

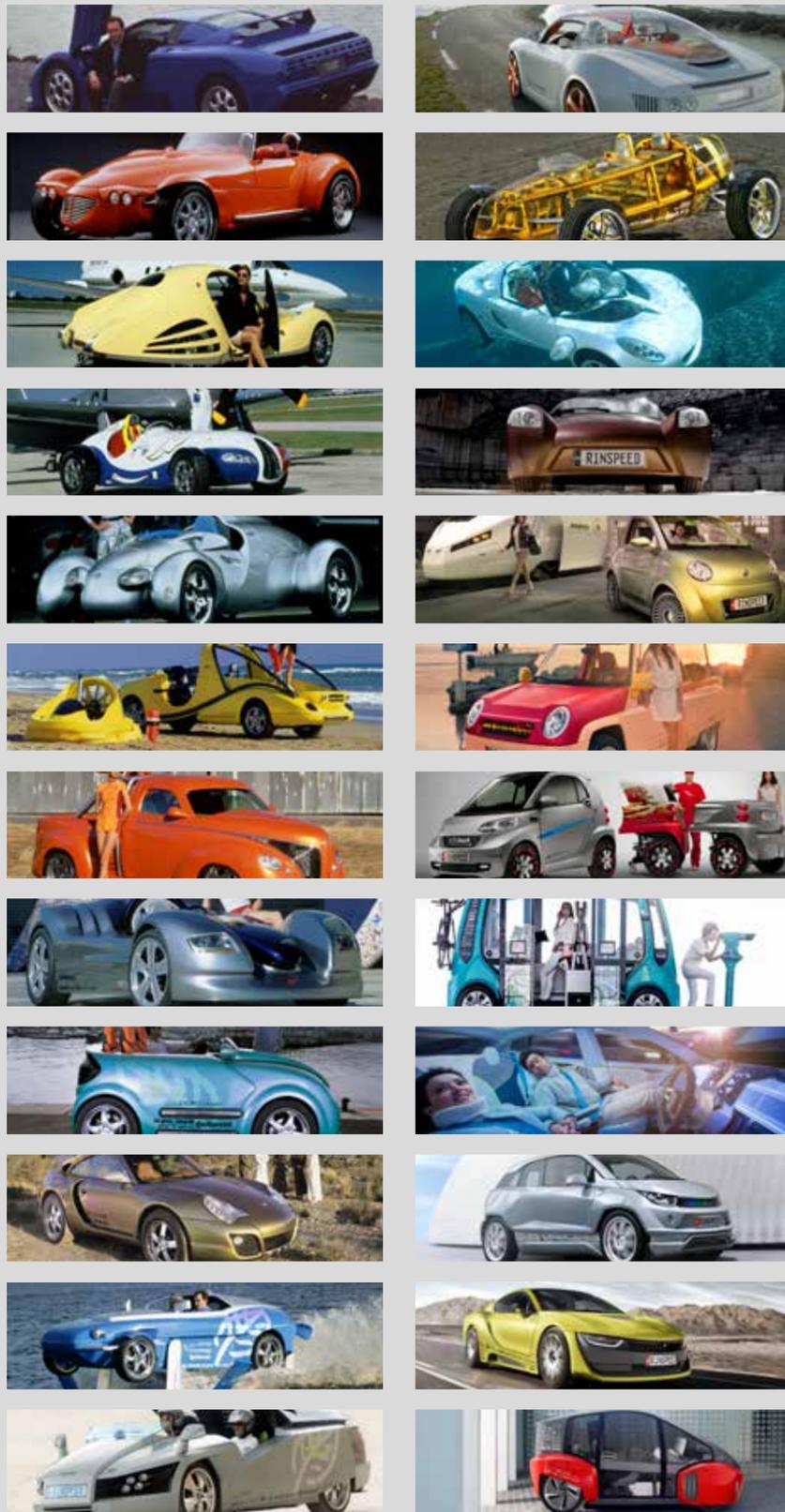
RINSPEED

PRESS BOOK 2018



+

snap



THE MAGIC 24

The day of my birth is listed in my vital records as being November 24. Like almost certainly all of us, I don't have any real recollections of it. My life partner was also born on the 24th day of a month, only my daughter quasi ran a week behind schedule. In turn, she grew up to become an extremely "upright," fantastic, and lovable woman. Good "things" take time, as we all know.

With the "Snap" illustrated in this book - my 24th own concept vehicle by the way - I want to explore entirely new avenues. Why do I have to make a distinction between mobility and immobility? Why wouldn't I be able to try dissolve these previously sharply drawn boundaries? Question things, expand on ideas, polarize, and stimulate discussions? If this is accomplished, I have already achieved one of my important project objectives.

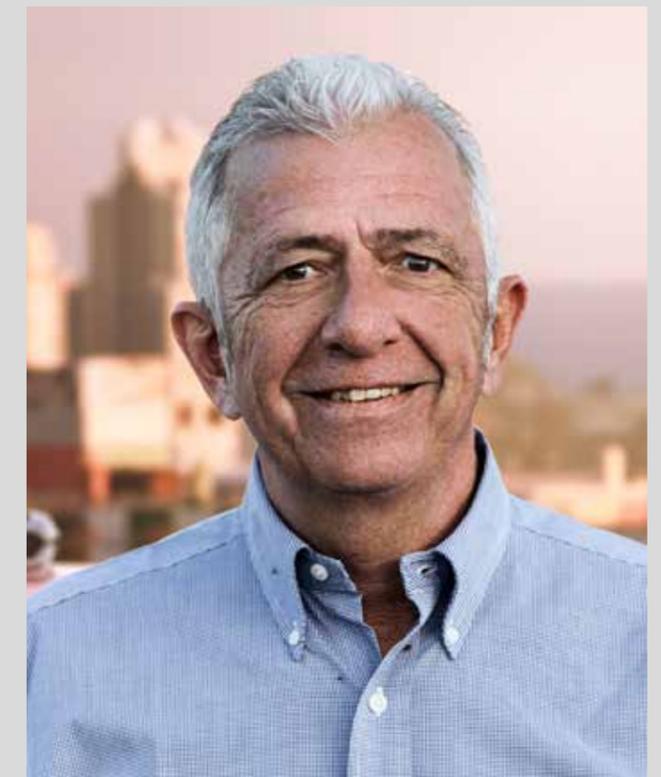
The auto industry is facing the arguably biggest challenge in the more than 120 years of its existence. In particular the advent of information technology under and in the sheet metal will - in my personal view - require rethinking the vehicle and mobility concepts from the ground up. Why? The lifecycles of mechanical systems and IT systems are diametrically opposed. And if we put creed in Moore's law dating from 1965, things will not get better in future, they will only get "worse," because the mechanical systems will become more and more robust, while the IT systems at the same time demand ever more performance. Today's approaches will not be able to effect the necessary harmonization of these still largely ignored timelines to be sure.

Disruption is called for - not in the already overused sense, but in fact - because the traditional top-down market introduction will become obsolete. And the "Snap" is intended to evince one possible avenue for solving the problem. However, no one knows which one it will ultimately be. I don't either. But let us think about it and discuss it.

Many thanks go especially to my creative and indefatigable team, my esteemed partners and helpers, and my family. Without them all, none of these 24 concept would have ever become reality.

And: The "Snap" will accompany my 40th presentation at the Geneva Auto Show. There is the 4 from the 24 yet again... As a Swiss national, I thankfully don't suffer from tetraphobia.

Warmly,



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CES LAS VEGAS 2018: RINSPEED SNAP -
THE SUM OF ITS PARTS IS GREATER THAN THE WHOLE

SNAP - LET IT CLICK!

Self-driving cars, stuffed full of short-lived IT components, will help solve the transport problems in urban areas in the foreseeable future - and not just there. To this end, Swiss powerhouse of ideas Rinspeed has designed an elaborate and unparalleled mobility ecosystem in its latest concept car, the "Snap." Rinspeed boss Frank M. Rinderknecht makes the hardware and software, which is bound to be outdated quickly, part of the high-wear chassis ("skateboard") - and separates it from the durable passenger safety cell ("pod"). From now on, they both will go their separate ways - whereby the pod can even be useful when stationary: it can be anything from a variable shopping pod or a spacious camping pod to a cozy cuddling pod and even provide a breathtaking, fully connected user experience for the occupants of the passenger cabin. The sky is here the limit for the possible applications.

The Swiss mobility visionary uses an ingenious trick to disentangle the different lifecycles of various automotive components: The skateboard carries the durable mechanical and the fast-aging IT components. They are recycled after a few years of intensive use once they have reached the end of their design life, while the much less stressed pod is able to remain in service for much longer, before it also must be sent to recycling. This benefits the environment, because it plays a significant role in conserving natural resources.

Almost as an aside, the innovative Swiss solve a problem that many know from the navigation systems in their own vehicles: they no longer find the way, because software and map data are outdated. What is merely annoying here can quickly become a safety issue in self-driving cars in the near future.

No question, when it comes to the Snap, the name really says it all, because everything fits together perfectly and can be snapped together. In keeping with a tried and proven tradition, the twenty-fourth concept car from Rinspeed was again designed at Swiss company 4erC and technically executed at Esoro. An extensive study of the Snap ecosystem conducted by EY shows its (virtually) unlimited possibilities. The electric

vehicle - as always when Rinderknecht is at work - is chock-full of technical and visual finesse, contributed by a reputable network of global companies. The two steering axles along with the integrated electric powertrain come from ZF. They allow the Snap to turn practically on a dime and produce no emissions in urban traffic. The Snap runs on weight-optimized and stylish 7x18 Borbet alloy wheels shod with tires of size 205/40-18, which are optimized to minimize fuel consumption. By the way, all adhesive bonds in and on the Snap are realized with innovative adhesives from Sika Automotive.

Optionally, there is even a 'personal assistant' in the form of an autonomous, intelligent robot to accompany the occupants. It will also be happy to help with running errands, carrying purchases, or handle other tedious tasks.

The city runabout is brimming with sensors. For example, US company Gentex is contributing the Iris scanner for occupant detection and dimmable front and rear glass elements, which can also be found on the Boeing Dreamliner. The sophisticated Lidar sensors from Ibeo in Hamburg ensure that obstacles on the road are detected by means of real-time measurement of the light reflections. The Harman Autonomous Drive Platform that is part of the skateboard makes safely moving through city traffic possible. It uses the NXP BlueBox, a sensor fusion solution. In turn, the Smart Antenna, jointly developed by NXP and Harman, ensures safe communication to the world outside as well as a high-speed connection to the Harman Ignite Cloud Platform. With 5G, Car2X, radio tuner, BT, and WiFi, it covers the entire spectrum of wireless networking possibilities. Sprint, a leading US telecommunications company, is committed to ensuring stable networks. Moreover, with highly-sensitive pod recognition and its customized Smart Access solution, the chip giant NXP offers a broad range of technologies that show promise for the future. Europe's leading business software company SAP contributes by enabling the digitized ecosystem through innovative technologies and software





solutions in the areas of smart cities, connected health, connected mobility, and transportation. And TomTom provides HD maps for autonomous driving and navigation technologies that enable predictive driving for passengers' comfort. Finally, the Israeli start-up Valens's HDBaseT Automotive connectivity technology connection is responsible for the fast and secure transmission of even ultra-high-definition, high-resolution multimedia signals between the numerous vehicle components.

An innovative marketplace net from MHP allows custom use of the wide variety of pods and skateboards with a wide range of service providers. Also not commonplace for a concept vehicle: The transmission of data and information was independently and impartially tested and certified by Dekra, the globally operating testing and certification experts. And who supplies the electricity for all these consumers? It flows into the vehicle via the quick-charging cable with high-voltage technology from Harting based in the East Westphalian town of Espelkamp.

Harman developed the 'True Level 5' HMI, an operating concept perfectly tailored to the needs of changing passengers in a fully autonomous vehicle. The goal of the development: maximum possible individualization paired with optimal protection of personal data. To this end, there is three-level user authentication, depending on the desired personalization. A token unlocks the vehicle and customizes the displays.

Personal cloud content is available after identification by face recognition. As a result, the voice-controlled intelligent personal assistant knows the preferences and habits of each passenger and suggests, for example, a suitable restaurant for every passenger, depending on personal preferences. In addition, a third level of biometric identification is required if health data of the passenger are to be recorded and analyzed.

Each passenger has three displays at his disposal for interaction. Personal settings are selected with the 'Personal Control Panel' featuring an interactive control dial. Personal contents and messages are shown on the touch-controlled 'Hover Tabs,' which are brought into position by swiveling arms. Two large centrally placed screens provide route information and movie enjoyment. The Lexicon surround sound system with Ambisonics Escape signal processing delivers a unique audio experience with all applications.

The Snap uses six projectors to communicate visually with the outside world. Two of them use the windshield and the rear glass to send full-color messages to other road users such as 'Right of way granted' or 'Caution, children.' Four laser projections on the side windows are used for communication with boarding passengers. The necessary functional interlayers for all-round glazing come from the Japanese manufacturer Sekisui.

There is also a host of technical innovations in the appealing exterior of the Snap, which is more reminiscent of architecture than of automotive design. For example, from German lighting specialist Osram Opto Semiconductors, which installs digital license plates as well as the entire lighting system - including interior LEDs that emit ultraviolet light to render bacteria harmless and thereby improve hygiene. The front and rear panels as well as lighting elements in the rocker panels are multifunctional and can display multimedia contents. They come from US company Techniplas, a leader in the design and manufacturing of engineered products for mobility. The safe swapping of the pods is ensured by lightweight-design supports from Swiss Company Georg Fischer.

The wellness features of the interior play a vital role in self-driving cars. In this area, Rinspeed has for years rightfully relied on the innovative Swabian textile developers at Strähle+Hess, who work with Dutch company Stahl, the world market leader for leather and man-made surfaces in automotive interiors. Functionality goes hand in hand with the discriminating design standard. The occupants relax on naturally soft leather from automotive leather specialist Bader. The storage systems from Dr. Schneider Unternehmensgruppe, some of which are even portable, offer optimal storage space complete with cup holders and wireless charging system. The portable storage compartment is a truly clever solution. Also able to convince is surface specialist Benecke-Hornschuch

Surface Group with its groundbreaking and partially translucent materials used on seating areas, storage facilities, floor, and as side panels. With traditional Korean Sanggam printing for seats and trim, the South Korean upholstery fabric manufacturer Kolon sets accents in the interior. Now then, time to lean back and drink some fresh tea. That is another thing the Snap designers also thought of! Mint and strawberries for homemade and healthy infusion drinks grow in urban farming containers from Kostal.

Snap - rarely has a concept car more precisely described the problems an entire industry has with the different lifecycles of various car components - and offered up an interesting solution at the same time. Maybe something goes 'click' with many who will marvel at the new creation of Swiss mobility mastermind Frank M. Rinderknecht at the CES in Las Vegas and in spring of 2018 - in the backyard of the Swiss national so to speak - at the Geneva Auto Show. As always professionally staged by Saarland ad agency Vollmond.



MASSE BASISFAHRZEUG

Länge	4'685 mm	Length
Breite	1'960 mm	Width
Höhe	1'842 mm	Height
Radstand	3'250 mm	Wheelbase base vehicle
Leergewicht	app. 1'700 kg	Empty weight

MEASUREMENTS BASE VEHICLE

ANTRIEB

Antrieb	28 kW (cont) / 51 kW (max)	Power
Lenkwinkel	ZF - app. 70° front / 14° rear	Steering angles
Kraftübertragung	Hinterachse / rear axle	Power train
Batterie	12kWh LiFePO4	Battery

POWERTRAIN

WERTE

Höchstgeschwindigkeit	> 80 km/h	Top speed
Beschleunigung 0-100 km/h	5,0 s	Acceleration 0-100 km/h
Reichweite elektrisch	100 km	Electric range

PERFORMANCES

FAHRZEUGAUFBAU

Karosserie	Composite Struktur mit Stahl-Chassis Composite with steel chassis	Body
Sitzplätze	4	Seats
Beleuchtungsflächen	Techniplas	Lighting panels
LED-Technologien	Osram	LED technologies
Dichtungen	Sika Automotive	Sealants
Innenraum-Design & -Materialien	Bader / Benecke-Hornschuch/ Kolon / Stahl / Strähle+Hess	Interior design & materials
Sicherheitstechnologien	ZF Friedrichshafen	Safety technologies
Leichtbau-Hebestützen	GF Automotive	Light-weight lifting stanchions

VEHICLE SETUP

BEREIFUNG

Bereifung vorne + hinten	225/35 R18	Front and rear tires
Felgen vorne + hinten	Borbet Design V 7J x 18"	Front and rear wheels

TIRES

VERSCHIEDENES

Multimedia/Infotainment	Harman	Multimedia/Infotainment
Kamera- und Radar-Sensoren	ZF Friedrichshafen	Camera and radar sensors
Lidar-Sensoren	Ibeo	Lidar sensors
Iris-Scan	Gentex	Iris-Scan
AD-Compute-Plattform	NXP Bluebox	Autonomous Driving Platform
Prüfungszertifikate	Dekra	Testing certificates
Funktionale Verglasung	Sekisui	Functional glazing
Ladestecker	Harting	Charging plug
HDBaseT-Technologie	Valens	HDBaseT technology
Integrierte Navigation	TomTom	Integral navigation
Mobility Farming	Kostal	Mobility Farming
Ablagefächer	Dr. Schneider Unternehmensgruppe	Storage bins
Eco-System / -Management	MHP / SAP	Eco system / -management

MISCELLANEOUS

Alle Angaben ohne Gewähr

All data without guarantee

4ERC GMBH CREATIVE - CLEAN - CAR - CONCEPTS THE COMPANY OF PETER KAEGI

For 19 years, Peter Kägi is the leading project manager and the technical father of the Rinspeed motor show projects, Frank M. Rinderknecht and him connect many creative moments.

For 30 Years, the owner of 4erC works with electric vehicles, the range goes from a power of a few kilowatts up to several hundred kilowatts.

The consulting and development company 4erC works on vehicle projects for OEM and industry. Focus on: concept, project management, package, lightweight construction and fiber composite.

Do you want to invest in this area and you have open question?

Ask us.

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Leather, the tanned, preserved animal hide, is one of the oldest man-made materials. The charm that leather radiates has been preserved over thousands of years until today. We use leather for shoes, bags and furniture. Leather is also indispensable in a high-quality automobile interior. Leather is a unique natural product that stands for quality, durability and comfort. Above all, as a material for seat covers, it can fully exploit its advantages. No other material can achieve these special quality characteristics of leather.

Bader has been producing leather for 145 years and special automotive leather for over 35 years for all renowned OEMs worldwide. In order to stand our ground successfully as a company, we must constantly face challenges and develop innovations. So we didn't have to think twice when Rinspeed AG approached us with the request to participate in the concept car „snap“.

This visionary study shows where the journey will take us in the future. In addition to electric drive and autonomous driving, the vehicle offers an almost unlimited number of possible uses. Passengers who no longer intervene in the traffic situation themselves will have more time to perceive the interior of the automobile in the future. Material, quality and design will be experienced more intensively and thus become even more important. At the same time, the demands on ecology and sustainability are increasing. Every company is called upon to optimise its products in this respect.

Despite all the technical possibilities available to us today in leather production, it is important for us to ensure that leather remains perceivable as an authentic natural material. The focus should be on the natural characteristic features: the pleasant surface, the typical leather structure and the warm feel.

Together with Stahl, one of our partner for tanning and finishing systems, Bader has created a particularly environmentally friendly and sustainable leather for „snap“. It starts with the raw material, which Bader is selecting very carefully. In the tanning process, we rely on natural, renewable resources made from plant ingredients.

High demands are made on automotive leather. In order to fulfil these requirements, the leather surface must be provided with a so-called finishing. This is the only way to guarantee the specifications for abrasion, lightfastness, hot light ageing or perspiration resistance, for example. The finishing that we have used for the

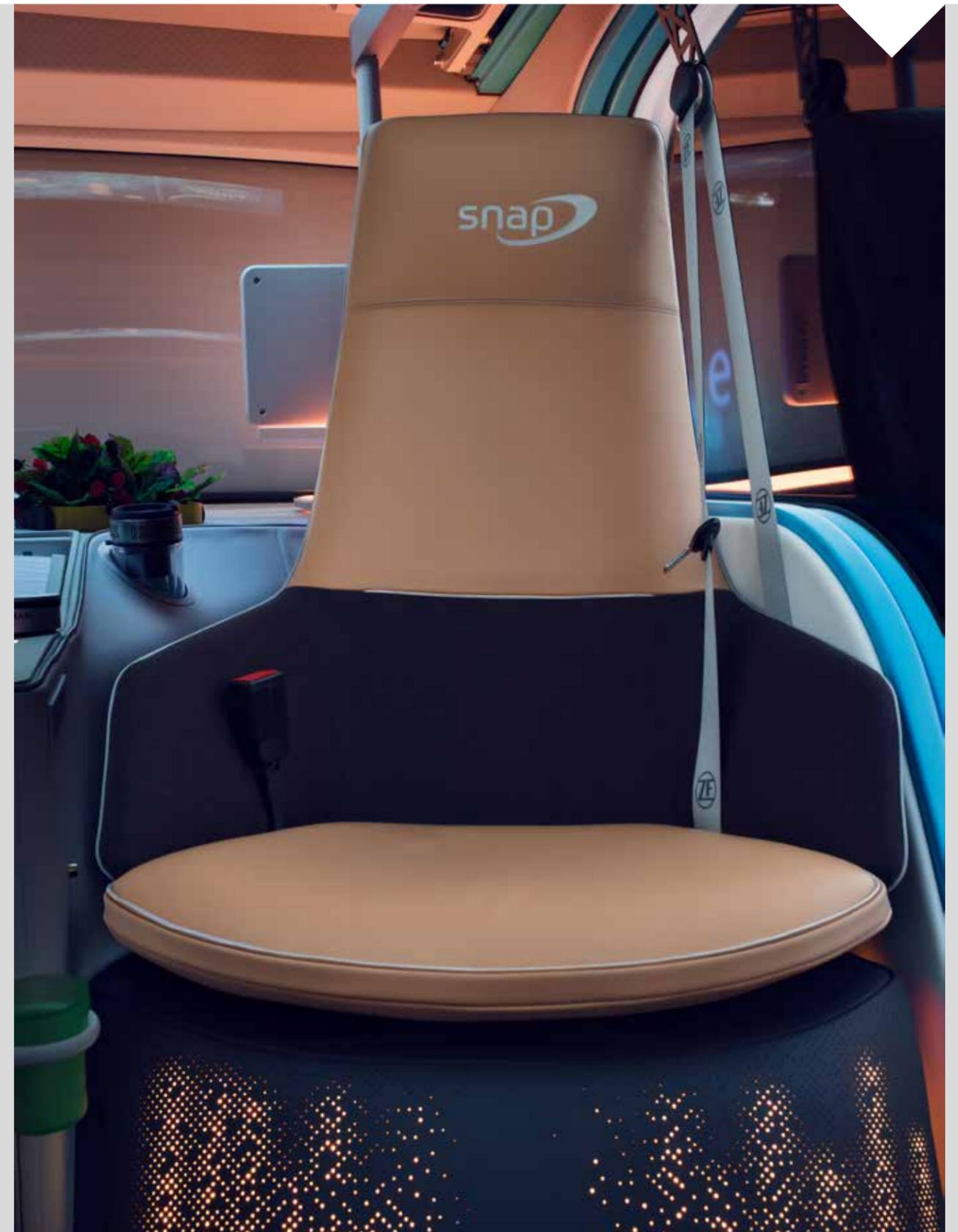
„snap“ leather has been reduced to a minimum thickness on the one hand, and on the other hand we also used components based on renewable resources such as rape oil instead of petroleum products. By a special recipe the finishing is stain-resistant and leather surface is more simply to clean. Energy and water consumption has been significantly reduced during the entire production process compared to a standard production process. When punching out the leather for the cut parts, natural features such as grooves, wrinkles and irregularities were deliberately used to accentuate leather as a natural material.

The warm reddish beige shade we have chosen for the leather makes the seats look light and pleasant. Circumferential and inserted pipings as well as partly visible seams with handcrafted appearance give the seat a valuable character. The armchair-like shape with its high backrest is inviting and offers comfort even on longer journeys. The seat, strikingly rounded at the front, makes it easy to get in and out in all directions. The black, textile insert in the lumbar support area clearly divides the seat into seat surface and backrest, and the two side bolsters, elongated to the front, provide lateral support and serve as arm rests. Those areas of the seat that come into direct contact with the passengers are covered with leather. This is where our material scores with all its assets such as comfort, breathability and durability.

We would like to thank Rinspeed AG and all colleagues at the participating partner companies for their friendly and inspiring cooperation. We are proud that we were able to make our contribution to this exceptional and forward-looking concept vehicle.

About BADER

BADER was established in 1872 in Göppingen as a shoe leather tannery and is a leading leather producer in the global automotive market. BADER has a staff of 11,300 employees at 13 state-of-the-art facilities located on five continents. Here, innovative ideas are transformed into designs, products and processes are researched and developed, leather hides, die cut components, and seat covers are produced. Many things have changed at BADER over the course of time, however, our passion for producing premium leather has remained constant since 1872.



Interior Visions

INSIDE SNAP

Things have just clicked again. The Rinspeed SNAP is the sixth cooperation entered into by Frank M. Rinderknecht with Hornschuch, which is now known as the Benecke-Hornschuch Surface Group. The world's leading specialist in sophisticated design, high-quality materials and fascinating surfaces in the vehicle interior was already on board as a partner for the Rinspeed Concept Cars sQuba (2008), Bamboo (2011), Dock+Go (2012), Micro-Max (2013) and Budii (2015).

"After we had been responsible for the entire color, structural and material concept in the interior of the Budii, our own concept car was only a logical step," says Ralf Imbery, Director of Design at the Benecke-Hornschuch Surface Group. THE PIONEER, the name of the show car, consistently implements the „New Business“ concept with 14 new materials. These stand out with their exceptional colors and structures, reflections, metallics, cutouts, breathability and vegan leather. "THE PIONEER was the first of its kind. The platform enabled us to demonstrate our material and design expertise," says Imbery.

Although THE PIONEER was a great success, the insights in this case are even more profound. "At Continental, everything is based on the motto 'The Future in Motion' – and as a surface specialist we are no exception to this," explains Imbery. Which concepts are suitable for the mobility of tomorrow? What will we be moved by in the future? And what are the roles of design and functionality in this? Imbery has the following answers: „Of course, design is important when we speak about surfaces. But in the future it will be necessary to develop a perfect combination of design and functionality so that they harmonize with one another. We live in a world in which the technical demands placed on our products are constantly increasing, for example when we think of antibacterial and antimicrobial equipment. At the same time, surfaces should look good and feel interesting. Light in particular opens up many new possibilities for us in this respect. We are talking about black panel technology or switchable surfaces with integrated sensors. On the way to a future where design and function are directly linked, it was easy for us to get excited about the Rinspeed SNAP. The overall vehicle concept with chassis (skateboard) and body (pod) and their SNAP connection is once again a highlight."

"The SNAP concept plays into our hands," says Imbery, „the vehicle will be mainly living space in the future, although it is also an office, means of transport, cinema, relaxation zone and much more at the same time. But no matter how we use the vehicle, we – the Benecke-Hornschuch Surface Group – are the interior specialists and are able to support and connect the different forms of use together in the best possible way. We are involved in the Rinspeed SNAP 24/7 – we provide people with support for our surfaces 24 hours a day, 7 days a week."

The following three materials cover the largest portion of the pod when taken together. **skai® Hexy**, a TPO material, displays its strengths on the floor. The innovative design shows the slightly washed-out print of the geometric shape of the hexagon, which is deliberately depicted here in an organically alienated form in contradiction to the formal structure. As a result, the contours are pronounced to a varying extent, with the hexagons appearing sketchy, positioned partly on top of each other and thereby producing a modern, cool look. The colors blue on gray were intentionally chosen because the SNAP interior is itself dominated by blue and gray tones. The structure of the print is imperceptible from a distance, with the material acting like a homogeneous gray surface. This only reveals itself from up close. **skai® Hexy** has an ultra-matt surface with sand embossing that provides a slip-resistant effect at the same time. The PVC-free material comes from the **skai® TransPorter Collection**. It is 3-D formable, robust, resistant to abrasion, oil and chemicals. Thanks to its easy-care properties, it is predestined for use in the footwell and cabin areas. The **skai® TransPorter Collection** has received the German Design Award – Winner 2017.

Acella® Hylite in slate metallic is used in the lower seat area, the seat base. The deeply embossed material is backlit. It consists of a raised printed surface and a black covering layer which is translucent. The ambient lighting is intended to create or support different moods, depending on the form of use. The backlighting is provided by LEDs from Osram, with the frequency, gradient and coloration being controlled by Harman. When the light is off, the disappearance effect can be observed, so that the material then appears to be gray-blue with a shimmering effect. As a result, **Acella® Hylite** appears to be very different in the ON and OFF states, with the perception resulting from the



color change being completely different. The Fade embossing with its gradual top-down tapering structure also contributes to this effect.

Acella® Hylite is also used for the shelves behind the seats – here in the color cashmere metallic, a lighter gray. The color scheme follows a color concept that becomes increasingly lighter from the floor to the ceiling. The disappearance effect can be observed here once again – the embossing is regular, the backlighting partially provided by LED panels from Osram.

With **skai® Neptun Ravenna**, the seat beltlines and frames are adorned by an almost indestructible off-white material. The light color is not a problem, as a nanocoating makes the material particularly insensitive

to dirt. It is actually designed for outdoor use, very hard wearing and stable to UV light. The matt surface of **skai® Neptun Ravenna** is refined by its fine sand embossing.

Digitally printed **d-c-fix®** stripes in graffiti style are stuck on the skateboard. Not only the geometric arrangement, but also the different types of fonts are a typical feature. The terms address current social topics such as autonomous driving, connectivity, the eco-system and urban mobility. With their street art-inspired design, they provide the skateboard with an urban look and feel – and therefore street credibility.

„SNAP“ UND BORBET – DER ENTSCHIEDENDE KLICK MEHR.

Die Zukunft des Fahrens ist nicht nur emissionsfrei und autonom, sondern kann auch sehr modulare Wege gehen - hin zu einer intelligenten Verknüpfung von Personen- und Warentransport mit dem Vorteil einer variablen Nutzung. Während manche Visionäre in punkto zukunftsweisender Logistik bereits von einem Himmel voller Drohnen träumen, bleiben die Zukunftsexperten von Rinspeed aber auf dem Boden der Tatsachen und hier kommt der Kompetenz von BORBET wieder eine entscheidende Rolle zu.

In der Zusammenarbeit zwischen Rinspeed und BORBET hat es wieder einmal „Klick“ gemacht. Wie schon in vielen Projekten zuvor haben die eidgenössischen Vordenker auf die besondere Design- und Produktqualität der Sauerländer Räder-Experten gesetzt. Für die Konzeptstudie „SNAP“ fand Rinspeed in BORBET wieder den idealen Partner. Gemeinsam stehen sie für Innovationsgeist und Qualität und garantieren ein völlig neues Fahrerlebnis.

LEIDENSCHAFT FÜR LEICHTMETALL

BORBET – das Familienunternehmen in vierter Generation – kann auf über 130 Jahre Tradition und Erfahrung in der Metallverarbeitung zurückblicken. Seit 1977 liegt der Fokus auf der Entwicklung hochwertiger Leichtmetallräder, mit denen sich das Unternehmen innerhalb von vier Jahrzehnten zu einem der führenden internationalen Hersteller entwickelt hat. Heute ist BORBET mit über 4.800 Mitarbeitern, acht hochmodernen Standorten und jährlich ca. 18 Millionen produzierten Rädern Partner von über 40 Automobilherstellern und -manufakturen sowie dem internationalen Fachhandel. BORBET legt großen Wert auf eine hohe Kundenorientierung fokussiert auf die Bereiche Engineering-, Produktions- und Vertriebsprozesse. Naheliegendermaßen also, dass auch Rinspeed auf die Erfahrung, Flexibilität und die innovativen sowie nachhaltigen Herstellungsverfahren des Leichtmetall-experten vertraut. Bereits zum fünften Mal in Folge stattet BORBET eine Rinspeed Konzeptstudie mit Rädern aus und zeigt, wie nachhaltig die gleiche Leidenschaft für die Zukunft der Mobilität sein kann.

AUSGEZEICHNETE INNOVATIONSKRAFT

BORBET fördert systematisch die Weiterbildung seiner Mitarbeiter und treibt die Entwicklung neuer, innovativer Herstellungsverfahren voran. So verbindet zum Beispiel das von BORBET entwickelte Verfahren NatureWheel den Metallguss mit dem Einsatz eines Mineralskeletts. Diese spezielle Kombination erlaubt eine bislang nicht für möglich gehaltene Gewichtsreduktion – ein Meilenstein in der Herstellung hocheffizienter und stabiler Leichtmetallräder.

Aber auch mit anderen nachhaltigen Technologien wie dem Undercut-Verfahren, FlowForming oder dem Laserverfahren ExaPeel geht BORBET immer wieder mit gutem Beispiel voran. Der so entstehende Beitrag zur Wertschöpfungskette der Automobilhersteller wurde bereits in zahlreichen Supplier-Awards gewürdigt. Eine Reihe von Auszeichnungen wie der „Porsche Supplier Award“, der „VW Group Award“ oder die Ernennung zur „Marke des Jahrhunderts“ spiegeln die breite Anerkennung für die Spitzenleistungen von BORBET.

UNVERWECHSELBARE DESIGNSPRACHE

Neben der technologischen Expertise überzeugt BORBET durch seine unverwechselbare Designsprache im Fachhandel sowie das sichere Gespür für Trends. Bestes Beispiel ist das 1987 vorgestellte BORBET A Rad – ein zeitloser Klassiker, der aufgrund der hohen Nachfrage auch heute noch im Programm ist und mit dem neuen A Rad die Legende der Tuning-Ikone wieder aufleben lässt.

BORBET V – SO AUFFALLEND ANDERS WIE SNAP

Durch die intelligente Trennung von updatefähigem Fahrwerk und vielfältig nutzbaren Aufbauten hat „SNAP“ die Dynamik der Mobilität völlig neu definiert. Mit dem BORBET V Rad hat die Zukunftsvision einen idealen Wegbegleiter gefunden. Denn auch das BORBET V verbindet dynamisches Auftreten mit einer klassisch-eleganten Linienführung und ist trotzdem höchst ökonomisch orientiert, da es gewichtsoptimiert konstruiert wurde. Die zehn Speichen



führen in einem geraden Zug vom äußeren Rand zur Radmitte, wobei sie leicht versetzt an der Radnabe enden. Der Radkranz ist ausgesprochen schmal gezeichnet, wodurch das Rad eine hochwertige Optik erhält. Das BORBET V ist in der Raddimension 7,0 x 18 Zoll perfekt auf den „SNAP“ abgestimmt und unterstreicht in edlem „crystal silver“ und trendigem

„mistral anthracite glossy“ seinen noblen Charakter. Genauso auffallend anders wie dieses Rad der Kategorie „Classic“ beim neuen Mobilitäts-Ökosystem von Rinspeed wirkt, so kann es doch auch bei Fahrzeugen aus dem Hier und Jetzt zeigen: V steht für „Victory“ und das gute Gefühl, genau die richtige Felge gefunden zu haben. Eine, bei der es sofort „klick“ macht.

SAFETY FROM A SINGLE SOURCE

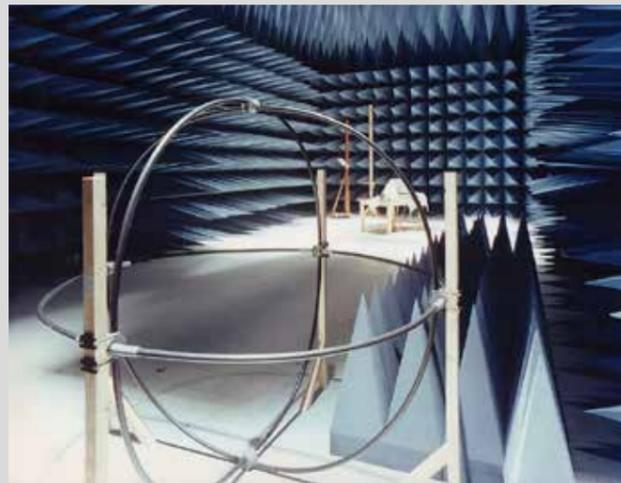
DEKRA has been committed to safety for over 90 years. What was founded in 1925 under the name "Deutscher Kraftfahrzeug-Überwachtungsverein e.V." is today one of the world's leading expert organizations. More than 39,000 employees in more than 50 countries ensure safety on the roads, at work and at home. The focus in all of these areas is increasingly on the "Internet of Things."

It should therefore come as no surprise that DEKRA is also on board with the latest Rinspeed concept car. In this self-driving electric car full of IT systems, safety has to be ensured in a variety of ways. When it comes to autonomous and connected cars, aspects such as secure wireless connections, interoperability, electromagnetic compatibility, cybersecurity and functional safety are of paramount importance.

Above all else, however, is the product safety of the individual components, which is independently tested and certified by DEKRA experts in their laboratories around the world.

Electromagnetic Compatibility

In Arnhem (Netherlands), Málaga (Spain) and in East Asia, DEKRA runs a number of laboratories for testing the electromagnetic compatibility (EMC) of not only individual components, but also the vehicle as a whole. When it comes to the interaction of devices and systems within a vehicle and in communication between the vehicle and its surroundings, it must be ensured



that the individual elements do not mutually impair each other's functioning, just as the system as a whole must not impair other products in the surrounding area. Checking this in advance is another of the core competencies of DEKRA's experts in the Product Testing and Certification business unit.

Secure Wireless Connections

The interconnected world depends on secure wireless connections. DEKRA offers a comprehensive range of services for certifying and testing wireless connections. These cover a range of different technologies (GSM/GPRS/EDGE, WCDMA, HSPA, LTE, WiMAX™, Bluetooth®, Wi-Fi®, RFID and NFC) and include conformance, regulatory and interoperability tests.

Functional Safety

In addition to the individual analysis of various safety aspects, DEKRA experts also look at overall functional system safety in order to prevent injury risks caused by possible malfunctions of systems or controls. The focus here is on the interaction of hardware and software as a whole.

New Testing and Inspection Center at the Lausitzring The Lausitzring in Brandenburg, which DEKRA took over on November 1, 2017, will soon be home to Europe's biggest independent testing and inspection center for automated and connected driving. Situated right next to the existing DEKRA Technology Center, the race track offers the perfect environment for testing the mobility of the future. The site will be a central element of DEKRA's international test association for automated and connected driving.

It will be used as a future venue for testing the entire range of automated driving functions up to fully autonomous driving (level 5) – including the flexible city course, various country roads and a section of highway on the test oval at the DEKRA Technology Center.

Automation and connectivity are becoming increasingly important for the safety of mobility. DEKRA takes its commitment to safety very seriously and offers its customers in the automotive industry comprehensive testing and development expertise for the mobility of the future.



A "Third Party" for Evaluating Vehicle Data

The ever-increasing automation of the driving experience can lead to a conflict of interests or disputes in matters concerning responsibility and liability. In the future, it will be essential that the task of managing and evaluating the relevant data is in the hands of a neutral and reliable institution – a "third party." This has for decades been the role of DEKRA in vehicle inspections and expert analyses, and DEKRA is now looking to deploy its experts in other fields, too.

Take the following scenario, for example: A vehicle of the future is found to be breaking the speed limit. The authorities now have to clarify whether the vehicle was driving itself at that time or whether a driver was at the wheel. If it was a driver, then it's the driver that receives the punishment for speeding. The vehicle data required for evaluating such a situation has to be stored at a central, secure location. Only authorized bodies must be allowed to access or query the data according to a strictly controlled procedure. DEKRA sees itself as pre-destined for setting up such a central facility.

Number 1 for Vehicle Testing

Whatever future technological innovations we will see in the field of automation and connectivity, DEKRA's expertise in the "conventional" automotive sector will remain as important as it ever was. Even automated

vehicles need functioning brakes, intact suspension systems and suitable tires. In future, these will continue to be subjected to regular, independent testing. As the world's number 1, DEKRA conducts around 26 million vehicle tests every year.

Future testing procedures will increasingly include electronic components. Also, and above all, electronic safety systems have to function reliably over the entire lifetime of the vehicle. The nature of periodic vehicle inspections will continue to evolve to take account of vehicle technology.

The same applies to homologation and type-testing. DEKRA experts in many different countries ensure that new vehicle models comply with regulations and are safe to drive on the roads. That is something that they will continue to do in the future, under the new conditions arising around digitalization.

Safety from a Single Source

Whether homologation or periodic vehicle inspections, functional safety or electromagnetic compatibility, automated driving functions or secure wireless connections, the DEKRA experts really do offer "safety from a single source" – and not just in the Rinspeed "snap."

www.dekra.com



REIMAGINING MOBILITY: MULTI-FUNCTIONAL SYSTEMS "TO- GO"

The Dr. Schneider Unternehmensgruppe creates intelligent storage systems

From a mobile office to a digital experience room to a relaxing feel-good living space – the automotive world is changing rapidly! As a partner of the Swiss think tank Rinspeed, the Dr. Schneider Unternehmensgruppe has made its vision of car interiors of the future a tangible experience – and that for the third time now. The automotive supplier from Kronach-Neuses (Germany/Bavaria) has created two multi-functional storage systems for the new concept car Snap. The focus was on innovative technology, appealing aesthetics and a comfortable atmosphere with a high degree of usability.

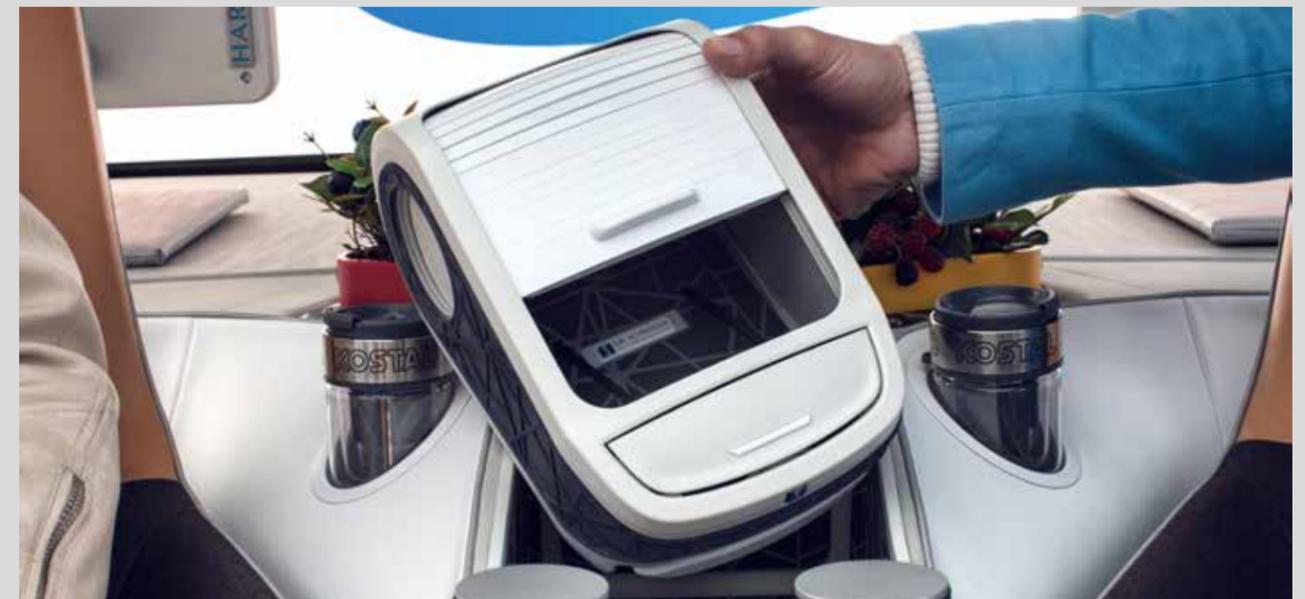
Autonomous driving is spelling the end of the classic car interior of yesterday and is creating completely new challenges for interior design. Intelligent, user-friendly and with intuitive operation of all functions, the components are partially integrated into the surfaces, often invisible and offer added value for any driver in such a car interior. Reduced but exclusive as well as being high quality is the trend in automotive interiors. The multi-functional storage systems of the Dr. Schneider Unternehmensgruppe are compact, smart and perfect for everyday use. The latest generation interiors are skillfully integrated and well-designed and can be adapted to individual wishes – so you can make the most of its space capacity.

Not only functional but multifunctional: The most innovative development of the interior specialist is a mobile storage system, perfectly designed and thought-out down to the very last detail. The storage system consists of two elements: a sturdy storage case and a tub inside the car. Thanks to a loop strap, the storage case can be pulled out from the tub quickly and easily and provides a maximum of flexibility when using it as e.g. an office box. At the same time, everything is safely secured and quickly accessible: A rubber

mat inside the big compartment that can be opened and closed by a roll-top, and rubber straps attached at various levels inside the case help to secure and organize storage items. Two lateral access openings make storing or retrieving needed utensils quick and easy and even expand the use of the mobile storage case. The lateral access openings allow you to store cylindrical-shaped items like a bottle or an umbrella. Small everyday items are best stored in the upper foldable compartment of the mobile case; a maximum of comfortable portability outside the car is ensured through a retractable handle. The mobile storage case is not only convincing because of its optimum functionality – it is also a visual highlight. Top-quality surfaces with bluish frosted glass elements as well as an integrated lighting module make the mobile storage case a real head-turner – functionality, design and haptic – a perfect trifecta!

The second product idea Dr. Schneider turned into a reality is a multi-functional center console storage surface with two compartments elegantly integrated into the overall design. When opened, you can pull out a flat, anti-skid storage tray featuring an inductive smartphone charging station. Two cup holders on each side plus some convenient storage space in the rear part of the console complete the upper tray. In the lower compartment you find an anti-skid rubber mat plus rubber straps attached at different levels. This creates a flexible and secure storage space for everyday items and keeps the car's interior safe and tidy. What's more, the four laterally integrated lighting modules of this useful storage space create a feel-good atmosphere to relax in.

"The goal we set for ourselves is to combine innovative and new production technologies with top-quality



technologies and intelligent functions and in this way actively shape the car interior of tomorrow", summarizes Markus Langbein, Head of Distribution and Marketing at Dr. Schneider. Thanks to their compactness and great flexibility, our developments also offer a lot of open space for the innovative use of car interiors in the future."

The Dr. Schneider Unternehmensgruppe, founded in 1927, has been working on smart technologies and premium driving experiences for many decades now. More than 4,000 employees all over the world proudly produce approx. EURO 500 million in turnover. As a specialist for innovative systems in the car interior, the full service supplier is revolutionizing the mobility of tomorrow – and always with a "Focus on Excellence".

SWISS MADE

ESORO – your experienced and innovative engineering partner for product developments, lightweight composite parts and clean car developments for cars and trucks.

The innovative concept “SNAP” consequently focuses on the new possibilities and advantages of new technologies and their innovation speed and therefore divides the vehicle in a very clear manner in the dynamic rolling EV-chassis and the body structures.

The intelligent “skateboard” integrates all drivetrain components as a rolling and fully automated chassis of the electric vehicle. The so called “pod’s” on the other hand are very long-lived modules, which are not outdated quickly and are fully dedicated to their specific use, i.e. as a transportation pod or as a breathtaking fully connected passenger pod with all comfort.

“SNAP” is a completely new concept and therefore not based on any production vehicle, but developed and realized completely from scratch. ESORO has been in charge for many of the engineering tasks and the complete realization of the concept vehicle.

“SNAP” is the 19th project, which ESORO realized for Rinspeed. In detail ESORO has been responsible for the manufacture of the chassis, all composite interior and exterior body panels of the vehicle and frames, which includes also the doors and door mechanism, so as the lift mechanism of the pod and all display movement mechanisms. ESORO has also been responsible for the development and realization of the energy management system, the vehicle batteries including battery management system and harness of the vehicle so as several control units. Additionally, ESORO implemented and adopted several different technologies and innovations of the project partners for the interior and exterior so as the fully automated suspension and steering system. Last but not least, ESORO was responsible for the final assembly of the interior and exterior of the “SNAP”.

ESORO has now 27 years of experience as engineering partner for product developments, concept vehicles and components focused on lightweight construction, alternative drivetrains and mobility. During this time ESORO has gained a well-deserved reputation for excellent efficiency and innovative solutions, which is demonstrated by numerous prototypes and serial products.

Since 1990 ESORO has been working intensively in the field of conception, implementation and tests of clean car concepts and drive systems. ESORO is thus one of the few companies in the world with well-founded experience in development and operation of electric, plug-in-hybrid and fuel cell drives. These activities are our core competence. ESORO therefore realizes EV projects in close cooperation with well known OEM’s starting with the initial conception and the prototype through to the serial project phase. In addition ESORO also supports R&D departments of OEM’s with it’s experience for BEV and FCEV vehicles (cars and trucks).

In 2016 ESORO has developed for COOP **world’s first fuel cell truck in the 35t class** (19t truck with a 16 t trailer) which has been presented on November 4th 2016 during the opening of Switzerland’s first public Hydrogen fueling station, which is operated from COOP and get’s delivered the Hydrogen from the close by CO2 free production from H2 Energy at a river power station. The ESORO 35t fuel cell truck has a range of 400 km and can be refilled in less than 10 minutes. Therefore the truck can meet the very high requirements for the COOP logistics without CO2 emissions.

ESORO is also developing fiber reinforced components from initial conception up to pre-production samples. In-house specialists optimize the component properties and characteristics throughout the entire development process. Important steps are non-linear, orthotropic Finite Element Analysis and simulation.

Another development from ESORO is the E-LFT production technology developed for Weber Automotive. **E-LFT** makes large scale production of high-strength and lightweight composite parts affordable. E-LFT composite parts weigh more than 30 percent less than comparable steel parts. For the development of the smart fortwo tailgate, which now has been produced 800’000 times with the E-LFT process, ESORO received the highly recognized JEC Innovation Automotive Award 2008.

> more: www.esoro.ch



MARRIAGE? NO THANKS!

We all know the situation when the onboard navigation system is unable to cope with real-time alternative routes to avoid traffic or new roadworks sites because the software is outdated: Then we tend to reach for our smartphone and navigate to the destination based on real-time data. Thanks to the continuous software updates of the smartphone industry, we are not lost in the jungle of obsolete data.

The automotive industry is now working together with many players from the technology sector to be able to deliver better and faster updates for onboard navigation devices. Otherwise, the smartphone may conquer the digital world in cars – resulting in the loss of lucrative additional business for the automotive industry.

In the age of autonomous driving, the requirement for perfectly updated data through software updates will increase significantly. In addition to the aspects related to comfort, factors relevant for safety are obviously in focus. It does not bear thinking, about a robot car losing orientation due to lack of software updates and causing accidents by wrong driving.

As much as continuous software updates ensure the necessary safety and comfort of digital processes in the car, they are not sufficient to ensure continuous optimum safety. Why is that? Every software and software update is only as good as the related hardware – for example, control devices or storage media – that has to be able to process the additional big data arising from software updates. Every PC user has experienced how quickly following a software update, unsuitable computer hardware slows down important operating systems or even paralyzes them. The time to be able to actually use the latest software has then come to replace the hardware.

But what does it mean for the car and therefore, also for the automotive industry? It is about aligning the IT life span with the mechanical service life of a car.

The basic conditions for the cars are clear: 1. Auto-

nomous driving is IT and thus dominated by software. In contrast to navigation, it is not about comfort but relevant for safety. 2. Software changes faster than hardware. 3. Mechanical lifecycles and the IT cycle are drifting apart. The million dollar question is: How can we synchronize these different life cycles?

In the first solution approach, software updates could be executed at regular intervals as always. If the hardware reaches its limit, the state of the last software update is maintained. The regulatory authorities may have serious safety concerns here – especially when it comes to autonomous driving. In this sense, this approach is not very realistic.

The second scenario could be when software and hardware are developed or exchanged to the same extent. Even if this scenario may be technically possible, the question is: where is the threshold of costs compared to the residual value of the car? Let's assume that software would be adjusted continuously through updates and hardware would be fully adjusted two to three times during the life of the car. Even though mobility customers might be ready to pay an extra price for safety, for example, for ABS, ESP, etc., hardware adjustments running into thousands of euros might not be of interest for most mobility customers. This therefore also seems to be a somewhat unrealistic scenario to harmonize the different life cycles of mechanics and software.

In a third scenario, mechanics and software – unlike in the last 130 years – will not be married but will go their separate ways. How would such a scenario look? Components prone to aging and hardware relevant for IT would have to be brought into an independent module, a kind of "skateboard", while the useful module – "pod" – is connected to the "skateboard" temporarily and can, therefore, be exchanged anytime.

The Swiss visionary, Frank Rinderknecht, calls this idea of temporary "companionship" between the "skateboard" and the "pod" for his latest concept vehicle –



"snap". In this way, the different lifecycles of mechanical components and components susceptible to wear and aging such as IT hardware can be separated from the "car or transport cabin" and can be connected temporarily through a simple "click" for passenger transport or other transport services. "Skateboard" and "pod" would, however, be only temporary companions – always depending on the mode of transport. What would be the advantages of this innovative relationship for the automotive industry?

The mechanical components and IT hardware integrated in the "skateboard" would not receive any expensive or technically complex upgrade due to the intensive use during their short service life. This saves money – not only for

the automotive industry but also for mobility customers. Therefore, mobility would remain affordable.

On the other hand, "pod" structures can be used not only in the mobile mode for passenger or goods transport but also, for example, as offices in a city, similar to a living container.

This would be a clever approach for solving the automotive industry's problems related to the first steps towards automated driving and will provide for a more intense mobility experience through the innovative temporary "companionship" of "Snap."

TODAY'S FEATURES - TOMORROW'S TECHNOLOGY

Gentex Technology for the Rinspeed Snap

Iris-scan biometrics pods – iris-scan camera pods that authenticate the driver for increased vehicle security, cabin personalization, and cloud-based-services authorization

Vehicle-to-home automation – cloud-based home-automation services

Dimmable sensor shrouds – dimmable glass panels that hide cameras and autonomous vehicle sensors for function improvement and aesthetic enhancement

Gentex Corporation

Gentex is a long-time supplier of electro-optical products for the global automotive industry. We supply nearly every major automaker with advanced electronic features that optimize driver vision and enhance driving safety. We also design and manufacture commercial fire protection alarms and signaling devices as well as electrochemically dimmable glass.

Since our inception, Gentex has managed the evolution of the rearview mirror. We've turned it into a strategic electronic module – a delivery mechanism for advanced vision-related features, including cameras, displays, alerts, transaction modules, and car-to-home automation systems.

As vehicle electrification and autonomous driving trends progress, our core technologies are converging to yield products that provide unprecedented advances in digital rear vision and stand to become integral components in connected cars and future mobility systems.

Iris-Scan Biometrics

Automotive biometric systems measure and analyze various physical characteristics to identify and authenticate the driver prior to granting vehicle and/or information access. Common biometric solutions include voice, fingerprint, and face recognition.

For Rinspeed's Snap, Gentex developed a vehicle-based biometric ID pod that authenticates the driver and delivers customized security, comfort and convenience features. The system consists of a small module housing near-infrared emitters, a miniature iris-scan camera and system intelligence.

To be authorized to use a Snap vehicle, users would first undergo a brief enrollment process, during which time the pod would scan their iris and map its unique pattern to a storable, algorithmic-based template. Users might also enroll using a cell phone and companion app with iris-scanning capabilities that would upload the template to the vehicle. Once enrolled, glances to the pod would authenticate the driver and assure the vehicle of his or her identity.

With the driver identified, the biometric system would allow the vehicle to operate and personalize setup by automatically adjusting seat position, HVAC controls, music favorites, GPS locations, and other cabin amenities, according to user-determined presets.

The biometric system could also sanction safe, secure access to a host of cloud-based, connected-vehicle services. For instance, an authenticated iris scan could grant the driver access to work files and virtual meetings, aid in on-line health assessments and medical care coordination, allow for secure banking transactions, and provide added security for in-vehicle trip-related purchases like tolls, vehicle charging and parking.



Vehicle-to-Home Automation

Gentex's HomeLink technology, which uses RF and wireless cloud-based connectivity to operate gates, garage doors, security systems, thermostats, home lighting and more, could also be controlled by the biometrics system. Once authenticated, drivers would be able to control all their home automation devices from within the Snap vehicle using the HomeLink Connect app. The biometrics system would provide security and convenience for multiple passengers by activating the unique home automation presets of the vehicle's various authorized users.

Dimmable Sensor Shrouds

Today's vehicles are increasingly being outfitted with sensors and cameras for various ADAS features. Autonomous vehicles like Snap will undoubtedly be equipped with lasers, radar, LIDAR and a host of other safety-related sensor systems. It can be a challenge to integrate these into a vehicle in a manner that optimizes performance while maintaining a clean design aesthetic.

Enter Gentex dimmable sensor shrouds – reinforced glass (or appropriate clear substrate) panels that darken on-demand or automatically according to sensor function. On Snap, they work to conceal and optimize the operation of forward-facing cameras, optical systems and the autonomous sensor farm.

Gentex sensor shrouds utilize electrochromics, which is the science of darkening a material using electricity. The shrouds use a chemical formulation like that used in our automatic-dimming rearview mirrors, which are known for their time-tested chemistry and durable device construction.

Electrochromic technology uses electricity to change the color and light transmission of a transparent medium capable of generating color. This medium is sandwiched between two thin transparent layers that have transparent, conductive coatings. The shrouds use an electrochromic gel sandwiched between two thin glass panels. As a small DC voltage passes through the conductive coatings and across the panels, an electrochemical reaction occurs in the gel, causing it to darken. Removing the voltage returns the gel to its natural, transparent state. The voltage can be precisely controlled to allow for the selection of intermediate states of light transmittance. The Gentex electrochromic technology has the greatest opacity range from light to dark, the highest optical clarity, and allows for the most durable electrochromic devices in the market.

Gentex is a proud sponsor of the Rinspeed Snap vehicle. With core competencies in microelectronics and vision systems, chemical development and coatings, software design, displays, glass processing, and automated assembly, we stand ready to help customers integrate today's features using tomorrow's technology.

LIGHTWEIGHT DESIGN FOR THE MOBILITY OF THE FUTURE

GF Automotive establishes innovative lightweighting with the right materials and bionic design – not only inside the SNAP.

As a global development and manufacturing partner, we are one of the top addresses for the global automotive and commercial vehicle industry. With innovative lightweight casting solutions, we contribute to the weight reduction of modern cars. This will help to reduce fuel consumption, CO2 emissions and increase range. Our long-standing partnership with Rinspeed emphasizes our passion for lightweighting and innovation and our mission for a sustainable mobility of the future.

A linkage between bionics and light metal

For the Rinspeed SNAP, GF Automotive designed the support structure between the chassis and the pod as a light but stiff lightweight structure. The linkage between bionic design and light metal results in maximum strength at minimum weight. Moreover, the component connects the specific function and the creative implementation in a new way – design follows function.

For series vehicles of almost all common brands, we deliver flexible lightweight solutions setting high standards in body, chassis and powertrain: Next to the weight reduction of the component itself, the freedom of design in the casting process allows further weight reduction of the vehicle by integrating additional functions into the components, which additionally reduces production processes and assembly effort.

An important key to lightweighting

Castings have to withstand high loads and are often classified as safety components. To achieve the maximum weight reduction with bionic design, which means that shapes and patterns derive

from nature, materials with improved mechanical properties are applied. Examples out of our product portfolio are the bionic steering knuckle and the bionic wheel hub for trucks.

For these lightweight components, the casting process is very suitable. As the metal is formed in a liquid state, almost any cross section and shape is safely producible on a large scale and in a short period of time. The wall thickness can be easily adapted to the load and cores even allow hollow profiles – an important design freedom to develop highly stressed components. The material is only used where it is necessary – an important key to lightweighting.

We are continuously approaching the limits of lightweighting as our creative minds at GF Automotive are analyzing and developing new materials and joining techniques. Extreme lightweight design can be approached by combining light metal and synthetic material in the casting process.

No matter if bionic design, advanced materials or manufacturing technologies – we are exploring new trails to achieve ambitious goals around weight, function, quality, safety and sustainability.



Cross Car Beam,
Magnesium high-pressure die-casting



Door Sill Frame Member,
Aluminum high-pressure die-casting

RETHINKING AUTONO-MOBILITY

How is the automotive industry addressing the disruptive challenges of the future? In the Rinspeed Snap mobility concept HARMAN presents a comprehensive yet flexible suite of solutions for urban mobility in ten years. The Snap concept proves once again that HARMAN is the undisputed leader for intelligent in-car technologies and a strong innovation partner for OEMs.

Designed for urban environments, the Snap ecosystem goes far beyond the well-known megatrends of shared services and automated, connected, and electric driving. With its level five autonomy, it opens the door to not only busy professionals, but to user groups with previously limited transportation options such as children and the aged. The flexible, modular design is firmly based on the idea that successful mobility services in the cities of the future call for comprehensive approaches. And it is becoming increasingly clear that from the Bay Area to Bangkok, successful mobility operators will need to provide a differentiated brand experience combined with highly personalized services and full reliability at competitive prices.

TRUE LEVEL 5 USER EXPERIENCE

The modular design of the “skateboard” and “pods” provides the optimal foundation. Within just three to four years, such a skateboard would travel 200,000 miles – a vehicle’s life set to “fast forward”. After this period of time, the simple chassis replacement made possible by Snap makes even more sense. The next generation skateboard benefits from lower battery prices as well as improved, lower-cost sensor technology and computing power that allows the durable cabins and bodies to continue being used. As a result, the skateboard fleet can be used very flexibly, depending on time of day and requirements. For instance, Snap can transport people during the day and goods at night. HARMAN with its parent company Samsung, has been working on developing innovative automotive mobility systems that contribute to making the car a third living space, one in which idle time is replaced with productivity and entertainment. Pods can be used both at a fixed location or on the go – the sky is the limit: they can be a self-driving camper van for trips to festivals, a guest room at home, or even an on-location conference room, to name just a few examples.

HIGHLY INDIVIDUALIZED, HIGHLY SECURE

The HARMAN “True Level 5 User Experience” in Snap offers an operating concept that is perfectly tailored to the needs of changing passengers in a fully automated vehicle. The aim of this development is to achieve the best possible automatic individualization without compromising the protection of personal data, and to adapt the HMI to users of every age group. Depending on the desired level of personalization, user authentication occurs in three steps. The level is addressed by a token – either a smart device, a pendant, or a ring, depending on the passenger’s preference – which unlocks the vehicle and individualizes the displays. The second level (face recognition for example) permits a user to access more personal content such as music, pictures, or movies. Finally, to protect confidential information such as real-time health monitoring, a third level of biometric identification is used.

PERSONALIZED COMFORT THAT IS INTELLIGENTLY CONTROLLED

For the purposes of interaction, there are three displays available for a maximum of four passengers in the spacious vehicle. Via the Personal Control Panel with an interactive control dial, individual settings can be defined. The touch-controlled Hover Tab displays individual information such as social media or productivity contents, as well as personal messages. Two passengers can use the large central displays that present media content such as movies. The experience is further enhanced by the spectacular sound of the Lexicon surround-sound system with Ambisonics Escape. The displays also show points of interest along the way and prepare passengers for upcoming driving maneuvers to prevent motion sickness, which is a common occurrence in automated vehicles. Regardless of whether Snap is being used as a stationary office at a building site or as a camper, HARMAN ambient noise compensation technology helps ensure that users have the quiet space they need.



ALWAYS A STEP AHEAD

The voice-controlled intelligent personal assistant further enhances comfort on board. It is always one step ahead: once cloud access has been granted, it is informed of the preferences and habits of all passengers. It can thus select the music that all the passengers like, which is often a source of conflict when a vehicle is used by several people. It can also recommend a restaurant that serves food to the taste of each person in a group, depending on personal preferences or daily specials. Through a total of six projections, Snap communicates visually with the world outside: two use the entire windshield and rear window to send full-color messages to other road users, for

instance to inform them that school children are about to get out and cross the street, or that the vehicle is granting priority to oncoming traffic at narrow points on the road. Four other, monochrome laser projections on the side windows serve to communicate with boarding passengers. Integrated into the skateboard, the HARMAN/Samsung Autonomous Drive Platform safely steers Snap through traffic. The 5G smart antenna, which meets all the relevant radio standards such as GPS and WiFi, ensures reliable Car2Car and Car2X communication as well as high-speed connectivity to the HARMAN Ignite Cloud Platform.



Pushing Performance

HARTING AND RINSPEED BRING HP TO THE ROAD – FAST CHARGING PUSH FOR “SNAP” CONCEPT VEHICLE

The two partners are a good fit – Rinspeed and the HARTING Technology Group complement each other perfectly and as a result have a consistent record of success. For more than 35 years, visionary Frank M. Rinderknecht and his team have achieved real dreams for the future in terms of traffic and technology. Swiss company Rinspeed is revolutionising the automotive industry with futuristic mobility concepts and vehicles. And, with its innovative product portfolio in the field of Connectivity & Networks, HARTING has consistently been at the cutting edge for more than 70 years. As a pioneer of reliable, clean and environmentally friendly e-mobility, the technology group offers its customers tailor-made solutions.

The e-mobility sector is becoming increasingly important for HARTING. Its subsidiary HARTING Automotive has seen a sharp increase in demand for solutions in this sector. Based on decades of experience in connecting and transmitting data, signals and power, the company develops and produces charging equipment for electric and plug-in hybrid vehicles.

HARTING WELL-POSITIONED IN E-MOBILITY SECTOR

HARTING is also involved in implementing the „SNAP“. Rinspeed is getting the concept vehicle up and running in conjunction with partners and suppliers from all over Europe. With „SNAP“, the Swiss think-tank has created a comprehensive mobility ecosystem which could someday make clogged roads and cities plagued by exhaust fumes a thing of the past.

The globally active HARTING Technology Group has long been at home in the automotive supplier industry market. Fast Charging technology – premiered at the Geneva Motor Show 2016 – is a convincing example of its growing portfolio of products and components.

„Besides conventional charging technology, almost all new e-car concepts from the big OEMs rely on high-performance fast charging. This will boost driver acceptance. This is the breakthrough,“ says HARTING Automotive Managing Director Marco Grinblats with confidence.

Grinblats sees the potential of an end-to-end network of conventional and fast charging stations which extends beyond just Germany.

The company has long been an expert, reliable partner to virtually all national automobile manufacturers and major OEMs in other European countries. At the end of 2016, HARTING became a direct supplier to the VW Group for a specific e-mobility solution. HARTING supplies various types of charging equipment for different Group brands. HARTING is also a Tier 1 supplier for BMW Group.

HIGH POWER CURRENT SOLUTION HAS GREAT POTENTIAL

Research continues. HARTING spies good opportunities for the development of high-power current solutions. „We’re working intensively on that. This technology is only just beginning, but it will shape the future of e-mobility in the medium term,“ says Philip Harting, CEO of the family-owned business, with confidence.

Early on, HARTING recognised the increasing environmental awareness within society with respect to vehicle traffic and the resulting challenges and opportunities in the market for e-mobility. „Consequently, we’ve focused on R&D and production, and are very well positioned in the e-mobility sector. We’ve also been supporting standardisation from the very beginning,“ emphasizes the Group head.

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SUCCESSFUL COOPERATION BETWEEN HARTING AND RINSPEED

Rinspeed and HARTING have successfully been working together since 2016: MICA, which garnered HARTING the prestigious HERMES AWARD at the HANNOVER MESSE in April 2016, was integrated into the „Etos“ vehicle for autonomous emission and condition monitoring.

In 2017, HARTING used its miniMICA – another component from the evolutionary MICA ecosystem – to support Rinspeed’s „Oasis“ car. The miniMICA, which is a plug-in module, created a scalable and flexible architecture with which computing components can be interconnected in various ways.



DC quick charging plug COMBO



HARTING offers customized solutions for e-mobility.

SHAPING THE FUTURE WITH TECHNOLOGIES FOR PEOPLE

The phrase sums up how HARTING underscores its ambition to be an innovative driver of technological development. The HARTING Technology Group, based in Espelkamp (Minden-Lübbecke district), is a visionary, pioneer and driver of this development. The owner-managed family business develops and produces electrical, electronic and optical connection, transmission and network technology and software. Services and products for all levels are created under one roof and in line with customer requirements – from innovative components to specific applications and services, through to system solutions and consulting, all according to HARTING’s vision „We want to shape the future with technologies for people.“ This puts the technology group at the forefront of future markets such as mechanical engineering, automation and robotics. In addition, HARTING offers innovative solutions for Integrated Industry.

HARTING ON DYNAMIC GROWTH COURSE

HARTING operates 13 production plants and branches in 43 countries. In the 2016/17 business year (as at September 30), some 4,600 employees generated sales of EUR 672 million, an increase of almost 15% y-o-y. HARTING attaches great importance to attracting individuals with technical and management expertise and offers them excellent career opportunities. HR marketing emphasises the company’s commitment to being family-friendly, multicultural and crossgenerational.



Philip Harting
CEO of the
HARTING Technology Group.



Marco Grinblats
Managing Director
HARTING Automotive



IBEO AUTOMOTIVE SYSTEMS: EYES AND BRAIN FOR RINSPEED SNAP

Ibeo's 3D Solid State LiDAR sensors are the eyes of Rinspeed Snap's skateboard. Mounted at each side of the chassis, the Ibeo LiDAR sensors enable a 360° field of view for reliable perception of the static and dynamic environment around the vehicle platform in 3D resolution. Thus, Snap is not only able to recognize other vehicles while driving long routes on highways, but it is also capable to perceive complex inner city scenarios with many traffic participants such as bikes and pedestrians.

Rinspeed Snap is a Level 5 Automation Vehicle, which means that no human driver is necessary anymore. To realize Level 5 Automation, Ibeo provides the software for the fusion of several „ibeo NEXT“ Solid State sensors as well autonomous driving and localization functions. The autonomous driving

functions are the brain of the vehicle since they control the lateral and longitudinal functions, and thus they direct the vehicle's actuators.

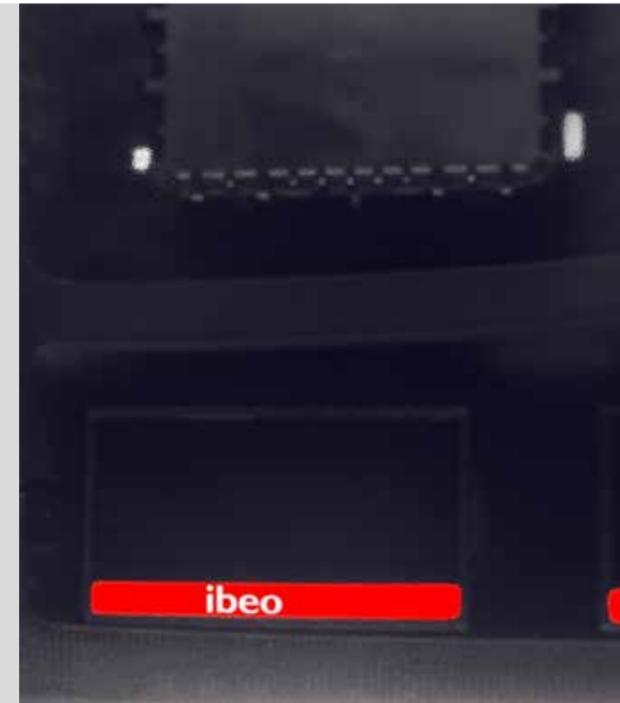
Snap also uses Ibeo's localization approach which is more precise than standard GPS localization. In this approach, a digital map is applied containing landmarks which are recognized by the LiDAR sensors for ego-positioning. This means that the environment perceived by the LiDAR sensors is permanently matched with the landmarks in the map to determine the vehicle's exact position.

ABOUT IBEO:

Ibeo Automotive Systems GmbH is the specialist for automotive LiDAR sensor technology located in Hamburg. In addition to the state of the art laser scanners, Ibeo develops software for environmental detection, referencing tools for Highly Automated Driving and Autonomous Driving (HAD/AD) systems as well as Highly Automated Driving and Mapping & Localization applications.

Since the company's founding in 2009, the engineers and software developers at Ibeo have been promoting LiDAR technology and developing new software applications for automated and autonomous driving to make driving a more relaxed activity and to increase road safety for all traffic participants.

In August 2016, the German automotive supplier ZF Friedrichshafen AG acquired a 40 % stake in Ibeo. This stake was then incorporated in Zukunft Ventures GmbH, a subsidiary of ZF, to pave the way for the serial production of a new generation of 3-D solid state LiDAR sensors without a rotating mirror. A second project is the fusion of various sensor technologies for even more sophisticated environmental perception to establish a basis for Autonomous Driving.



In the future, the cars people drive will look very different from the present. Advanced technologies, such as autonomous driving, will change the structure of existing cars and our lifestyle as well. The biggest changes will be in how people experience their space and time as they go from point A to point B.

The Pod concept, presented by Rinspeed and its partners, will change the way we think about cabin space. It may even change our residential environment by enabling a new form of nomadic lifestyle.

Kolon GEONIC combines Bader's finest-quality leather and Stahl's finest surface treatment effects with outstanding design. The logo on the inner sheet of SNAP is created using the inlay technique used in traditional Korean ceramics on fine quality leather, instead of sewing or attaching it to the seat surface, thus creating an unprecedented design. It expresses the identity of the space in a more luxurious way, and makes the logo blend in better for an improved user experience.

The Geonic technology also meets the desire for a comfortable and unique design, by eliminating unnecessary design elements of a conventional seat interior such as the backside or 2nd floor, and recognizes the user's IT devices as part of the interior when they enter the pod. Geonic will add a sense of warmth and comfort to the cold and rigid IT devices.

As a lifestyle innovator, Kolon Glotech has presented various solutions for creating people-centric spaces. Geonic, featured at the SNAP, is a technology that can control the depth, color, touch, and design by stacking materials, achieving mass-customization, and meeting user's individual design preferences.

* Geonic: Reddot Design Award (Best of the Best 2013)



About KOLON GLOTECH

Kolon Glotech, established in 1987, is a manufacturing company with a diverse portfolio of automotive, life, and high-tech materials. We produce car seat modules and fabrics, artificial turf, polypropylene staple fiber, and polyester filaments. We are equipped with a systematic production processes and have attained various quality standard certifications. In order to supply products on time and optimize our production efficiency, we have established production centers not only within Korea, but also in China and have established local corporate sales units in the American and Mexican markets. Kolon Glotech will continue to focus on developing eco-friendly, lightweight functional material to continue our growth into the future.



MOBILE URBAN-FARMING

How will we spend our time when we no longer have to drive the car? International studies have provided three answers to this: sleep/relax; work/communicate and eat/drink. The third answer - eating and drinking - is a very special and individual matter. Many new trends must be considered and a great deal of flexibility is required. The days gone by, when fast food from the drive-in was the usual answer have given place to a healthier and more leisurely life-style. Why settle for fast food when we have so much more time to relax when the car is driving itself?

An initial approach is provided by KOSTAL with the „PowerPlant“ concept, presented in the Rinspeed „Snap“ study. The idea is simple but it contains a great deal of potential for increasing the well-being which a vehicle can deliver to its passengers. By integrating useful plants the car can become a place of retreat, a little farm in the jungle of a big city. The passengers can even eat the plants which are cultivated. With interchangeable plant pots additional flexibility can be achieved: in winter you can grow mint for your cup of hot tea and, in summer, why not strawberries for your cooling, refreshing drinks.

A range of sensors can be fitted to check the plants and operate systems to maintain them in top condition and, indirectly, maintain the ease and comfort of the vehicle's passengers. Automatic watering is activated by moisture sensors in the plant substrate. Other sensors in the earth around the plants monitor nutrient levels and will provide an early signal of any nutrient deficiencies. Automated maintenance is further supported by a smart phone app for communication between the passenger and the „PowerPlant“ module. A docking station at home can hold a wide selection of plants.

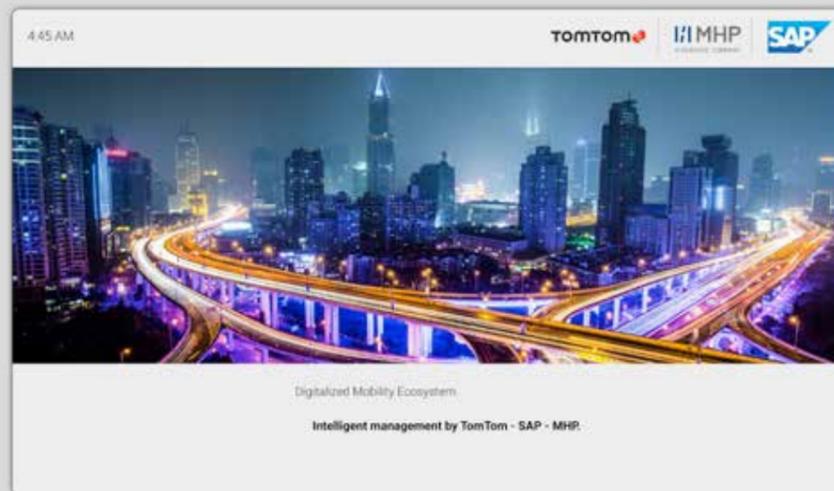


IT KNOWS ME. IT HELPS ME!

Mobility devices will help me organize my daily routine. In cooperation with SAP and TomTom, MHP has developed an intelligent SNAP Ecosystem that relies on artificial intelligence, but focusses on people.

HOW CAN MY CAR HELP ME IN EVERYDAY LIFE?

Inspired by this key question, MHP has developed a "SNAP Intelligent Ecosystem" in cooperation with SAP and TomTom. It is as flexible and dynamic as the SNAP itself. It manages the fleet, the logistics, deals with the energy management and results in more flexibility and time for its users!



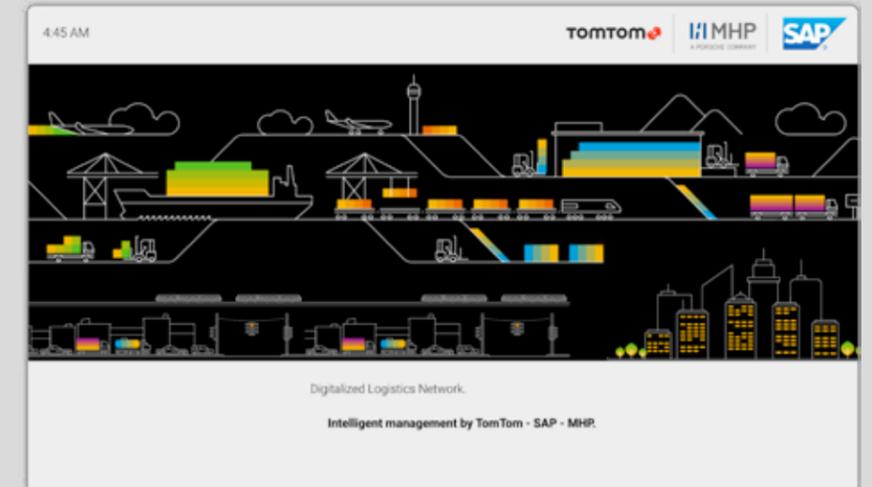
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DIGITALIZED LOGISTICS NETWORK

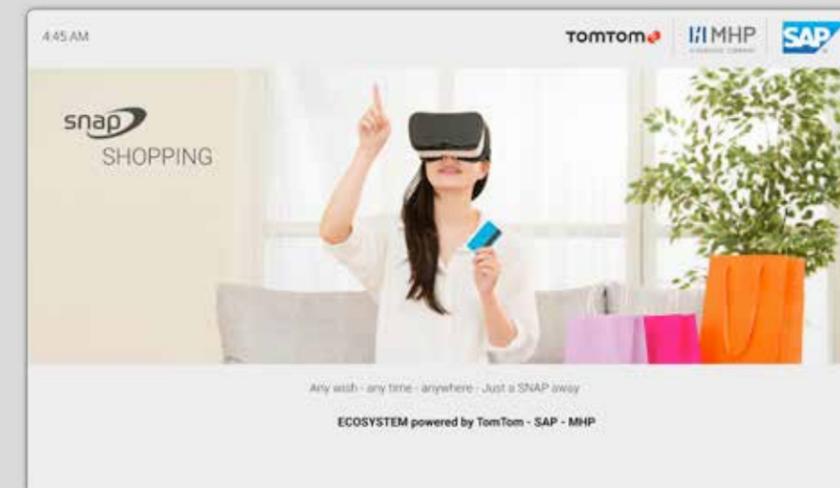
Depending on the type of pod, the SNAP will transport people or also goods. SNAP Network Control will use free pod capacity for transporting goods. But the pods themselves will also be moved around during low demand periods. Taking into account the time of the year, the day of the week, holidays and school breaks as well as the calendar of events, the artificial intelligence of the SNAP Ecosystem will compute where, when, how much and what kind of mobility



will be required. At night when the streets are empty, the SNAP fleet will then be organized accordingly. By the next morning, the pods will have been loaded as required and be ready for service, awaiting their users with the right equipment.

SNAP MARKETPLACE

This is where you can rent, lend, loan, swap, buy or refine pods. A range of service providers will take care of special applications such as the fixtures and fittings for a camping pod or a sophisticated hotel pod.



FASHIONPOD

For your trip to the opera house, the Ecosystem will provide a fashion pod that offers a selection of formal attire to suit your personal taste. Or the fashion pod will come with a range of the latest fashion items to your house. A personalized boutique on wheels, if you will. All this is enabled by the "SNAP Intelligent Ecosystem" that manages the SNAP fleet and the entire Ecosystem around it. More flexibility, more time – just a SNAP away!

RINSPEED AND NXP PUSH THE FUTURE CAR'S BOUNDARIES WITH A DOMAIN BASED APPROACH

For more than 40 years Rinspeed has pushed the boundaries that popularly define a car. Just as a designer, artist or writer challenges the set ideas of an age, Rinspeed questions the conventional wisdom that surrounds mobility. You think of car ownership, Rinspeed asks about car sharing. You imagine a driving cockpit, Rinspeed sees the opportunity for an entertainment, productivity and commerce zone. Rinspeed is always fresh, nimble, innovative and surprising and is driven to deliver quality and reliability. This mindset explains why the partnership between NXP and Rinspeed has such deep roots.

NXP delivers a domain-based architecture and a complete portfolio for the car of the future that provides unbounded creative potential to the free thinkers at Rinspeed and developers across the globe. Anchored by quality and reliability, NXP is a one-stop shop for autonomous vehicles offering scalable, flexible and differentiating characteristics that cover every mode and level of mobility. NXP is also able to harness the innovation beyond the car by linking its home and vehicle technologies.

NXP and Rinspeed both start our work with the philosopher's tools: questions. One question that is always on our mind is one that we are asked often. "If it were up to you," people ask us, "How would you build a self-driving car?" How a semiconductor company approaches a self-driving car may not seem intuitive until you consider how vital electronics have become to present-day automotive architectures. In fact, most of what's new and innovative in the automotive industry is based on electronics.

At NXP, our automotive customers rely on us for technical guidance and insights on implementation because our expertise extends to processing, security, and mobile technologies that are at the core of autonomous innovation. As a result, when people ask us how we would build a self-driving car, we have a clear, streamlined approach to system design: Domain-based Car Architecture.

The Domain-based Car Architecture

The Domain-based Car Architecture reflects the work of our own team of automotive innovators and our collaboration with key industry stakeholders. It organizes and groups together the functions that let cars sense, think, and act on our behalf, and helps to manage complexity and support scalability.

Dividing functionality into separate domains helps highlight the functional safety and cybersecurity requirements for each subsystem, simplifies the development and implementation of robotic algorithms, and makes it easier to scale features within each subsystem.

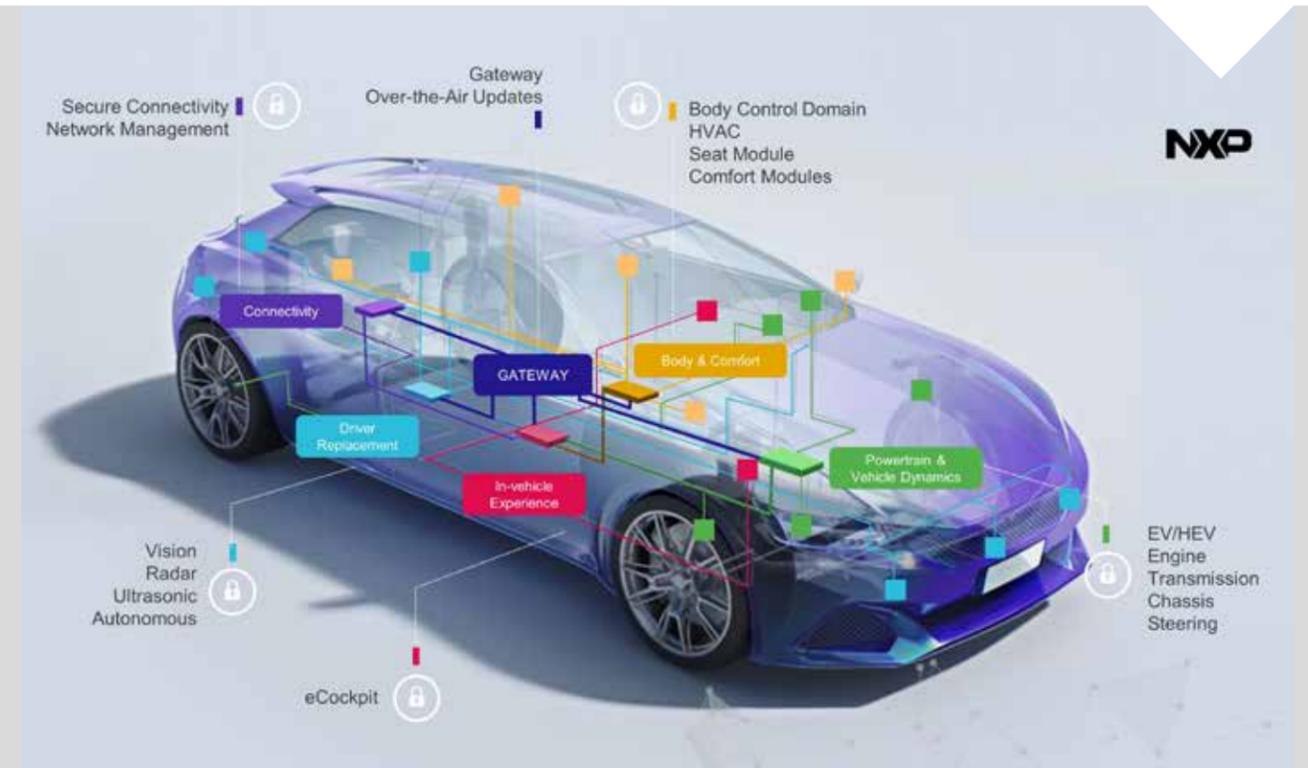
A Closer Look at the Domain-based Car Architecture

THE CONNECTIVITY DOMAIN

The Connectivity domain is an overarching domain that covers many operations. It governs all the wireless interfaces that connect the car to the outside world. The Connectivity domain seamlessly and securely deploys and collects information from all a vehicle's externally connected interfaces. That includes familiar interfaces used by passengers and their devices.

THE DRIVER REPLACEMENT DOMAIN

The Driver Replacement domain lets the automotive "robot" take over the task of driving. It provides the capabilities of sensing and thinking, and uses safeguards to ensure proper operation. The Driver Replacement domain is where a lot of the car's "smarts" reside, making it possible to interpret the environmental observations produced by various sensors and cameras. The "sensing" components include radar, cameras, laser-based LiDAR, and components for positioning and other types of environmental information. The "thinking" components include situational assessments, path planning, sensor fusion, safety-related algorithms, and more.



THE POWERTRAIN & VEHICLE DYNAMICS DOMAIN

Governing motion and speed, this domain is what makes the automobile move. In self-driving cars, the movement is based on inputs from the driver or the driver substitute, and can be modified and optimized based on personal preferences and environmental constraints, such as road conditions.

THE BODY & COMFORT DOMAIN

The Body & Comfort domain supports basic functions for the driver and passengers, and follows behavior to learn preferences. This is also where passive safety mechanisms (seatbelts) and access mechanisms (door locks) are typically managed.

THE IN-VEHICLE EXPERIENCE DOMAIN

This is the domain that lets the car support the entertainment, productivity, and well-being of everyone onboard.

The Architectural Glue: Gateway & In-Vehicle Networks

The Domain-based Car Architecture is connected by a sophisticated communication network that lets the domains operate in tandem and share information. Acting as the architectural glue that holds the domains to-

gether, the internal network ensures data is shared at the right bandwidth and in a secure, reliable manner. The internal network uses many of the same technologies used in today's most advanced IT setups, including Ethernet connectivity and secure gateways.

More Than an Architecture - A Way to Organize

The Domain-based Car Architecture is a logical way to break down and group the hardware and software components associated with vehicle design, but it's also a way to organize the design team itself. At NXP, we're using the domains to guide our internal structure. It's helping us focus our efforts and gather our expertise, and making it easier to maximize the collaboration and technical crossovers needed to spark innovation, the type of innovation that Rinspeed is driving every day.

VISIONARY IDEAS FOR THE MOBILITY OF THE FUTURE

Driven by the conviction that technology makes life better, Osram Opto Semiconductors combines innovation and passion to develop and market the best optical semiconductors. Its employees are totally committed to this vision. Everyone from bright sparks to passionate developers. From initial idea to full-scale implementation. From high-precision optical sensors for health monitoring to breathtaking stage lighting with LEDs and laser light. This is why Osram Opto Semiconductors is among the market leaders in optical semiconductors and one of the major drivers of innovation in illumination, visualization, and sensing.

The concept vehicle by Swiss think tank Rinspeed once again showcases this wealth of experience and industry expertise. The "Snap" incorporates custom-adaptable components which represent the optimum blend of safety and design and enable next level mobility.

The models in the "Snap" range are equipped with arrays of LED, infrared and laser components from Osram Opto Semiconductors and offer a secure driving experience from start to destination.

Safety is boosted by elements such as a **responsive LED license plate** and **exterior vehicle lighting** in designated colors for front and rear.

Built-in LED and laser lights deliver **projections** which allow the vehicle to communicate with the outside world as well as its passengers. Messages projected

onto the windscreen can inform pedestrians that the vehicle is reducing speed and it is safe to cross the road. Projections on the front and rear windscreens also keep passengers informed of the remaining travel time to their destination.

At the start of the journey, **matrix light** delivers important information in the form of a wide range of animations and projections. Thereby, it can 'roll out the red carpet' for passengers entering and exiting the vehicle.

Door locks are deactivated automatically after an **iris scan** identity check. The **facial recognition** function releases information about the passenger's personal preferences to enable automatic adjustments for seat height, interior temperature, and lighting.

LED lighting throughout the interior provides even, harmonious illumination during travel and can be adjusted using the **Human Centric Lighting** function. The in-car illumination can respond to the passenger's moods, based on data collected by **health tracking solutions**.

At the destination, **projected texts** bid a personalized goodbye to the passengers and inform them of their next appointments. The vehicle interior is sanitized in a **UV light bath** and readied for its next passengers.

For more information about our latest mobility concepts and semiconductor solutions, visit www.osram-os.com.





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SNAP AND BEYOND: From Vehicle to Ecosystem

The motorized vehicle may change more in the next 10 years than it has in the past 100. Autonomous, connected, and electric – the so-called ACE attributes of tomorrow's automobile will transform the way cars are designed, developed, and deployed.

But the revolution will extend far beyond the vehicle. New means of mobility will inspire new ways of consuming transport. New kinds of connectivity will drive simpler logistics, cleaner energy, smarter cities, higher quality of life: an automotive ecosystem of connectedness and capability.

For the automotive industry, this ecosystem will enable mass customization of products, on-the-fly personalization of services, newly imagined business models, and entirely new revenue streams. All made possible by digital technologies such as the Internet of Things (IoT), cloud computing, machine learning (ML), and Big Data and analytics.

The Rinspeed SNAP concept embodies this innovative, modular approach to ACE transport. It also mirrors SAP's vision for digital transformation around the world.

Solutions for Connectivity, Automation, and Innovation

The automotive ecosystem will result in quantifiable benefits to business and society. Advantages will include reduced traffic, faster commutes, lower greenhouse-gas (GHG) emissions, decreased transportation costs, and a more resilient logistics infrastructure. Such advances will be made possible by the SAP® Leonardo digital innovation system, which allows organizations to innovate, integrate, and scale with technologies such as IoT, ML, blockchain, and advanced analytics.

SAP Hybris® Solutions

Automotive companies will gain competitive advantage by personalizing products and services, and by gaining a single view of customers across channels. SAP Hybris® advances such customer centricity through e-commerce, marketing, sales, service, and revenue capabilities. These innovative solutions empower the mobility ecosystem to deliver a consistent, superior customer experience across all touch points.

Logistics and Digital Supply Chain Solutions

The automotive ecosystem will reinvent logistics and supply chain processes. The modular approach of SNAP helps solve the first-mile/last-mile problem by supporting passenger transport, delivery, and parcel service in a single architecture. Likewise, SAP software – from SAP S/4HANA® to the SAP Transportation Management application – empower automotive companies to run real-time supply chains that link people, processes, and things.

Energy and Utility Solutions

The proliferation of connected and electric vehicles will align the automotive and energy sectors. Electric mobility will position automotive companies to participate in renewable and distributed energy markets. Connected cars will generate data that predicts driving behaviors and matches energy consumption with grid capacity. SAP solutions – from the SAP HANA® platform to SAP Leonardo Analytics capabilities – will deliver energy-usage insights, improve energy efficiency, reduce GHG emissions, and drive energy-focused business models.

SAP Health Portfolio

Autonomous, connected vehicles will enable new consumer-focused services – including mobile health monitoring. Embedded sensors will capture healthcare information such as blood pressure and sleep cycles, and combine it with environmental data such as humidity and pollen count. Predictive analytics will deliver risk scores and health alerts. Feedback loops will connect patient with provider to optimize health outcomes. The SAP Health portfolio of solutions will drive the convergence of healthcare and the automotive ecosystem.

The SNAP concept illustrates the art of the possible for the mobility of tomorrow. SAP is empowering automotive leaders to connect, automate, and innovate on their road to digital transformation – and to realize the art of the attainable for the automotive ecosystem.





SEKISUI S-LEC, leading company for glass interlayer film, unveil new SEKISUI Design Innovation and SEKISUI Technology Innovation toward next vehicle dimension, Level-5 future Autonomous vehicle. SEKISUI Nano Technology brings Automotive Glass Interlayer to Next Dimension. You will find future with "SEKISUI Luminous Interlayer" concept and "SEKISUI Projective Interlayer" concept at Rinspeed concept model in this year.

SEKISUI S-LEC provides interlayer film for automotive laminated glass market, known as "SEKISUI S-LEC" brand to the worldwide automotive industry more than 70 years. SEKISUI S-LEC introduced world first Sound Acoustic interlayer which bring significant noise reduction inside cabin and world first None metal coating IR Solar Control interlayer for thermal comfort and CO2 emission reduction. Concerning vehicle safety, SEKISUI S-LEC developed wedged interlayer film for HUD (Head of Display) which illuminate double image and bring clear visibility for driving safety.

Automotive industry is boosting technology revolution especially IT field such as IoT, AI, Electrification and new E-Architecture which contribute ADAS and HAD, Highly Automated Drive and future driverless full automated vehicle. It seems vehicle will transform from Mechanical Machine to Electrical Devices. In this new dimension, we thought interface between passenger or driver and vehicle become more important

role and all windows positioned with your eye height are the perfect tool and interface for HMI which tell us "what vehicle see", "what vehicle thinking" and "which action vehicle try to take".

SEKISUI S-LEC interlayer film will also move to next stage aimed new possibility and new requirement a line with this new automotive movement and direction with unique cutting-edge technology and SEKISUI Advanced Nano Technology.

2018, This year, SEKISUI S-LEC presents new design concept "Luminous Interlayer" and "Projective Interlayer" with Rinspeed Luminous Interlayer" and propose new way of HMI, Human information display with SEKISUI Luminous Interlayer at "Rinspeed Passenger Pod" and "Rinspeed Logistic Pod" as following three main concepts.

SEKISUI Projective Interlayer in "Rinspeed Logistic Pod" will turn whole surface for advertisements and delivery information as well as external HMI information display.

SEKISUI E-Blue concept with SEKISUI Luminous technology also provide iconic "E-Blue" such as futuristic luminated blue window for all Zero Emission Vehicle which bring remarkable different impression from the conventional vehicle.

SEKISUI S-LEC Luminous Interlayer Smart Message display on Glass

More information need more display. Simply, new technology always required new interface to human.

Vehicle display area is expanded year by year with huge Center Information Display and now speed meter with multi page display.

SEKISUI interlayer technology makes it possible to display message or icon on the glass. This special interlayer only reacts special light source. Now entire window turned to huge screen ever before.



SEKISUI S-LEC Projective Interlayer

Level-5 driverless vehicle will create new logistic age. Thanks to IoT technology, goods delivery demand is sharply increasing everywhere in the world. Autonomous Door to Door logistic service will become reality near future.

SEKISUI Projective Interlayer will provide futuristic tolancerosent milky white window which is able to project delivery information and advertisement with taking natural sun light into cargo area.

Of course, it is very useful for internal or external communication at Automated Passenger Vehicle as Active HMI.

SEKISUI S-LEC e-Bluefor all

"A gift to the future of children by Sekisui S-lec interlayer film products and technologies" is one of the vision of SEKISUI S-LEC. We SEKISUI take any action to reserve Earth Environment for next generation.

EV, Zero Emission vehicle is always beside Automated vehicle technology with futuristic design.

SEKISUI S-LEC propose e-Design Innovation with e-Bluenew design for window not only color but also with luminous technology.



SIKA SOLUTIONS FOR SAFE AND EFFICIENT E-MOBILITY

Electric vehicles are a key to the future of mobility. As an experienced partner in Automotive Sika started years ago to support e-vehicles for individual and commercial transport with various solutions. They reduce vehicle weight, increase occupant safety by strengthening the structure and protect from fire and noise. Sika is proud to be, once more, partner of the 2018 Rinspeed project Snap. This groundbreaking concept shows great modularity and exchangeability. This requires on one hand stiffness, longevity and lightweight construction. On the other hand, safety and comfort are of big importance since the concept offers not only driving capabilities but also living and leisure experience. With a variety of Sika solutions, we helped this year's concept car to achieve these challenging goals:

DIELECTRIC POTTING

Sika's high tech resin formulations satisfy the requirements of potting, encapsulation and casting applications in numerous industries. Resins for capacitors, relays, sensors, electronic boards, coils, electronic devices and filters are part of the high tech encapsulation and potting resins of SikaAxson. Furthermore, they offer high chemical and mechanical properties.



FLAME RETARDANT & INSULAR COATINGS

Sika Fire Protection Systems have been developed as intumescent coatings for steel and wood substrates. These products offer depending on the technology fire and corrosion protection at highest level. Those features combined with high mechanical and chemical resistance provide excellent solutions for safer e-vehicles.



STRUCTURAL INSERTS

The very versatile structural insert technology reinforces car and commercial vehicle body structures while delivering process and outstanding performance benefits which includes improved acoustics. The three-dimensional parts are designed to create lower weight, high-performance structures, and enable the creation of car bodies with higher impact safety and reduced weight while achieve higher stiffness at the same time.

STRUCTURAL ADHESIVES AND SEALERS

Safety and sustainability became cornerstones in modern vehicle design and manufacturing. The topic gained further importance with an increase of material-mix in combination with higher performance and legislation demands. Sika's proven structural adhesives, mastics and sealants enable improvement of vehicle body stiffness, crash and corrosion resistance in combination with enhanced fatigue performance.



ASSEMBLY ADHESIVES

Longevity and durability against climatic influences in combination with lowest possible weight and optimized processes drive the selection of assembly adhesive for e-vehicles. A large variety of one component and accelerated assembly adhesives from Sika fulfill these requirements in an optimal way.

BATTERY CELL & PACK ASSEMBLY

Battery boxes are a key weight contributor in today's e-vehicles. It is no surprise that weight reduction in this area is a focus. Furthermore, the boxes must be protected from leaking and require thermal insulation. Sika offers different sealants and adhesives and potting materials to ensure tidiness and optimal heat transfer



With these and many other systems and products for bonding, sealing, damping, reinforcing and protection in construction and automotive industry, sika is successful since 1914. Its more than 17,000 employees generated annual sales of CHF 5.75 billion in 2016 with more than 190 factories in 99 countries.

More information can be found on www.sika.com

Overview.

Sprint has provided IoT network and platform solutions to customers and technology collaborators across the United States for more than 15 years, and now, together with SoftBank, we provide integrated global IoT solutions. On top of this experience, our spectrum resources and network advancements continue to push the entire industry towards NB-IoT, Cat-M, and 5G.

Sprint and our technology collaborators in the ecosystem power solutions to compete in today's ever-changing technology landscape, powering connected vehicles and smart cities to healthcare wearables and weather sensors. We believe every day is an opportunity to innovate -- Inspire Innovation Today!

Sprint is proud to collaborate with Rinspeed, Harman and the Snap Vehicle Team to help bring the very best in technology solutions to market. It's our mutual belief that industry growth will be derived from working together with the goal of developing game-changing technology that continues to reshape the future. Sprint is committed to continue building on our innovation pillars with the entire Snap Team.

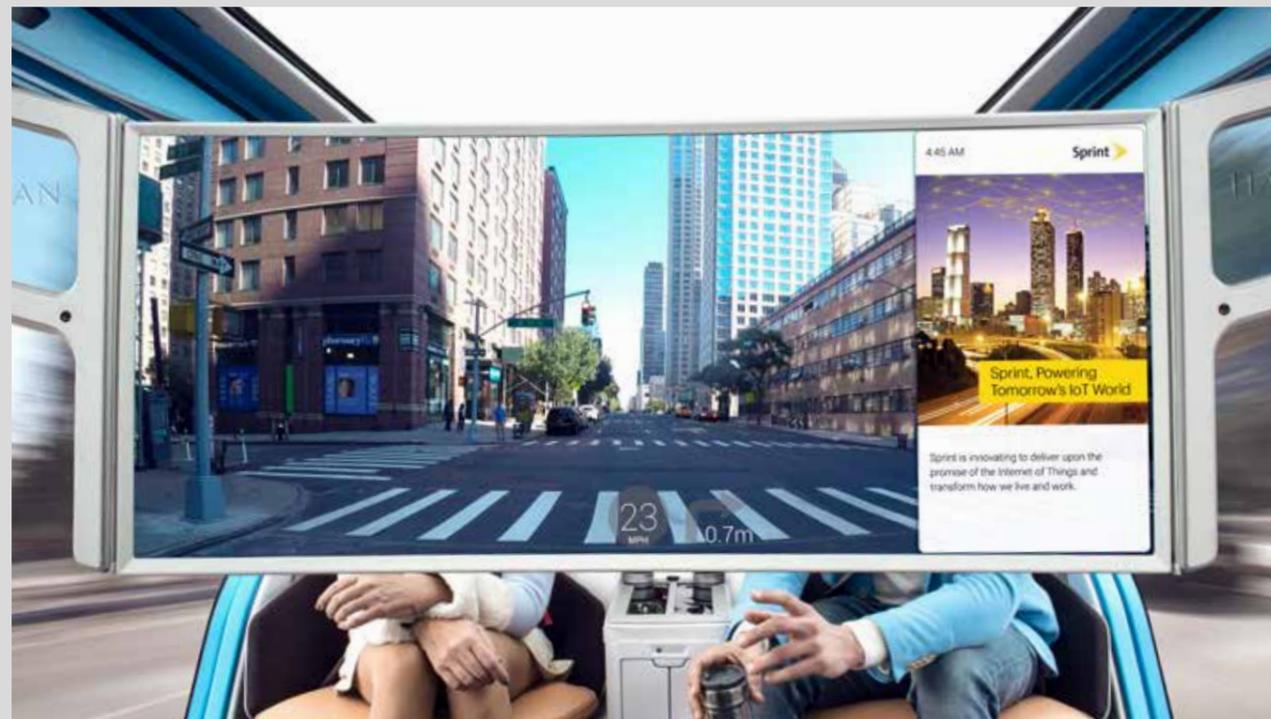
SPRINT DELIVERS POWERFUL IOT CONNECTIONS

Network.

Sprint customers and technology collaborators have full access to our network including 4G LTE Plus, and future NB-IoT, LTE Cat-M, and 5G. The confluence of this perpetual innovation provides new and innovative use cases, more capacity, faster speeds, lower latency, and smart-antenna technology to enhance connectivity options and solution development. As automotive and IoT continue to converge, the proverbial "pavement," if you will, is the connectivity between the vehicle, systems and infrastructure. Regardless of the myriad of technology in a vehicle, seamless connectivity and the ability for the vehicle to speak to and with, the software is paramount.

IoT Solutions.

Sprint actively collaborates with Softbank-owned sister companies and other technology collaborators to create ground-breaking solutions that make sense for their individual needs including customizable IoT data plans, visualization and control options, and network



solutions. Sprint enables companies to innovate and deliver world-class IoT solutions. Autonomy is now part of the very fabric of the automobile, and the ability for that vehicle to communicate precisely has never been in more demand. Grid-based software platforms control the ebbs and flows of traffic. Sprint is leading the telecommunications industry as an integral resource, working directly with key industry players to ensure our future is designed with the shifts in vehicle technology.

Industry Experts.

Sprint distinguishes itself as an IoT leader with an experienced team dedicated to ensuring our technology collaborators have what they need to be successful every step of the way. It all starts with Ivo Rook, Senior Vice President of IoT who recently started at Sprint after leading the IoT practice for Vodafone. Our extensive ecosystem continues to grow every year and presents ongoing collaboration opportunities.

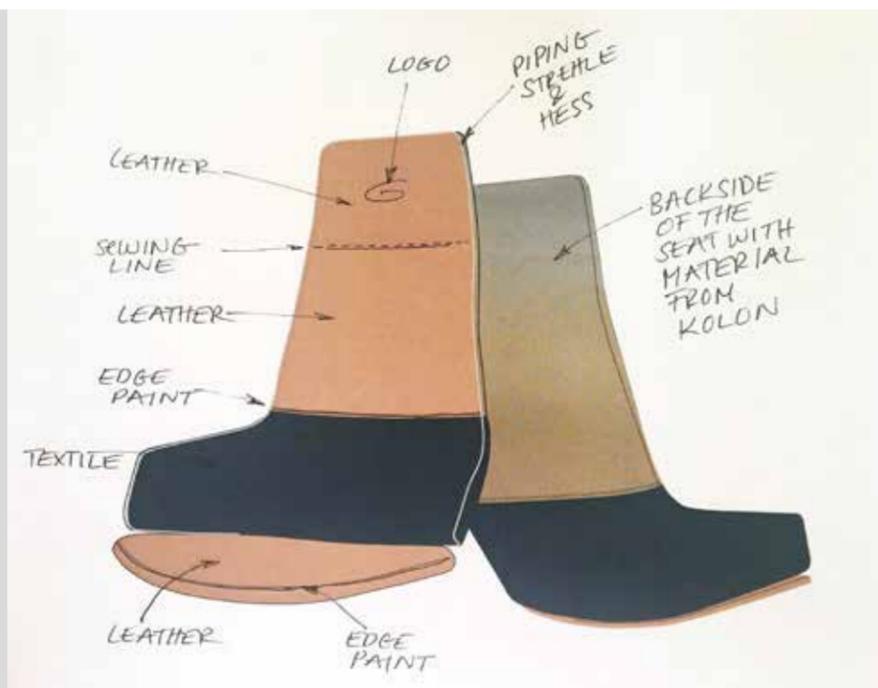
The Future.

Sprint will power tomorrow's IoT world — one in which fleets of self-driving cars will scan citywide grids to auto-detect traffic patterns or nearby pedestrians; and Malaysian surgeons will use robots to operate remotely on patients in Miami — and will do it with more than just a cutting-edge, high-tech infrastructure. Sprint will lead a paradigm shift by guiding customers on how to best operate in increasingly globalized and virtualized environments where Internet-connected devices, artificial intelligence (AI) machines, and free-roaming workforces become the standard. With great collaboration, we believe the future is now.



DISCOVER THE COMPREHENSIVE MOBILITY ECOSYSTEM OF THE FUTURE

By creating premium and more sustainable interior materials that are in sync with Mother Nature and the mobility needs of the future, brought together in the Rinspeed SNAP concept vehicle.



This year is the third time that Stahl cooperates with Rinspeed, the leading innovator when it comes to creating inspiring and innovative concept cars. As the expert for car interior surfaces of any substrate and worldwide market leader in our niche, we are inspired by working together with leading brands from various fields, jointly moving boundaries and always striving for the best solutions. That's why we contributed to the various automotive surfaces used on the seats, door-trims, dashboard and the steering wheel, amongst others – all fitting Rinspeed's revolutionary vision regarding the comprehensive mobility ecosystem of the future.

Partnerships as the basis for a better future

Partnership is the key element for creating new and innovative solutions and possibilities. This belief is one of our core principles. At our headquarters in Waalwijk in the Netherlands, we have even created an 'Automotive Center of Excellence' in which we invite OEMs, tiers and partners to share knowledge, passion and enthusiasm for opening up endless possibilities. This center is one of many around the globe - our way to invest in successful partnerships and a durable industry-wide future, from automotive to home interior and apparel & accessories.

The SNAP car interior – the ultimate driving experience

The interior of the Rinspeed SNAP concept car is all about innovative solutions that are more sustainable, inspire and surprise the user. This was a great challenge, which we accepted enthusiastically. That's when we decided to do what Stahl does best: push the boundaries to create more sustainable solutions for a better future.

To contribute to the best possible interior harmony inside the Rinspeed SNAP concept car, a premium look and feel was created that not only works esthetically, but is focused on performance as well. Therefore, to create that long-lasting impact, our Stay Clean technology was applied. This innovation makes sure that the car interior lasts for decades, as it is protected from dirt and staining. Besides boosting performance, our Edge Paint technology was used to enhance both the overall design freedom as the luxurious appeal - a true statement regarding premium craftsmanship that complements the driver's personal style.

Creating the car interior of the future is not only about 'great innovations' but also (and perhaps even more) about the environment. Therefore all the solutions that have been incorporated in the Rinspeed SNAP

concept car are VOC-free and part of a higher mission: developing premium and more sustainable car interior materials that are in sync with Mother Nature and the mobility needs of the future.

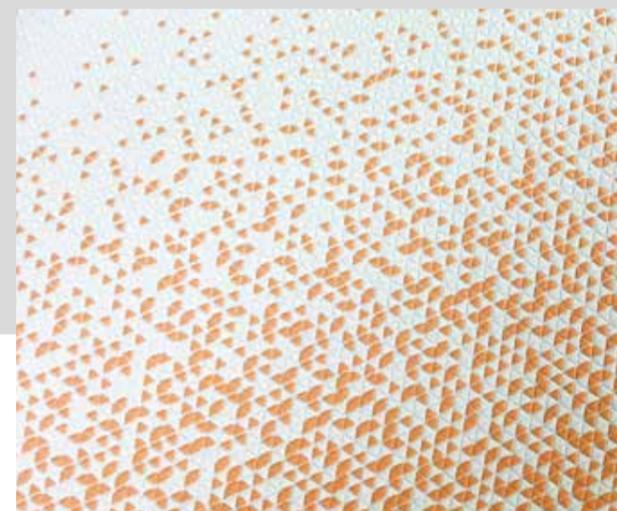
These innovations are only a glimpse of the possibilities, which can be realized through excellent partnership and the urge to search for the unknown.

What happens when automotive meets interior design?

Discover at our Rinspeed SNAP experience 'Stahl&Partners: Sense the future' at Superstudio Piu' in Milan. This unique, full-sensory showcase will take place during the Salone del Mobile 2018 (World-famous Milan Design Week) from the 17th until the 22nd of April.

About Stahl

Stahl is a leading company in process chemicals for leather products, performance coatings and polymers. We offer a wide range of solutions for various industries, such as automotive, apparel & accessories, home furnishing and the leisure & lifestyle industry. The company also develops solutions for industrial applications. With more than 2,100+ employees in 24 countries at 13 manufacturing sites, 38 application labs and 12 R&D centers, we can keep up with the global demand for quality and performance. With our innovation power, expertise and broad range of technical solutions, Stahl is able to deliver best-in-class solutions and services. One of these services is direct and close cooperation with (potential) clients at one of our 7 Centers of Excellence or at the Stahl Campus®. This allows us to respond even better to client needs and secure a more sustainable future.



We live and breathe fabrics. And have done for more than 90 years now.

Fabrics are our mission: creating exciting and emotional vehicle interiors our vision. More than 270 employees knit and machine-knit with passion and expertise in Althengstett, Bisingen, Topolčany (Slovakia) and Auburn (USA) to enhance the inner values of your car. It is no surprise that all well-known car manufacturers worldwide are customers of STRÄHLE+HESS.

Our creative and talented designers always keep up with the latest trends. S+H fabrics turn interiors into something very special with colours, structures and materials.



Flextime car

Today, in our fast-paced society, time is the most precious thing we have. Living spaces are evolving and increasingly moving into our means of transport. Snap thus adapts to our requirements and allows us to use this precious time as comfortably as possible. With the exchangeable pod the showcar can change in a flash into a living room, business lounge, chill-out zone and lots more. The drive platform is reminiscent of a skateboard. With its graffiti-like colours, it has the look of urban lifestyle.

For all requirements

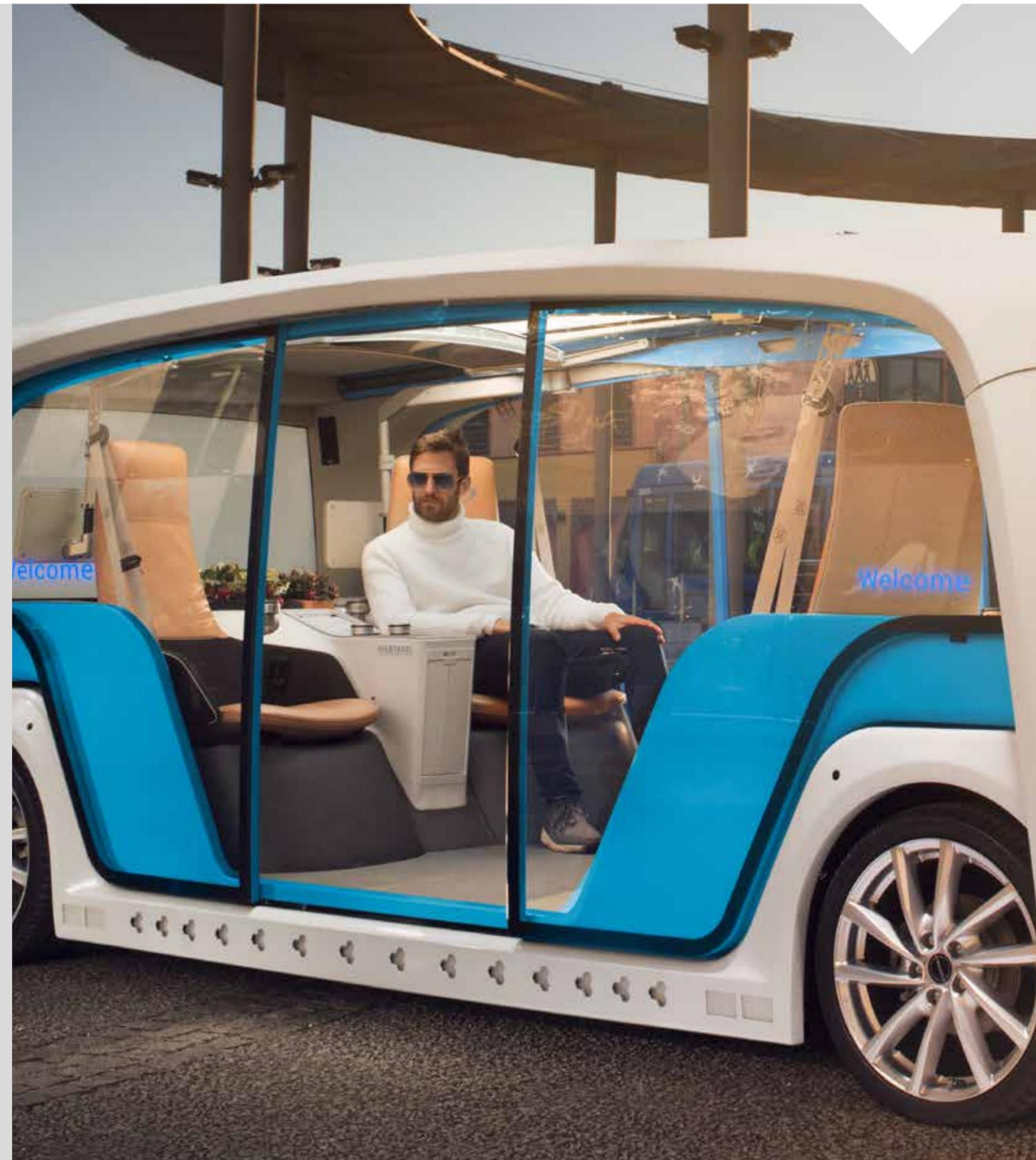
We're not the only ones who want to be flexible. Our vehicle does, too. An appropriate space is always available to suit your desires and requirements. The variable pod increases the number of possibilities and is sustainable at the same time. The electric drive is gentle on resources and the environment. And this opens up a whole new dimension of car sharing.

Finest handcraft

High-tech fabrics from STRÄHLE+HESS with finely lasered engravings harmoniously cover the headliner and pillars. The main focus of the seats is the mélange-coloured flat-knitted material, sandwiched between sturdy saddle leather and edged by silver piping. The cool grey tones of the laser engraving, combined with silver, dark blue and the natural colour of the leather on the seats, create a relaxed atmosphere.

This is the place for me

The interior lets us take a break from the hustle and bustle of the outside world; the ideal place for recharging batteries, chilled and relaxed. High-tech and traditional materials are combined perfectly and, with their cool/warm colour mix, fit like a glove in an interior in which so much is possible.



VISUAL COMMUNICATION FOR SAFETY

Further Assisting Autonomous Vehicles

MOBILITY & IMMOBILITY

Mobility and immobility are merging – creating a flexible living environment that connects users to their surroundings. This transformation has produced a shift from owning a vehicle to sharing a vehicle in urban environments, allowing a flexible vehicle evolution to emerge in the living, working or even utility fields. This evolution takes place as development increases on the cognitive, communicative and personalized abilities of autonomous systems. The Snap lighting system demonstrates the peak of these emerging trends.

Autonomous driving allows us to focus on life, leaving the actual “driving” to the vehicle. This translates to a refined focus on safety, of which is the Snap’s top priority. Like we’ve seen in years past with flat light panels in the Budii, an illuminated seat logo of the Etos, and recently the transparent and functional rear window of the Oasis – visual communication clearly plays a major role within Techniplas. Today, this technology is yet developed within the Snap.

The Snap uses its front, rear and side lighting to communicate with its environment. These surfaces are covered by actively dimmable glass, which turn transparent when the vehicle “awakens;” conversely, the surface has a non-transparent mirroring finish when the vehicle is not activated. These faceted surfaces contain RGB-LED light sources, not directly visible – each having their own function or combining ability. The front, rear and side lighting surfaces visually indicate its intent to turn. Additionally, the lighting surfaces contain communicative symbols, both static and dynamic, that inform pedestrians and other autonomous users in the vicinity.

We witness these symbols when the Snap comes upon a pedestrian at crossings, at which point a green Ampelmann* symbol, “walk,” is displayed when pedestrians can cross safely. Conversely, the Snap displays a red Ampelmann* symbol, “don’t walk,” when it is not safe for pedestrians to cross. Also among these symbols

is the intriguing battery display. Located in the back, the status of charge is known by viewing its animated process.

The Snaps uniqueness lies in its ability to detach the Skateboard from the Pod. During the coupling and decoupling process, blinking red and green lights dance across the door sills, warning the vicinity of the separation or attachment. Red and green animated lighting also displays below the opening doors as a warning when passengers are boarding and de-boarding; green is used for the opening of the doors and red is used for the closing.

Be it a pleasant ambience, safety-related communication, or brand recognition – visual effects can offer users a wide range of options. Techniplas creates 2-dimensional lighting elements through the combination of LEDs with creatively shaped light guides, extending the boundaries of lighting technology. Light guides made of Plexiglas® from Evonik have micro-structured areas supplied with light by high performance LEDs. Inspiring 3D effects are created by multilayer structures of the individual optical fibers. Multilayered designs of lit areas allow the superposition of functions, such as the rear lighting and brake lights, on the same surface. The lighting functions integrated into the existing surfaces offer a clean design of the vehicle.

TECHNIPLAS TECHNOLOGY

At Techniplas we are committed to rapidly embracing and infusing new technologies and innovation. With the Snap lighting system these ideas come together, as the solution was to microstructure the surface of the light guide. Our OPTIBACK software, designed specifically for this purpose, was acquired by our unique expertise in the field.

“OPTIBACK allows us to accurately define the scattering or characteristics of coupling out at a microstructure



point,” explains Dr. Peter Dörfler, head of research and development. “The coordinates of microstructure points are calculated by simulating the known light emission characteristics of each point.”

The result matches light guides with previously unmatched homogeneity and effectiveness. The system furthermore offers designers tools for 3D calculation. This technology has proven to be versatile. The use of RGB-LEDs allow for the increase in conveyed information and display of status messages. The lighting of a defined area in a structure and multi-colored symbols offer a wide range of options for visual interaction.

Like OPTIBACK, another naturally integrative and exponential technology to Techniplas is 3D printing. Techniplas’ partner, XponentialWorks, a company focused on additive manufacturing and technology development, 3D printed the load-bearing structure of the illuminated Skateboard areas. Development and production processes were reduced and, despite limited space, creates a basis for optimal assembly, strength and an accurate fit.

COMPANY PROFILE

Techniplas is a leading global design and manufacturing provider of engineered products and services that are helping to shape the future of mobility. By continuously expanding the reach of our data enabled cognitive technologies into everything we do, we deliver personalized, performance-enhanced and sustainable mobility. Find out more at www.Techniplas.com.

XponentialWorks is a venture investment, advisory and product development company focused on seeding and scaling high-tech companies that are creating and disrupting the connected world. With over 3 decades of additive manufacturing experience and over 50 investments and acquisitions in the team’s history, we thrive on taking technology to the next level. Learn more at www.XponentialWorks.com.

* With the kind permission and support of AMPELMANN GmbH, www.ampelmann.de.

NAVIGATION TECHNOLOGIES FOR AUTONOMOUS DRIVING

Whether you talk about smart mobility, connected cars or autonomous driving, the minimum common denominator is navigation technologies. The future of mobility relies on a mix of high-definition maps, real-time maps, advanced navigation software, and live data from vehicle sensors. These innovations are now being used to foster technology adoption in the domains of advanced navigation, electric vehicles and autonomous driving – and it all comes together in the new Rinspeed Snap.

TomTom is right at the heart of autonomous driving technology with products and services tailored for connected autonomous driving systems and the future of passenger safety and comfort – specifically in the HD mapping field. TomTom’s HD Map provides

a highly accurate and realistic representation of the roadway profile, including key elements such as 3D geometry, lane markings and road furniture. The TomTom HD Map extends the range of view of an autonomous vehicle, enabling a safe and comfortable driving experience. The HD Map can also be leveraged to fulfill a broad range of advanced driving applications. TomTom also developed RoadDNA, a localisation layer in the TomTom HD Map that enables accurate and robust localisation for autonomous vehicles.

TOMTOM MOTIONQ: PASSENGER SAFETY AND COMFORT

One of the great design challenges of autonomous vehicles is to make passengers feel safe and comfortable. Safety entails making passengers feel confident that the vehicle is aware of its surroundings and that it will handle all aspects safely. Comfort entails both a smooth driving style as well as enabling passengers to anticipate the movements of the vehicle, so as to avoid motion sickness. Visual cues need to be provided to passengers, to help them anticipate the vehicle’s motion and “stabilize” their body accordingly.

TomTom MotionQ is a set of visual cues that enables passengers to anticipate an autonomous vehicle’s motion, leading to a safer, more comfortable experience. TomTom MotionQ provides intuitive overlays on the central display of the Rinspeed Snap that communicate the vehicle’s intended motion. This includes the vehicle’s path, turns and acceleration, as well as road elements of the TomTom HD Map such as road borders, lanes, markings, centerlines, traffic signs and traffic lights.

When designing TomTom MotionQ we applied a ‘looming’ effect, meaning the intensity of the motion is communicated through the change of intensity of the shapes. In addition, gradual anticipation allows for more comfortable motion anticipation, allowing passengers to gradually ‘sense’ the planned motion. Tweaking the combination of these elements for front-facing

and rear-facing passengers, as seen in the Rinspeed Snap, enables a more comfortable experience for autonomous vehicle passengers.

Another important consideration for shared autonomous vehicles is that passengers must always be able to monitor and explore their route. They need to be able to check their ETA, see where the next passenger will be picked up, and explore points of interests (POIs) along their route. The TomTom Route Genius does just that, informing passengers of all the aspects of their journey, from accurate ETA information, to relevant POIs along the route, from next pick-up points to detailed traffic information.

TomTom HD Maps not only power the autonomous driving system of the Rinspeed Snap, enabling a safe experience, but also power TomTom MotionQ to improve passengers’ comfort in autonomous vehicles.

TomTom is on a mission to make autonomous driving a reality, by building highly accurate, scalable and updated HD Maps to enable a safer and more comfortable experience. In the Rinspeed Snap, TomTom leverages its autonomous driving products – such as HD Maps – to make robotaxis more comfortable, and enable passengers to be more productive and enjoy the journey without side effects.



VALENS: CONNECTIVITY THAT DRIVES THE FUTURE

The time has come for us to maximize our travel time. Time, after all, is an expensive commodity, and Snap is here to guarantee we make the most out of it.

Have some work to do? No problem, connect your computer and get ahead of the curve. Riding with friends, and want to enjoy some music or even a movie? You deserve the downtime – take your pick, lay back and relax.

To guarantee a reliable, smooth user experience – whether for ADAS or infotainment – our vehicles must be equipped with the right connectivity infrastructure to support the many applications, cameras, sensors and displays that are expected in the autonomous and connected car.

That's the essence of HDBaseT Automotive.

Valens' HDBaseT Automotive is incorporated into the Snap to optimize the transmission of data and content

within. To better deliver an exceptional customer experience, the Snap – as any connected and autonomous car yet to come – is a bandwidth-hungry, application-rich environment. HDBaseT Automotive provides a single, holistic and cost-effective approach to connectivity within the Snap.

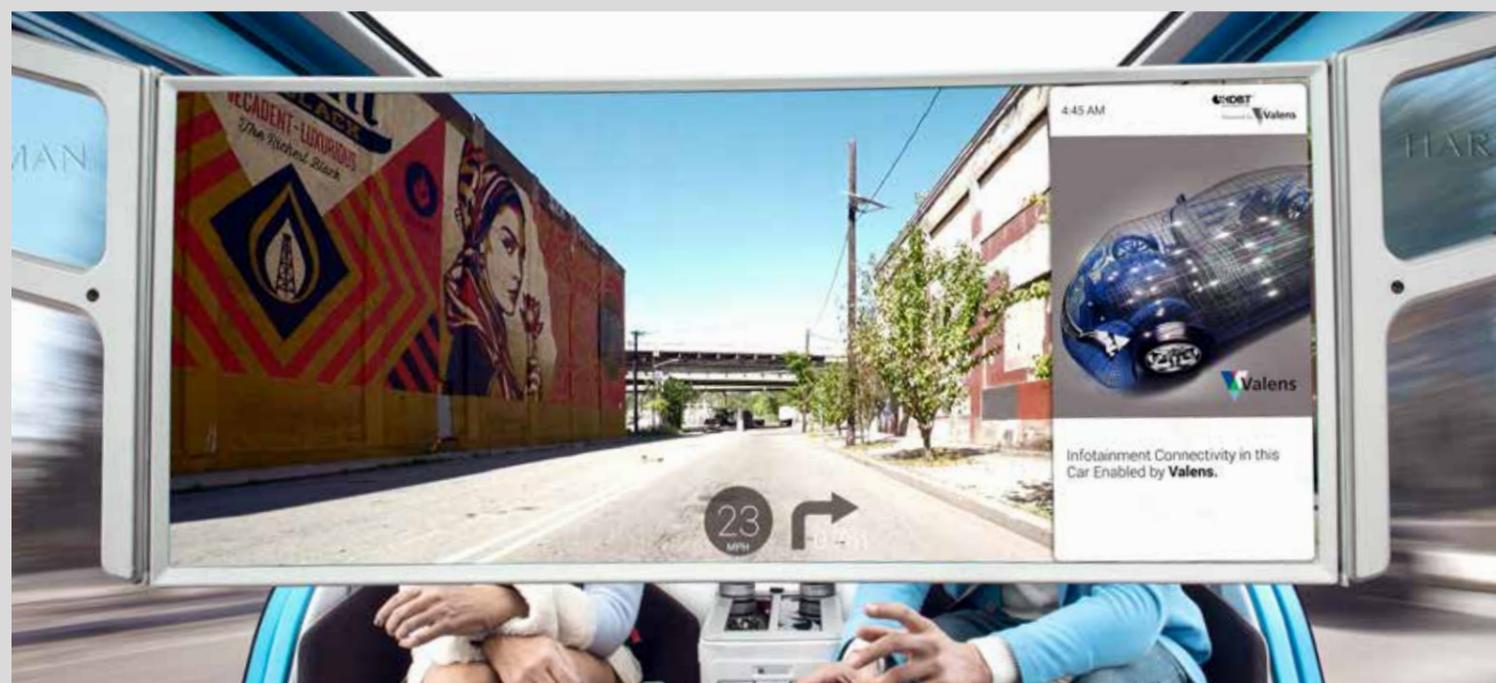
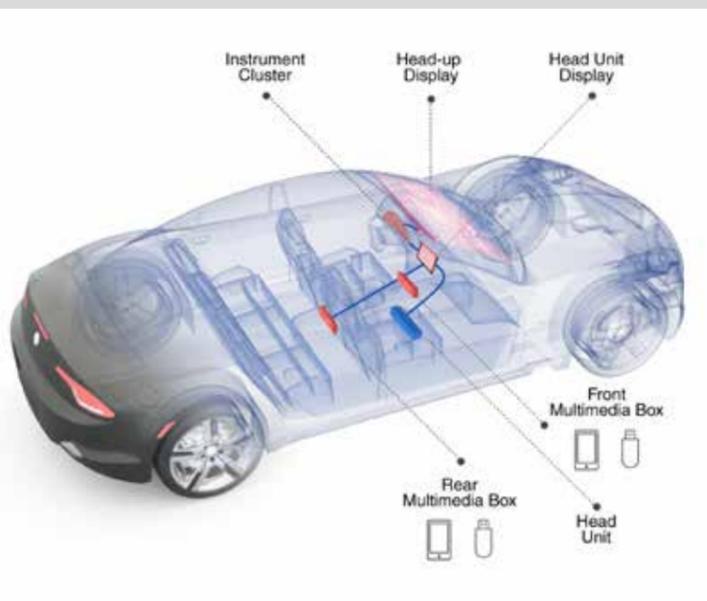
Valens' HDBaseT Automotive brings:

- > Unprecedented multi-Gig throughput over low-cost, low-weight and long-distance cabling
- > Extraordinary capabilities to handle EMC requirements without compromising performance
- > Convergence of multiple native interfaces over the same link to accommodate all applications, including extension of interfaces only possible with HDBaseT
- > Simple and scalable architecture, while enabling daisy-chaining, multistreaming and networking

HDBaseT is a technology developed by Valens to optimize the transmission of high-throughput content between sources and displays in the audiovisual and consumer electronics market. As our cars increasingly become an extension of our connected lives, HDBaseT provides the necessary infrastructure to support the high demands of the automotive sector: high-bandwidth, high resistance to EMC, reliability and redundancy, near-zero latency and flexible architecture.

Valens is a fabless semiconductor company, headquartered in Israel.

For more information, contact us at info-auto@valens.com



FULL SERVICE, CREATIVITY AND ECONOMIC EFFICIENCY

Opinions are changing, designs are varying.
Only one thing remains the same – advertising!

As a full-service partner, the Vollmond Advertising Agency has been developing promotional communication solutions in the print and non-print area since 2004. We are proud of supporting Rinspeed in the areas of brand communication as well as print and onlinemedias.

Vollmond inspires and unites people with companies. We are convinced that success is measurable and we want to thank all our customers for being able to prove this every day.

Vollmond provides safe and honest advice, planning and implementation. Thanks to national and international experience, we demonstrate our ability in the areas of advertising, marketing, design, search engine optimization and programming over and over again by acting in a loyal and reliable manner.

Among our customers are renowned representatives of various economic sectors.

We do not distinguish by the amount of the budget, but we are happy about every new challenge, about our customers' success and the good feeling of having achieved something.

In dealing with our customers, we rely on the human touch, trust and reliability. This ensures a smooth process flow and provides optimal results.

In other words: each of us spares no effort to perform more than you expect – day after day.





ZF ELECTRO-PLATFORM MOVES AND CONTROLS THE RINSPEED SNAP

With its Intelligent Dynamic Driving Chassis (IDDC), ZF has produced a highly versatile platform for electric vehicles. It is also the autonomous driving platform for Rinspeed's latest urban mobility concept "Snap". The IDDC is a perfect example of how ZF is using intelligent mechanical systems to enable vehicles to see, think and act.

Tomorrow's urban mobility concepts will ideally handle many tasks simultaneously. They will offer local, emission-free driving, be automated, flexible and also as variable as the demands of its users. Developments like ZF's forward-looking IDDC are creating the building blocks for such concept cars. The main features of the system include an innovative front axle with an enormous steering angle as well as the mSTARS modular rear axle system. The mSTARS system not only actively and extensively controls the vehicle by means of the AKC rear axle steering, it also powers the vehicle using its integrated electric motor and power electronics. Together, the two ZF axle modules form a complete modular vehicle platform. With such features, the IDDC will make future urban transport vehicles such as the Rinspeed "Snap," agile and capable of acting independently. The flat floor that lies in between the modules supports any type of car body while also providing space for a traction battery.

Data is fed to the IDDC through ZF's environmental sensors including camera, radar and lidar sensors which all work in harmony. These provide a powerful vision system that provides a continuous 360° view of the surrounding area. In the future IDDC concept, sensor fusion and also the data processing required for fully autonomous driving will be enabled by ZF's ProAI supercomputer.

It is therefore the ideal foundation for visionary self-driving mobile concepts like the Rinspeed "Snap," which sees the chassis and the car body as two completely separate units. These add-on car bodies, referred to as "pods," are designed to be mobile or

stationary cabins - without steering wheels - for people and goods and can be exchanged as needed depending on how the vehicle requirements.

mSTARS: rear axle, electric drive and active steering support in one

Like the IDDC, ZF's modular rear axle system mSTARS (modular Semi-Trailing Arm Rear Suspension) opens up a world of new vehicle design options. First of all, it makes electrification more simple and flexible. The unique integral link design with separate spring-damper configuration creates an installation space for integrating different electric drives directly into the axle - including gear ratio, differential and power electronics. For the Rinspeed "Snap," ZF uses an electric motor with 50 kW instead of the 150 kW drive from its "Vision Zero Vehicle." The electric motor is configured to support maximum ranges, relatively low speeds and continuous urban car-sharing uses. The jump from 0 to 50 km/h is set to a maximum of 5 seconds, taking into account the potential number of standing passengers.

Additionally, vehicles equipped with mSTARS are extremely agile due to the addition of the active AKC rear axle steering system. For the urban Rinspeed concept, ZF was able to raise the rear axle tracking up to 14 degrees, which can additionally improve safety and comfort.

EasyTurn: front wheel turning radius is unique

The Rinspeed "Snap" can turn almost at a standstill thanks to the interaction between ZF's unique front



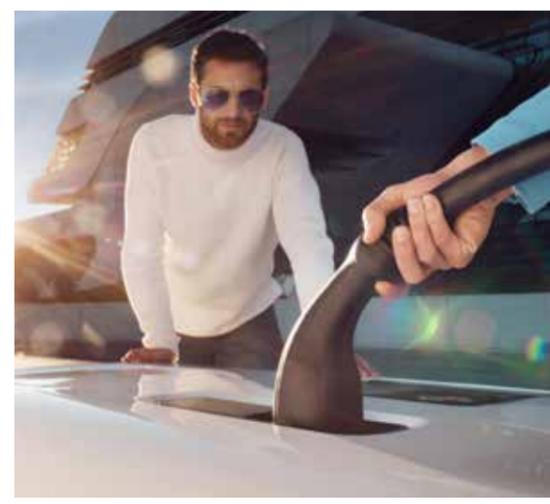
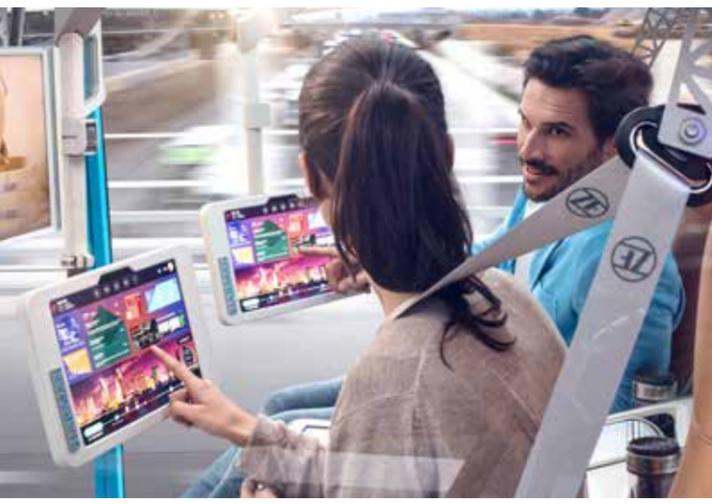
axle concept and the AKC integrated into the IDDC. This new concept, EasyTurn, allows for a wheel-steering angle of up to 75 degrees - current front axles allow for a max. of 50 degrees. It is therefore ideal for city center traffic turmoil, narrow roads and tight parking places, construction sites, or loading zones. ZF's EPS steering system which is also adapted for the IDDC creates a further important system requirement both for vehicle electrification as well as for automated driving. The same applies to ZF's integrated braking system which is also installed in Snap.

Environmental sensors enable the vehicle to see

Without a human driver, vehicles will have to be able to „see“ for themselves. For this, ZF has also integrated the necessary hardware and software directly into the IDDC chassis. It comprises radar lidar (jointly developed with the company Ibeo) as well as camera systems. Utilizing this sensor cluster, IDDC can quickly and reliably recognize the 360-degree surrounding environment and is optimally configured for autonomous driving in cities. It works at both short and long-range, at all speeds relevant for an urban environment and in all light and weather conditions.

ZF ProAI: artificial intelligence for autonomous driving

Data from all components, systems and sensors in the IDDC as well as the Car2X communication will all be analyzed and processed together on a central supercomputer developed jointly by ZF and NVIDIA. The system, called ZF ProAI, processes data in real time and instructs the respective actuators accordingly. It therefore controls all longitudinal control, lateral control and, if applicable, vertical control functions. For vehicles up to automation level 5, the high-performance control box provides artificial intelligence and deep learning as additional capabilities. Such functions allow the IDDC to gather experience independently and the information learnt during the process can be used for new and improved functionalities. This feature is key as ultimately, no system can program, in advance, all situations and eventualities that an autonomous vehicle might experience on a daily basis.



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