positions the company to capitalize on what it believes to be a fast-growing battery systems market.

## Al: Where do you see potential for partnerships?

**Lissalde:** BorgWarner is actively working on partnerships and investments that support our product lines and our Charging Forward strategy.

For example, in December 2021, we entered into an exclusive licensing agreement with PolyCharge America, a start-up company formed based on our Series A investment and prior joint development to deliver disruptive

capacitor products. With this agreement, BorgWarner secured exclusive rights to bring the PolyCharge NanoLamTM capacitors in-house for use in the company's extensive selection of inverters. The capacitors enable highpower inverters to be smaller, lighter, and more tolerant to high temperatures. The investment strengthens our inverter capabilities and offerings.

Al: BorgWarner plans to dispose of a number of products in your internal combustion-related portfolio. What is the value for potential buyers if the market is declining?

**Demmerle:** The current end market environment conditions with the volatility we've seen with the US\$76 million global light vehicle market and with the supply chain uncertainties, has absolutely had an impact on the buyers – broadly buyers' willingness to engage in some of these discussions.

We do have a pipeline that we're pursuing to drive toward that US\$1 billion of dispositions later this year. It's going to be helpful for

us to see a more stable market environment because the appetite is there when the market is more stable and more certain.

With our active product portfolio management, our goal is to optimize our combustion portfolio. The products we would be looking to divest are not bad products; they would be better suited with a different owner.

Our focus is on executing our strategic plans, controlling what we can control and making sure we get good value for the assets that we dispose of.

> Dr Stefan Demmerle, President & General Manager PowerDrive Systems at BorgWarner

Al: One of the competitive advantages you list is "award-winning teams". New skills will be required for the electric drivetrain portfolio. What is being done to upskill/reskill BorgWarner people?

**Demmerle:** We are evolving our business through Charging Forward, and a key facet of that strategy is also evolving the skills of our existing talent so our workforce is sustainable. "Power to Evolve" is a training program created in partnership with leading universities in the U.S. and Europe to increase our talent's knowledge of and skills for electrical engineering. Employees learn hands-on skills required for productive work and complete modules for inverters, batteries, and motors. We've had a few cohorts "graduate" from the program and it has been a success for us.

#### AI: What next for BorgWarner?

**Lissalde:** BorgWarner will continue to deliver on Charging Forward, achieve our goal of Carbon Neutrality by 2035 (in Scope 1 and 2 emissions), continue progress on diversity, equity and inclusion and ESG targets.



BorgWarner's High Voltage Coolant Heater range is suitable for supply voltages of between 180 and 800V, with a power range of between 3 and 10 kW.



The eFan 40kW system combines a cooling fan, electric motor and inverter.





The Rohde & Schwarz CMP200 Radio Communications Tester.

# Testing **automotive ultra-wideband** applications of the future

# Ultra-wideband (UWB) radio technology uses short signal pulses with a wide bandwidth for accurate ranging, close proximity, energy efficient and secure communication.

These characteristics have brought a new generation of automotive UWB applications to the market. It is expected that by 2026 almost all smartphones will support UWB and the technology will be widely adopted by vehicle manufacturers to support applications such as indoor navigation, access credential sharing, handsfree payment, passenger health monitoring and parking assistance sensors.

The technology includes secure data communication at rates up to 27 Mbps, with very low power requirements. The very wide bandwidth of 500 MHz and more,

Martina Neuherz, Market

at Rohde & Schwarz

Segment Manager Automotive

As a leader in wireless device testing, Rohde & Schwarz provides a full range of UWB test solutions for research and development, certification, chipset characterization and production to accurately measure key parameters such as Time of Flight (ToF) and Angle of Arrival (AoA). This includes radio communication testers, oscilloscopes, signal generators and analyzers.

Rohde & Schwarz is at the heart of the technology, being a member of both the FiRa and Car Connectivity consortia.

Automotive Industries (AI) asked Martina Neuherz, Market Segment Manager Automotive at Rohde & Schwarz, to explain ultra-wideband technology.

> **Neuherz:** The ultra-wideband technology was first used in 2002, mainly for specific industry applications. The IEEE 802.15.4z amendment has improved multiple aspects and added secure ranging functionality.

This allowed new use cases for smartphones, wearables, tags, car access and more and provided resistance to relay attacks from spook signals. From a testing perspective, it is necessary to verify the ranging. Therefore, measuring ToF and AoA is important because the receiver on the vehicle needs to know

the angle and position of the user. To do this precisely

Over-the-Air (OTA) at high-bandwidth and low power is quite demanding.

#### AI: What is UWB used for?

**Neuherz:** Next to securing low-power communication, the key characteristic is precise ranging. While Bluetooth LE ranging can provide a range precision of few meters if the conditions are right, UWB measures the real-time location with an accuracy of few centimeters.

The distance between two objects can be calculated based on the time of flight. It is the time the signal takes to pass from initiator to the responder.

combined with the very low power spectrum density make it possible for UWB signals to share spectrum with other technologies without causing interference.

Impetus has come from the 2020 release of the IEEE 802.15.4z UWB PHY enhancement to the IEEE 802.15.4 standard, making provision for higher data rate, improved ranging and enhanced security. Based on the IEEE 802.15.4a and 802.15.4z standards, UWB enables centimeter-accurate location measurements at a distance of up to 70 meters.

Testing the UWB devices is important in both the laboratory and production line to ensure compliance with regulatory aspects as well as correct function and the accuracy of the positioning.



#### Al: What about testing?

**Neuherz:** You take the time a signal needs from device A to B and back (ToF). On the way back, device B sends information about its time of reply to device A – so it can calculate the ToF.

Accurate ToF estimation requires time measurement at the analog antenna. Measurement is made in the digital domain, but time reference point is in the RF domain. Therefore, this must be calibrated and compensated, and it is necessary to know the time difference between the antenna and the digital time processing.

Because this correction value can vary, it is necessary to calibrate and validate UWB devices. UWB measurements should ideally be done Over-the-Air.

So, we have to come up with a smart solution to accurately measure the ToF. Our R&S CMP200 radio communication tester is ideal for solving UWB test challenges in mass production as well as in R&D. The tester combines the capabilities of a signal analyzer and a signal generator in a single instrument. In combination with Rohde & Schwarz shielded chambers and the company's automatization software WMT, the R&S CMP200 offers a complete solution for transmitter, receiver, ToF and AoA measurements in conducted and radiated OTA mode, compliant to IEEE 802.15.4a/z specifications.

#### This is how it works in practice:

The device under test is put in a shielding cube for Over-the-Air testing. A signal is generated by the R&S CMP200 radiocommunications tester. This enables the signal to be sampled at transmission and receipt which leads to very accurate time measurement.

Through the coupler and switch the signal is passed to the antennas. The answering signal from the device follows the same

route back and is processed by the analyzer within the R&S CMP200. We support both send and receive test configurations as the R&S CMP200 can operate as initiator or responder.

With our three-antenna setup in the shielding cube, we can also measure the angle of arrival. The antenna in the middle is placed with a zero-degree orientation to the device and helps calibrating and verifying the time of flight.

In combination with the two antennas at plus and minus 45 degrees to the device, we can send signals in three different angles. Due to the physical offset of the devices antennas, the device measures a phase offset, also called "phase difference of arrival" and thereby calculates the angle of arrival. A smart channel function divides the tester into multiple sub instruments, allowing the unit to share its hardware with multiple devices and technologies.

The R&S CMP200 can be paired with the R&S CMQ200 mmWave shielding cube to provide a complete FR2 radiated test solution. The combined unit, known as the R&S CMPQ test solution, is a complete solution from a single supplier, which takes ownership and responsibility especially when it comes to operation at the radiated interface to overcome the mmWave over-the-air RF losses and link budget conditions.

#### Al: How has the market reacted?

**Neuherz:** The Bosch Group has selected the R&S CMP200 radio communication tester from Rohde & Schwarz to validate UWB applications in manufacturing. The project is a continuation of a long-term cooperation between Bosch and Rohde & Schwarz in wireless connectivity.



Door opening at a touch.



"Our expansion plan is the offering of finished vehicles logistics with a focus on the European market."

# PCTC line aims to expand into finished vehicle logistics By: Michael Stewart

## Shifts in global logistics distribution patterns have sparked a fresh wave of investment in pure car and truck carriers (PCTC) by shipping lines.

One of the companies investing in new-generation vessels is Sallaum Lines, an international ocean transportation company that has been providing global RoRo cargo shipping services from the EU and USA to North, West, and South Africa since 1991. It is ranked as the 10th largest vehicle carrier in the world with over 3,000,000 Car Estimated Units (CEU) shipped by the end of 2021.

Sallaum Lines' owned and chartered fleet of 10 vessels consists of modern Pure Car &Truck Carrier (PCTC) vessels designed to handle a variety of vehicles and high and heavy cargoes. Sallaum Lines specializes in global

Sami Sallaum, Vice President of Sallaum Lines.

RoRo shipping and vehicle logistics, managing the distribution of cars, trucks, rolling projects and breakbulk to customers all over the world.

#### Automotive Industries (AI) asked Sami Sallaum, Vice President of Sallaum Lines, what services the company provides in addition to seaborne transport.

**Sallaum:** Our expansion plan is the offering of finished vehicles logistics with a focus on the European market. LMC Automotive forecasts a dramatic increase in global vehicle production in 2022, whereby four million additional vehicles will be produced compared to that of 2021. Hence, the global supply chain market size is expected to reach \$42.46 billion by 2027, rising at a market growth of 10.4% CAGR during the forecast period. Therefore, now is the best time for Sallaum Lines to improve its supply chain services for Finished Vehicle Logistics (FVL).

#### Al: Are you investing in new vessels?

Sallaum: With sustainability being a core value in our business,

we are in accordance with the International Maritime Organization's goals to reduce carbon emissions by 40% by 2030. Therefore, our action plan includes placing the orders of dual-fuel LNG ships in the near future. Our fleet currently consists of 10 PCTCs, with a vision to at least double the fleet in the next decade.

Al: Is there a shortage of RoRo vessels and services? Sallaum: The PCTC market has seen a rapid recovery and is currently firm. But it is facing some hopefully short-term challenges due to the lack of semiconductors and the impact of the Russia-Ukraine war on the auto industry. The current

firm newbuilding orderbook remains reconcilable, standing at 7% compared to the sailing fleet.

Another factor for the shortage of RoRo vessels is the limited number of yards building PCTC vessels, with 26-30 months ordering time for potential new vessels. With the positive outlook for GDP growth in the coming years, historically well correlated with car sales, we expect the fleet utilization to stay high and charter rates to remain very firm. **Al: With your expanding service, what** 

ports do you now regularly call on?

**Sallaum:** We are covering over 30 ports within the North and South Atlantic Ocean.

- Our main routes are as follow:
- Europe to West Africa
- Europe to South Africa
- Europe to USA
- Europe to Mediterranean Sea
- South, West and North Africa to Europe
- USA to West Africa

### Al: How are you reducing the carbon footprint of vehicle transport?

**Sallaum:** We have set a long-term target of net-zero emissions of greenhouse gas (GHG) by 2050. The goal and mission are to reduce the  $CO_2$  emissions per transport work by retrofitting our fleet along with greening our operations. Our retrofitting includes fitting fuel optimizers, improved ballast water treatment systems, utilizing cleaner fuels, and installing exhaust scrubber systems.



# Zero-emission cars. Is it even possible without aluminum?

Carmakers are now prepared to go the extra mile, and for many, producing climate-neutral cars is on top of the agenda. Polestar is one of these companies, and the goal is to do so by 2030.

Hydro supports Polestar on their challenging, yet vital journey. But the challenge requires something special: Extruded aluminum solutions with zero-carbon footprint.



Learn more at hydro.com

# Value-added Mediterranean port gateway for Far Eastern vehicle exports By: Ed Richardson

Importers and exporters moving vehicles through the Mediterranean port of Koper are being offered a range of value-added logistics services, which include preparation of vehicles for media launches, mechanical repairs, vehicle modifications and care and maintenance.

Situated in Slovenia, Koper is one of the most modern and largest car terminals in Mediterranean. It handles vehicles on behalf of more than 30 OEMs. Imports originate mainly from South Korea, China, Japan and Turkey, while the European production is exported through the terminal to various destinations. In addition to new and used passenger vehicles, Luka Koper also handles freight and other special vehicles through the Ro-Ro terminal.

> Gregor Belič, Car Terminal Manager, Port of Koper.

#### Automotive Industries (AI) asked Gregor Beli, Car Terminal Manager, Port of Koper, how the port is improving its support for the automotive industry.

**Belič:** By providing reliable and flexible port operations, connected via a vast network of maritime and land connections. This makes Koper one of the important players in the Mediterranean and Europe. In 2021 we handled 656,000 cars, and we were ranked as the leading car terminal in the Mediterranean and the 5th in Europe (by throughput).

Al: Please tell us more about the partnerships with others in the supply chain such as forwarders and transporters

which helped you to overcome the operational challenges of the automotive industry in 2021.

Belic: The port community in Koper, which includes forwarders, rail and road operators, and the customs authority, is connected through a common IT system. This helps to manage volumes and peaks efficiently. We can predict

the arrival of trucks and wagons and organize storage and additional services accordingly.

Constant hand-in-hand cooperation, regular communication and coordination of all partners are the key factors in today's unpredictable and volatile automotive industry.

Al: How has the situation in Ukraine affected the port?

Belič: The situation in Ukraine affected some OEMs, which have suffered from a shortage of certain parts, resulting in a disruption to the supply chains. This, as well as flows to Ukraine which have been stopped, have affected Port of Koper to a minor extent. Our primary hinterland markets are the countries of Central Europe.

Al: Do you provide containerized services to the auto industry (import and export of components, for example).

**Belič:** Yes, our container terminal handles relatively big volumes for the automotive industry, supplying various production plants in Central Europe with components, steel coils, tires, etc. The total throughput of our container terminal was one million TEUs in 2021.



#### Al: What about electric vehicles?

**Belič:** The port is prepared for the growth in electric vehicle volumes through investment in plug points, transformer substations, safety equipment and employee training.

#### Al: Is it a "smart" port?

**Belič:** Digitalization can help save time, reduce costs and help us to respond more effectively to customer demand. Recognizing this the port authorities invested in a modern terminal operating system some time ago. We have optimized work processes and standardized communication with partners.

Truck management is also being digitized to become a purely paperless process.

### Al: What progress is being made in reducing the carbon footprint of the port?

**Belič:** Reorganization of internal port logistics has significantly shortened the transport routes inside the port, which has a positive environmental effect. We are introducing modern lighting systems for storage areas, which bring energy efficiency and enable smarter light management.

The internal fleet is being replaced with EV vehicles which are more sustainable.

#### Al: What are the plans going forward?

**Belič:** Market intelligence is predicting a 4% increase in vehicle throughput in 2022 compared to 2021.

In 2022 we plan to relocate our automotive-dedicated internal truck terminal closer to the exit port gate. The terminal will reduce traffic in the city and optimize the access logistics.

We also plan to acquire new open-storage areas (around 4.000 parking lots) in first quarter 2023. Further expansion of the

storage areas of about 8,000 parking lots is planned to be further developed in next years.

Our goal is to become the most important port in EU for the flows with Far Eastern countries by providing the shortest, fastest and the most sustainable transport route.

The works on the new railway track between Koper and Divača are progressing according to plan, with the end of construction planned in 2026.

The new line will significantly boost the capacity of rail transports of the car terminal, but also of the whole port, which relies heavily on train transport. At present the modal split is 59% for rail and 41% for road.



Some 59% of the landside transport is by rail.



# In-car **safety systems** a priority for new vehicle buyers By: Jon Knox

Recent research confirms the importance of in-car systems that are able to assess the safety status of vehicle drivers and all occupants (pets/children/passengers) in order to trigger alerts to prevent the development of dangerous situations.

The study was part of a national CARAVAN® survey commissioned by Xperi and conducted by ENGINE Insights. It identified car owners' interest (especially Gen Z and Millennials) in secure in-vehicle computer vision technology that provides increasing personalization of the in-cabin experience. Some 98% of respondents said that safety informed their choice of vehicle.

Jeff Jury, Xperi SVP and general manager, Connected Car.

#### Automotive Industries asked Jeff Jury, Xperi SVP and general manager, Connected Car whether the findings were aligned with the known market trends.

**Jury:** They were aligned. The importance of in-vehicle driver and occupancy sensing systems in preventing accidents has become a focus both in the US and abroad – spurring a series of actions globally to encourage automakers' implementation of driver and occupancy sensing systems. That being said, as the pandemic reinforced the importance of the personal vehicle, increasingly, consumers are viewing the vehicle as a third space – an extension of the office or living room – and in fact as an extension of themselves and their digital identity. So, increasingly, vehicles are not just about the utility of going from A to B, but more about the way you feel while you are going from A to B.

AI: Does DTS AutoSense<sup>™</sup> meet the safety expectations of respondents?

**Jury:** While there is no official "rule book" yet, various regulatory bodies across the world such as NHTSA in the US, or NCAP and CLEPA in Europe, are focusing initiatives and regulation

on the kind of in-vehicle safety technology that DTS AutoSense™ provides (and, in some cases, is the only one to provide). We are committed to advancing safety in vehicles in alignment with the driver distraction and passenger safety objectives outlined in the Euro NCAP roadmap published in December 2021.

Xperi pioneered in-cabin sensing (ICS), an Advanced Driver-Assistance System (ADAS) that combines computer vision technologies with computing devices that enable cars to detect changes in drivers and occupants. We believe that ICS systems such as DTS AutoSense will become standard in the vehicles of tomorrow and can form the basis

of new motor vehicle safety standards required by Euro NCAP. Al: How important is a computer vision system in the buying decision?

**Jury:** Very important! 86% of car owners surveyed said that their likelihood to purchase a vehicle would increase if it had a safety-focused computer vision system. The number of accidents, and associated casualties, generated by any form of distraction or by leaving a child or a pet behind in a hot car, has made car owners especially conscious and interested in technologies that contribute to in-cabin safety.

For example, 90% positively viewed a vehicle feature that could sense, in real-time, driver and occupant immediate health, and act on it to prevent accidents. Over half would like a sensing system that adapts their vehicle interior to driver/occupant preferences, such as wheel and chair position.

That survey also uncovered car owners' interest (especially Gen Z and Millennials) in secure in-vehicle computer vision technology that provides increasing personalization of the incabin experience. From sensing the vehicle occupant/driver to automatically customizing playlists, lighting and HVAC systems – to hands-free selfies and pay-on-the-go capabilities.

Millennials (92%) overwhelmingly say that they are more likely to purchase a vehicle model/brand if it had a computer vision system that can detect children/pets left in a hot vehicle, seatbelt status, sudden sickness, driver drowsiness and other distracted driving indicators that trigger alerts.

Unsurprisingly, child safety is a key priority. In-vehicle computer vision systems that detect if a child is present and properly secured in the vehicle are considered beneficial by nine out of ten adults. Seven in ten ranked the ability to detect a child left in a hot vehicle and trigger alerts as their top, or second most important feature. Pet safety (alerts if left in a hot vehicle) is of major importance to over a third of respondents (36%).



#### Al: What about privacy?

**Jury:** Fortunately, technology provides the solution to privacy. Xperi's product designs have privacy at their core. 'Privacy by definition' is key in enabling personalized experiences through sensing technologies, while eliminating the distrust associated with the concept of "monitoring."

This can be deployed through edge computing, where data is processed and stored temporarily by, or near, the devices that collect it. The data stays within the vehicle, and is not transmitted to the cloud or stored or processed by a remote server.

### Al: What does the journey from concept to the computer vision enabled vehicle look like?

**Jury:** The reality is that there is no "one size fits all" deployment. Each deployment is unique, and each feature set needs to consider both the platform specifics and the needs of the partner.

Our engineering is defined equally by the way we develop software and by the tools we use to develop it. Our goal is to deliver the highest quality code for production. There are two areas of focus for our processes: One is centered around compliance through the quality management system, with an emphasis on integration of business processes. The other is focused on engineering best practices and automotive standards compliance, such as automotive SPICE (Software Process Improvement and Capability).

Al: When will see the first vehicles with DTS AutoSense?

**Jury:** Our DTS AutoSense Driver Monitoring System has been on the road since 2019, while our world's first Occupancy Monitoring System (OMS) hit the road in 2021. It includes technologies such as occupant detection, emotion detection, child and child seat presence detection as well as pet detection. Our OMS uses a single camera and leverages our extensive experience with image processing (20+ years) and artificial intelligence. The technology can also enable personalization of infotainment recommendations, in-cabin temperature adjustments or any setting that can be adapted to a user's specific taste.

### Al: How do you envision the in-cabin experience of tomorrow?

**Jury:** We believe that tomorrow's vehicle can become a (very safe) third space rather than just a transportation device – with the cockpit a place of relaxation, where content consumption (music, movies), working or socializing can take place – one that



is personalized and allows a seamless transition from 'at-home' to 'in-vehicle,' with the vehicle sensing all the music and comfort preferences of the driver/passengers, then automatically adjusting.

Because computer vision and sensing capabilities can also be combined with entertainment, we see a future where this technology can help define preferences for the driver and passengers – and go many steps further – creating an even better, and safer, in-cabin future. DTS' in-cabin products, including DTS AutoStage, which combines over the air broadcast with IP-delivered content for a robust, rich, personalized in-cabin infotainment experience, is well-aligned to deliver just that.

As vehicle automation and self-driving vehicles advance, the interior of the vehicle can transform into a mobile conference room, or an extension of the driver/passenger's mobile device, enabling them to generate and interact with social media content. Xperi enables extraordinary experiences, and this is what we will do for the in-cabin space with our innovative technology.





# Sustainability and innovation complement each other By: Tony Tickner-Davidson

Automotive companies wishing to remain competitive or even stay in business are having to re-engineer their entire manufacturing and assembly value chains in order to minimize the impact of their operations on the environment.

Automotive Industries (AI) asked Patricia Heidtman, Chief Innovation and Sustainability Officer at Sika how the company is becoming more sustainable.

**Heidtman:** Sustainability permeates the entire organization and is an essential driver in developing competitive solutions for demanding markets and emerging customer needs. It is the strategic target of Sika to enable sustainable construction and transportation solutions that directly contribute to lowering the environmental footprint along the value chain. Sustainability encompasses the quest for alternative, renewable materials, low carbon solutions, new recycling concepts, more efficient production methods like modular building, resource members of organizations and initiatives like World Business Council of Sustainable Development (WBCSD) and Together for Sustainability (TfS), and collaborate with many stakeholders to reach sustainability benefits throughout the value chain.

AI: How does sustainability align with your growth strategy?

**Heidtman:** The Sika Growth and Sustainability Strategies are closely linked to each other: The Sika Growth Strategy 2023 ensures long-term success and profitable growth. The company's innovative drive combined with sustainability is a key component. Sustainability is the overarching principle with the overall goal to reduce the  $CO_2$  emissions (scope 1 and 2) per ton sold by 12% until 2023.

Furthermore, the Sustainability Strategy "More Value – Less Impact" 2023 refers to Sika's ambition to maximize

the value of its solutions and contributions for all stakeholder groups, while simultaneously minimizing the risks and resource consumption associated with value generation. With its sustainability strategy, Sika pursues six strategic target areas, focusing on climate performance, energy, waste/water, community engagement, occupational safety, and sustainable solutions.

Al: How do you identify and process key sustainability topics?

Heidtman: The goal is always to increase customer benefits with innovative products, improve

human living standards, while at the same time minimizing the use of resources and the burden on the environment. To align the sustainability strategy with stakeholder expectations, Sika regularly processes a materiality analysis. The materiality analysis 2022 is based upon the feedback of more than 1,000 stakeholders and allows us to identify the most important ESG/ Sustainability topics, opportunities, and risks for the business from two perspectives: their importance to Sika stakeholders and their impact on Sika's business.

Patricia Heidtman, Chief Innovation and Sustainability Officer and Member of the Sika Group Management

efficiency, health and safety at the workplace and in living spaces, enhanced flexibility in product application and production, and digitally enhanced product solutions and applications.

#### Al: How do sustainability and innovation fit together?

**Heidtman:** Combining innovation and sustainability allows Sika to strengthen and accelerate its concept for enabling sustainable construction and transportation by placing sustainability aspects at the core of strategic and operational innovation processes, while simultaneously driving operational efficiency and excellence across the organization. We are active

### Al: What does Sustainability mean in terms of customer focus?

**Heidtman:** Sika takes a holistic approach based on the three pillars of environmental, social and governance aspects. Our company targets the development of proprietary technology that provides both performance and sustainability benefits and thus allows Sika's product platforms to respond to global trends such as resource saving building methods, energy-efficient and low-emission construction materials, high-speed manufacturing processes, modular construction, and lighter and safer vehicles.

Key projects focus on high-performance components with tailored features, smart refining techniques for polymers and surfaces, renewable and biobased materials including recycling processes and sustainable construction methods, and digitalized manufacturing technologies such as 3D printing.

The objective is to help customers meet the challenges they face by introducing new products in response to tighter climaterelated and chemical regulations, increased sustainability awareness among their customers, and shortage of skilled labor.



Sika's fire protection coating for battery casings can be easily and efficiently applied, and offers the highest level of safety

### Al: Sustainable Solutions are one of Sika's target areas. What does that refer to?

**Heidtman:** The Sustainability Portfolio Management (SPM) concept is the backbone of the "Sustainable Solutions" strategy and how the company makes sure that its cutting-edge products always combine performance and sustainability benefits. SPM links Sika's strengths and innovation-driven product strategy with sustainability and facilitates strategic alignment.

SPM provides guidance and definitions for a shared understanding of a "sustainable solution" and of how it is measured and communicated in a reliable and fact-based way in the markets. Sika uses methodology to assess both performance and sustainability-related risks and opportunities of producttechnology combinations in defined segments in which Sika is active. This will lead to a deeper understanding of the sustainability performance of Sika products and solutions portfolios, focusing on new developments and identifying mitigation actions for existing products by reference to innovation priorities, and portfolio actions.

### Al: How do you promote sustainability in your organization?

**Heidtman:** A network of Regional Sustainability Managers, coordinated by the Innovation and Sustainability team, has the objective to strengthen the rollout of the sustainability strategy at regional and local levels.

Local operations managers are responsible for implementing initiatives helping Sika's targets to be met and for setting and achieving local targets. To facilitate the interaction and align the various initiatives, an internal Sika Sustainability Committee was established. This committee steers and coordinates all sustainability-related projects aimed at achieving sustainability targets and monitoring proper implementation of the Sustainability Strategy throughout the Group. It also prepares the decision-making of Group Management on such topics. We promote training and have created a "Sika Sustainability Academy" to run capacity building programs.

### Al: What do you focus on in your community engagement program?

**Heidtman:** Sika is helping local communities to build up and maintain infrastructure for social projects. This is because besides its automotive and industry business, Sika applies its products for bonding, sealing, damping, reinforcing, and protecting. Important elements of community support encompass the advancement of education and vocational training, as well as projects that focus on water and climate protection. We collaborate with existing charity organizations and Sika staff are contributing to those activities through volunteering work.

AI: How are you engaging with suppliers and customers? Heidtman: Collaboration is key and while do our own homework in reducing the impact of our production and logistics, we also see ourselves as enabler for our customers to reach their own targets through improved vehicle efficiency and battery e-vehicles, and at the end-of life with improved recyclability concepts. As purchased goods and services account for the major part of our footprint, we investigate potentially more sustainable raw-materials and invest into responsible supply-chain sourcing.

Al: Does your cooperation scheme include competitors? Heidtman: Yes, of course. Fighting climate change is an ambition we share with our competitors and the other stakeholders in the industry. We collaborate in the relevant global organizations like the "World Business Council for Sustainable Development", where we participate in working groups and case studies. Or the "Together for Sustainability" initiative, where Sika is chairing a workstream which aims to develop a global solution for scope 3 greenhouse gas emissions, product carbon footprint calculation and sharing.

#### Al: Where to next for Sika in terms of sustainability?

**Heidtman:** The aim to become a net zero company pushes us to the next level of this very meaningful and challenging sustainability journey. It affects our production, the product portfolio and our entire organization. Our automotive customers push the concepts of zero emissions and circularity ahead at high speed and we can support them with solutions that are in line with their own targets through every step of the value chain with concentration and alignment on our own.





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