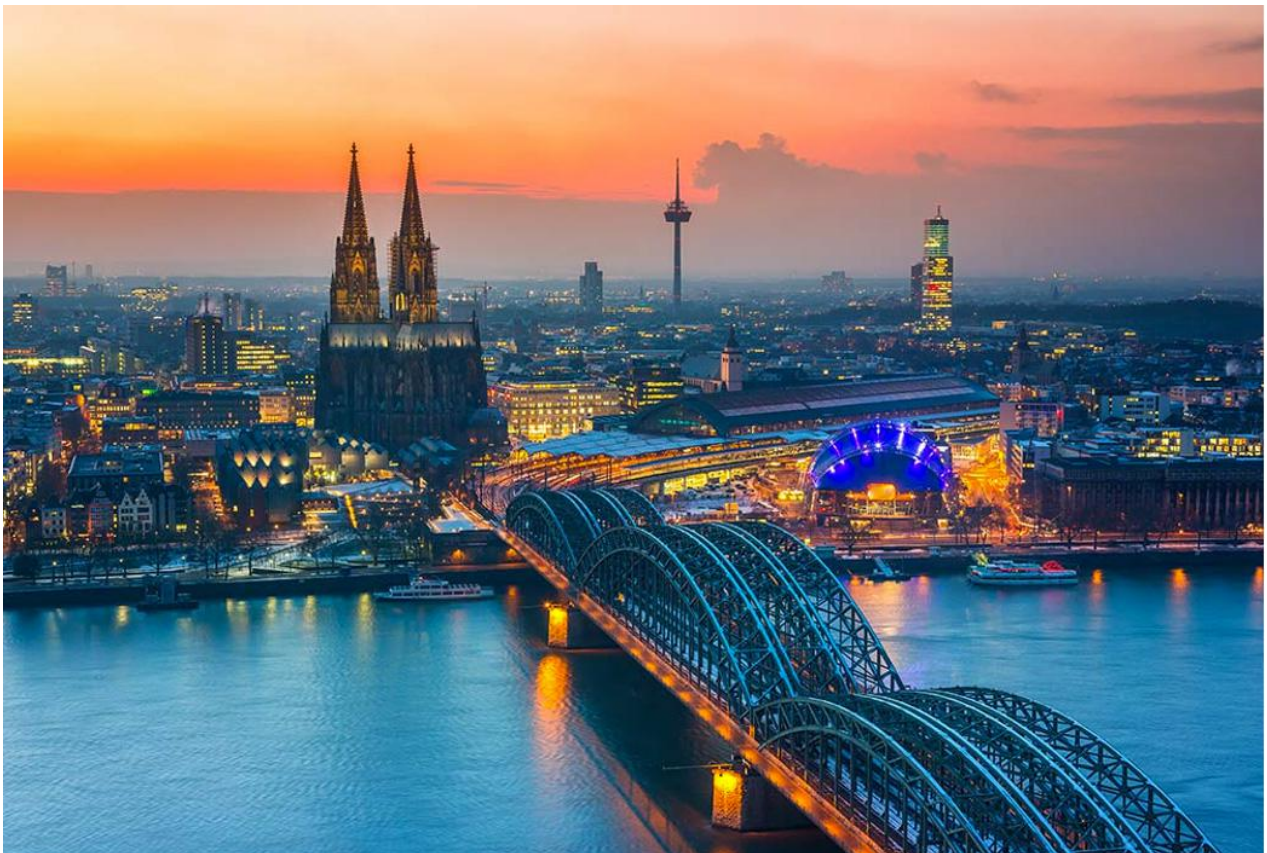# Editorial

Interior Community Heads To Köln Next April

The DVN Interior team is hard at work preparing for the DVN Interior workshop on 25-26 April in Köln, Germany. Save the date! This week we proudly bring you the first information concerning this event—where we'll celebrate our 100th DVN-I Newsletter.

With two keynotes and 22 lectures in six sessions during the day-and-a-half event, the workshop will center around the rubric **Experience Interior: Technology for Safety, Comfort, and Fun**.

Sessions will address important interior topics including functional surfaces; driver monitoring systems; human-machine interaction; interior lighting; interior air quality, and materials and sustainability.

Lectures will be given by speakers from automakers and tier-1 and -2 suppliers, who will share their views and technical and technological innovations for cockpits; seats; dashboards; screens; climate control; design; perceived value; safety; comfort, and all aspects of performance within the car interior.

After these two difficult years we've all slogged through with the pandemic, we're extra super happy to be organizing this Workshop as a grand event for all participants and attendees! All sanitary measures prevailing in Köln at that date will be in place. Conference and exhibition spaces will be safely laid out for a hundred of in-person attendees and a full onsite agenda.

For a more detailed preview, this week's in-depth article focuses on the ways plastic technologies are growing in importance. Not a member yet? Join us **here**!
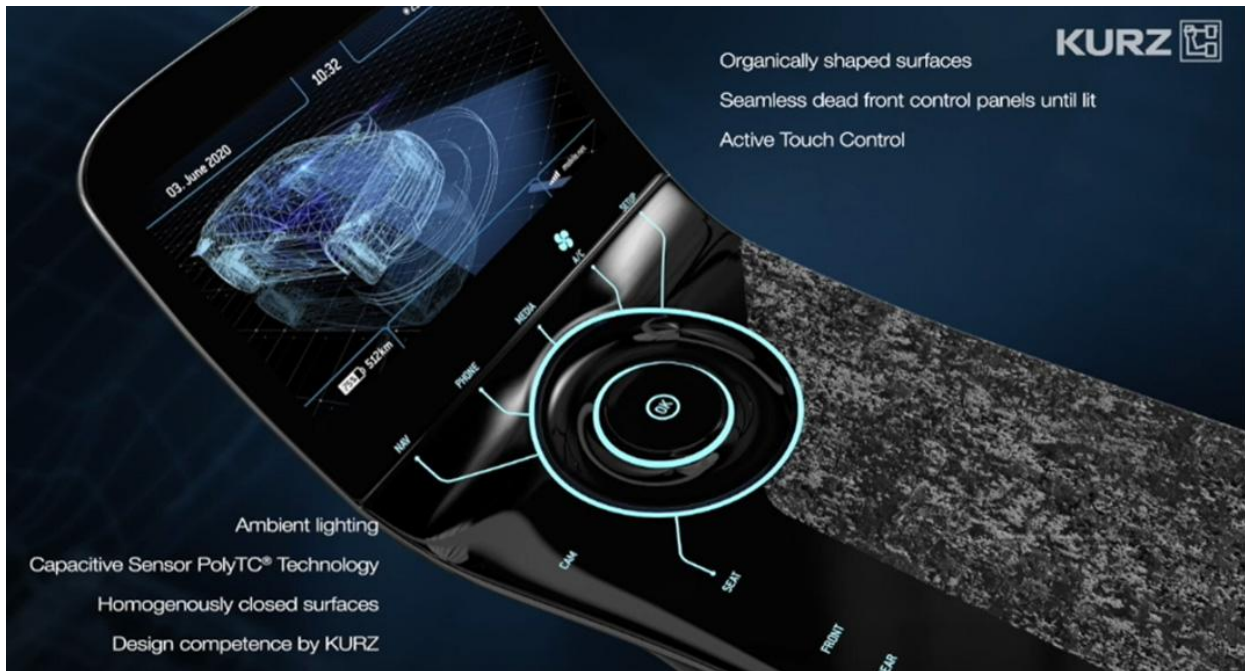
Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Kurz/PolyIC on Interior Plastic Technologies

KURZ IMAGE

The automotive industry is currently undergoing major disruptions due to electromobility, digitalization, and connectivity. The turn towards electromobility is based not insignificantly on society and customers' increasing understanding and concerns on sustainability and ecology. This complete perspective shift has also a direct influence on automotive interiors.

In the 1990s, the increased use of translucent techniques for symbols began, among other things, through the increasingly extensive use of film techniques like in-mold decoration and film insert molding. New design possibilities were created by the disappearing or black panel effect. While at the beginning of the 2000s matte surfaces, for example with soft-touch lacquering, were supposed to increase perceived quality, high-gloss surfaces came into fashion with the advent of the "piano black" trend, while chrome surfaces changed from glossy to brushed or matted.

High-gloss surfaces and the establishment of nanotechnology led to the development of new systems for lacquering and films, which achieved new dimensions of scratch resistance with the help of UV curing. An additional technology accelerator and a step towards environmentally friendly coatings were the new regulations on VOC emissions. These made it possible to apply solvent-based coatings without treating the exhaust air only in combination with hydro and UV coatings. The rapid development of LED and fiber optic technology was resulting in new ambient lighting in vehicle interior design.

The changes in the interior always go hand in hand with evolutions in human-machine interaction, which is strongly influenced by the development of new operating functions. In parallel, the proliferation of smartphones and their user-centric interface has exerted influence on car interiors as well. The input developed from the classic, mechanical long-stroke pushbuttons to short-stroke pushbuttons, and from rotary pushbuttons to touch displays with gesture and voice controls. These have evolved to new heights of usability, largely on strength of the likes of Siri and Alexa. This has dramatically reduced the number of switches in current vehicles (almost none at all, for example, in Tesla's vehicles).

Finer sensor technology and new methods for haptic feedback are facilitating the replacement of mechanical switches by capacitive sensor technology. Such systems allow for closed component surfaces, require significantly fewer components and installation space for functionality, and remove design constraints.

The output of information has also transformed the interior. From the initial single LEDs and analog instrument clusters, the interior is now dominated by an ever-increasing number of displays replacing and integrating symbol and ambience lighting, which was originally implemented exclusively first with multi-component technology and then predominantly by means of painting/laser ablation and film back-molding. Design development is moving in the direction of curved and three-dimensionally deformable displays, and integration-creep will carry on with more functionalities and features being integrated, such as the camera replacements for physical rearview and sideview mirrors.

KURZ IMAGE

Exciting new designs are expected through the further development of display technology, through more customizing by means of graphic digital printing as well as through still unknown techniques, such as buttons similar to the black-panel effect, which can appear three-dimensional as required, so-called "morphing". As with the exterior, concepts for a future model range must also remain true to the brand when it comes to vehicle interiors—and fascinate the prospective customers of tomorrow. Already today, many elements for the driver's cockpit and the interior of cars are made from high-quality plastics. Innovative technologies will open up new perspectives in this area. The highly efficient combination of different production steps helps to manufacture equipment parts even more economically.

Kurz specialize in innovative and practicable plastics technology solutions for vehicle equipment refinement, from an attractive start button to convenient new steering wheel functions, touch-controlled HMI with seamless curved shapes, plastic decoration and surfaces with completely new looks and diverse haptics.

Their particular expertise in adhesive bonding of sensors on wafer-thin substrates directly to the plastic creates attractive surfaces with integrated functions in the vehicle interior. Kurz also produces plastic-based chrome parts for the dashboard, the on-board computer, the navigation system and the air-conditioning system with real chrome plating without galvanization or hexavalent chromium. Even double-sided decorations on flat, curved, polygonal, small and large

surfaces are possible, and they can be glossy, matte, chrome-like, carbon-look or with an exclusive wood-chrome look, in a rich velvet matt effect or elegant piano lacquer.

Kurz and PolyIC, a Kurz company for smart and flexible sensors, integrate capacitive sensors to create exciting functions with large, curved, antireflective touch panels with seamless surfaces against dust and dirt; smart HMIs with impressive user experience through backlit buttons and controls instead of mechanical devices; touchpads and steering wheel switches that light up in ON mode and provide feedback to the driver via vibration, and door trims and other trim elements that are backlit with color change in day-night design to enhance the atmosphere and exclusivity in the vehicle.

POLYIC IMAGE

In addition to an attractive design, backlighting can be created by integrating sensors in all decoration processes. Capacitive sensors with a hair-thin, flexible metal mesh structure ensure functional enhancements: from lighting and light changes to useful additional functions for operation and comfort.

Kurz offers a wide range of decoration processes such as hot stamping, IMD (in-mold decoration or insert molding), which can be used to implement a wide variety of designs. The decorating processes are characterized by rapid decor change, efficiency and surface resistance to scratches, abrasion, UV rays, moisture, suntan lotion and cleaning agents.

Insert molding technology is ideal for components with very strong 3d geometries, also for applying haptic and non-haptic decorations. With Kurz's new IMD Varioform technology, forming; decorating; back injection molding, and punching plastic with pronounced 3D geometry is now possible in one technical manufacturing step.

KURZ IMAGES

IMD Varioform technology uses a foil feed device, specially developed for plastic finishing, which guides the decorative laminate foil to the tool. During the transport process, the finishing layer is infrared-heated to make it malleable before it is introduced into the tool via a vacuum system. At the same time, a 3D-deformed sensor is inserted on the opposite side of the tool. The tool closes and molten thermoplastic is injected.

The production of completely integrated touchpads and touchscreens for curved center consoles becomes possible with intelligent surface, semi-transparent and backlit functions and a front in piano lacquer. Also possible: a capacitive HMI control panel for the on-board computer,

navigation device and air conditioning: ultra-thin, with backlit buttons and haptic feedback if desired. Surfaces deposited with functions can be controlled by the driver with taps or swipes.

Innovative soft-touch surfaces from Kurz can help to dampen and harmonize noises in storage compartments and other interior zones. High-quality topcoats and clearcoats ensure that the surfaces remain extremely scratch-resistant, colorfast and abrasion-resistant, with anti-reflective properties and effortless cleaning.

Interior News

Volvo Invests Spectralics: Optical and Imaging Startup

GRUPO ANTOLIN IMAGE

Volvo Cars has invested in optical and imaging technology startup Spectralics, through the Volvo Cars Tech Fund, the company's venture capital investment arm. The investment gives Volvo access to promising technology at an early stage of development that could contribute to making cars safer and revolutionize the in-car user experience.

Coming from a background in aerospace technology development, Israel-based Spectralics creates state-of-the-art imaging and optical infrastructure spanning materials, hardware and software, enabling a wide variety of advanced optical capabilities.

One of the company's core solutions is the multi-layered thin combiner (MLTC) which is a new type of thin optics film applicable to see-through surfaces of all shapes and sizes. Integrated into a car's windshield or windows, the technology could be used to overlay imagery on the glass.

In a windshield configuration, the technology could create HUDs with a wide field of view to instill a sense of distance as virtual objects are superimposed onto the real-world environment, for a safe and immersive experience. Volvo Cars chief product officer Henrik Green calls Spectralics "an exciting company with technology that holds truly great promise…by supporting their development, we can bring forward the potential their products could have in future Volvo cars".

Other potential uses of the technology include advanced filters for various applications, in-cabin sensing, blind-proof front-looking cameras and digital holographic projections.

Spectralics is an alumnus of the MobilityXLab programme in Gothenburg, Sweden and is part of the DRIVE network in Tel-Aviv, Israel. They are both accelerators for promising start-ups with ideas that can break new ground in the mobility sector. Volvo Cars has been a leading partner in both initiatives since 2017.

Antolin's "Double Slush" Skin is Distinctive, Sustainable

GRUPO ANTOLIN IMAGE

The slush molding process is used to produce precision-sintered molded skins, mainly used in the automotive industry for the production of skins for vehicle interiors. Pleasant to touch yet robust surfaces with an appealing pattern or grain for door trim, dashboard, glove compartment cover or other trim are created in this way. Aspect and Haptic are the main benefits, with a high degree of design freedom. However, the weight of PVC and the high energy consumption in the slush skin production process are not favorable.

Grupo Antolin's cockpits division started work in 2017 on what is now launched as Double Slush Skin, to meet environmentally sustainable demands and improve perceived quality.

This new skin has identical design freedom with at least 30 per cent less weight (an IP Skin is about 2 kg), better behavior at low temperatures, and about 10 per cent less energy consumption during the production process. The 2-layer skin is about 8 per cent thinner than conventional types.

Conventional Slush Skin	Double Slush Skin
• Single layer Skin: about 1,2mm thick) • Produced in one production cycle	• First Front layer → identical to conventional Skin: ~0,6mm • Second layer → foamed PVC and fiber filled (~0,5mm) • Produced in two (shortened) production cycles

GRUPO ANTOLIN IMAGES

Other additional advantages of the new skin include better low- and high-temperature stability and behavior, easier airbag weakening, adhesion to PU back foaming, and easier tooling construction because of reduced shrinkage.

Antolin's Double Slush skins are already present in two MY22 premium vehicle programs.

SPE Awards for Auto Interior Plastics Achievements

INTERIOR NEWS

SPE IMAGE

The Automotive division of the Society of Plastics Engineers (SPE) recognized plastic-based innovation in the automobile industry at their 50th SPE Automotive Innovation Awards Gala in Livonia, Michigan shortly ago.

In the body interior category, the winner is the third-row seatback in the Toyota Sienna, made by **Toyota Boshoku and Flex-N-Gate** using BASF Ultramid PA material. A 16-piece steel assembly is replaced with a one-shot PA injection-molded assembly for this third-row seatback that reduced mass by 30 per cent and cost by 15 per cent. The innovation doubled crash safety performance and took 63 per cent less effort for occupants to raise the seat to its upright position, eliminating the need for a motor. The industry's first fully plastic freestanding seatback offers excellent energy absorption without the need for metal support brackets. A new 35% short-glass, impact-modified PA6 resin was developed for this sequentially injected application.

SPE IMAGE

In the Additive Manufacturing category, **IAC** won for their industry-first integrated tether system, as used in the Ford Maverick. It allows customers to download NFTL files to 3D print their own swappable accessories (like cupholders, trash bins, etc.), allowing for flexible, customizable storage and use features.

Initial designs were developed by Ford and their supply teams, but future iterations could be suggested by customers. A variety of printer types and suggested materials can be used.

SPE IMAGE

A bit earlier, in Germany, SPE Central Europe had its Award Night. In the Technology Enabler category, the winner is **Novem** Car Interior Design, with prototype of the FIAM center console. FIAM means function in authentic materials and combines a user-friendly smart surface with exclusive precious wood.

BMW XM Gets Closer To Production Levels

BMW IMAGES

In Miami, BMW's M division is giving a concrete preview of the production model of the Concept XM. The luxurious interior is fully equipped. The driver faces a curved display like those in the BMW iX and i4. Controls are by touch and voice, but there's still BMW's rotary-and-push dial knob main control on the broad central console, and some will prefer to do it that way.

Patina-look brown leather with copper and carbon accents serve up elements of luxury and performance all in one go. There's a trim brace demarcating the driver zone from the rest of the interior, and a decorative surface of carbon with woven copper threads forms the basis for displays, air outlets, and controls.

BMW IMAGES

The driver-centric design in the first row of seats is counterbalanced with what BMW calls "an extravagant and luxurious lounge atmosphere" in the rear. "Special materials, expressive surfaces and details turn the rear row of seats into a unique M Lounge", and that's before even mentioning the light-show headliner; BMW implicitly disclaims any need for a glass roof—instead, you have an artificial-reality sky!

Continental, Ansys Work To "Find the Waves"

CONTINENTAL IMAGE

With always more equipment on board, more health risks come for the occupants of the vehicles. Continental and Ansys are collaborating to complete certification for on-board communication systems. The idea is to save precious time in identifying harmful waves in the upstream phase of product design.

Before this cooperative venture, Continental worked out a strategy, produced a prototype and went to validation. In case of missed tests, development had to go back to square one. "The test process changes depending on the product. Numerical simulation allows us to achieve certification, explains Grégory Siguier, design engineer at Continental in Toulouse. We therefore want to involve more and more simulation in our approach".

The benefit clearly comes from the gain in efficiency. Engineers can quickly envision several scenarios. Depending on the simulation results with the Ansys software, the Toulouse teams from Continental have the possibility of modifying the design of a system to reduce the power and therefore the magnetic radiation. They can also, supported by data, edit recommendations for the automaker and supplier, who then improve the interior system design so that the occupants are best served.

Ceres, Covestro Expand Holographic Display Collaboration

Ceres Holographics and Covestro have deepened their coöperative efforts around Ceres' HoloFlekt films for automotive display systems.

Ceres-finished HoloFlekt films are used in new kinds of holographic optical element-enabled displays in automotive, aviation, and public transport markets. The two companies' joint efforts will focus on customising Covestro's Bayfol HX photopolymer together with the Ceres mastering and replication technology that enables production of the finished HoloFlekt functional films.

To produce full size HoloFlekt films, they industrialized full-scale replication technology in an 800 m^2 facility in Livingston, Scotland, supported by EU funding.

Covestro's Bayfol HX film is a transparent thin film featuring a light-sensitive, self-developing photopolymer that is ideal for the production of highly efficient volume holograms for advanced light-guiding applications. This partnership has already resulted in Ceres' ability to develop core technology to produce a line of light guiding film solutions. Ceres' end-to-end holographic system and HOE design capability allows the development of customer-specific holographic master designs that can then be re-produced as thousands of perfect replicas in large format HoloFlekt films, enabling OEMs and Tier#1s to implement custom Transparent Display and AR HUD solutions in next generation vehicles.

The future engineering collaboration will first focus on optimizing the Bayfol HX film, and the HoloFlekt mastering and replication equipment to define the boundaries and range of possibilities for Ceres' Transparent Display solution. The two companies will jointly work on meeting OEM application readiness requirements with regard to windshield displays, including system geometries, brightness, uniformity, clarity, and ease of integration etc.

Ceres Holographics design and manufacture holograms and holographic optical elements for optical systems in augmented-reality head-up displays; holographic transparent displays, and holographic lighting systems.

_Car Interiors Unplugged (Summary Series, 5th out of 7)

PEUGEOT 3008 I-COCKPIT (PEUGEOT IMAGE)

5. Privacy vs Property

We all spend time moving and traveling. And by traveling, we give and take things, we trade, we exchange stuff, ideas and wisdom in contact with dissimilar beliefs, values and notions. By moving and traveling we are not only fueling the economy but indeed our imagination. "Silk Road"today is a metaphor for the exchange of goods and ideas between diverse cultures. In fact, it is not one single road but a network of roads and highways that along with them comes movement, passage of people, goods and commodities, culture, knowledge and wealth. Originally, alongside the rare and exotic goods, spices, gold and precious stones came stories, ideas, beliefs and technologies; something like the internet of antiquity. This back-and-forth of ideas or ideas in any material form, created one of the earliest macro-economic networks in history.

Land ways, airways and seaways are the graphics of movement of the territories crossed and by extension, an imprint of who we are. Surprisingly, little has changed in this pattern since a thousand years. The Silk Road is also an allegory for whatever moves in time and place, a symbol for looking towards anything that promoted wealth and progress through motion and geography. Silk, a well-kept secret behind the wealth of China was such a highly lucrative technology that inevitably triggered a race to steal it. Eventually, the Chinese monopoly was broken as in, the greatest industrial theft in history. How the secret escaped became subject of legend and myth: '*the silk princes married to the prince of the land of jade, a kingdom that could not make silk, she decided to brink a gift to her new people, her father's most well-kept secret. She hid silk worms, mulberry seeds and all needed in her royal dress, knowing that she will not suspect and left for her new home…*' Breaking the secret was breaking the cartel thus transferring wealth and knowledge.

In today's China, new technologies seem to be trading an immediate future of wealth, as lucrative as globally diffused. A new type of Silk Road between east and west has resurrected, transferring data, knowledge and new narratives. A novel macro economy is spreading into a global reality

larger than human perception. The proof can be found in the recent pandemic that emphasized that we can only have control on our physical proximity. Beyond that, we cannot control much. It is worth remembering that the idea of a centralized material ownership has always been represented by coinage. Looking into pre-modern world, coinage is often the only mass-produced item in use and a way to spread shared value while confirming the authority that issues and controls. Often the authority is pictured on the coin that otherwise is locally and temporarily owned by anyone.

Technology of our days, based on information, enables new forms of currency (token, crypto). Equally, in a connected world, ownership cannot remain as exclusive or as linear as before. Shifting from fossil fuel to electricity, for instance, we centralize energy, or, from TAXI to Uber, we centralize mobility. Projecting that into our digital connected profiles, what happens when the quantified self becomes the monetized self? Who has access, for what purpose, under what terms? If privacy was the ultimate property, how does privacy relay now to ownership? Yet, we do not have digital human rights as in owning our own data.

The most data intense environment is probably car interiors, generating several times more data per unit of time than any smartphone. A place in which both habitat and mobility, as hostages of one another, create a surrounding space within our physical reach, bringing 'there' and 'how to get there' into one coherent notion. It is like a show wrapped around ourselves. A show that is not about who we are in our everyday life but rather about who we are alluding to be. This is our itinerant sample of ownership and privacy all in one self-sufficient entity. The aesthetic property of things becomes the real ownership of such private space by self-expression, communication and the very personal relation to anything within reach.

This is the 'sense of place' as in home that is not just a location, but a circumstance, a feeling of coziness, security and comfort that could not be found in a (higher tier space like) a train station. Mobility is only the part between destinations where important events take place and the reason to travel. Thus, we gain a momentary ownership of the land we cross and a sense of safety through the 'inhabited motion'. In addition, we earn memorable experiences that are potentially transformative.

Car interiors, half-transparent to the outside scenery, are very physical/tactile places. They concentrate a great variety of smells, textures, forms, functions and materials, orchestrated into three-dimensional objects with purposeful details. Sometimes, an astonishing 'click' or even a musical sequence of more clicks create an extra dimension. Tactile, physical, acoustic…a car interior touches you too, even constantly, even in some of the most intimate parts of your body, frequently hugging you with no restrictions... We have created a world that is more compelling than any other setup, accessible to each one. Aesthetics involve all senses. A switched-off computer screen cannot offer that, neither a bland interior space. Spirit and sense of place cannot exist without collective cultural memory and all the deeper material dimensions within.

When today's destination can be anywhere, home is not just the place where you were born or live, it is the place where you become yourself, surrounded by personal items with stories to tell. Objects become experiences of our everyday life in a similar way a steering wheel converts monotonous steering into a dance move around the cockpit; the cylindrical extruded metal gauges, seemingly coming straight from the soul of the engine, express feelings of torque and friction; the blinker sound causing a 'ritual' silence to announce the imminent change of direction. Equally, in modern cars, advanced manufacturing technologies, reveal details such as toggle switches, crafted meticulously with a mesmerizing watchmaking precision. A center console knob or a paddle shift can be laser-toasted out of metal composite plasma, so sculpturally exotic that we want to touch before even knowing how it functions. Analog-merging-digital controls can convert the feeling of airflow, temperature and vibrations on the skin of our fingertips to a simultaneous visual. Holographic dials appear like precious jewels-behind-glass while details engraved with elaborate algorithmic patterns and contours, aspire to rare historic relics and artifacts. Car interiors are depictions of itinerant adventures, framed by precious-looking objects, each one with a story to tell. We must carefully consider them as evolving organisms that preserve our codes into one precise integral sample of human scale before we effortlessly instruct designers to convert them into hotel lounges of new mobility.

Recently, however, a disproportionate development of screens within car interiors is overwhelming to the deficit of all other sensations. Most observable forms, materials and textures are substituted by a constantly updated graphic, shuffling endlessly according to its algorithmic protocols. Screen interventions are invading our interiors with de-contextualized designs that in their monologue trivialize the experience and the interior 'fabric' as a whole. The race for attention

based on predictive analytics (to know someone's mind and how it works), confirms that screens have to always be kept animated. Lacking any exciting physical or tactile aspect as texture or form, screens as cognitive neutral surfaces are, otherwise, unprepossessing. They are rather made as story-telling enablers.

There is a compelling showbiz mythology around anything displayed in a car interior that finally alludes and often becomes the reason why we are in it. Certain tales have affected so strongly hearts and minds through entertainment or advertising, that they gradually became part of the collective unconscious reality, remaining, until today, horizons to be reached. We are quite confident that this contextualization is key to humans' ability to adapt to technological evolutions and shifts in values and habits that can nevertheless shake up our everyday existence. One thing is clear: these tales allow us to project ourselves further ahead but certainly remain committed to narrative structures that often place the future into the hands of technological progress, for better or for worse.

Technology is a facilitator of this exchange of ownership. From Prometheus stealing the ultimate know-how from the gods, fire, to the legend of the silk princess, they are not seen as industrial thieves but rather benefactors and gift givers to human kind. They are great mythological contributors bringing knowledge and skills to people empowering our aspirations into a connected macro world.

General News

Xiaomi Pours Money Into Automotive

XIAOMI IMAGE

Xiaomi is a Chinese maker of consumer electronics and related software, home appliances, and household items. They're the world's № 2 maker of smartphones (behind Samsung). They're posting record profits, investing heavily in startups, and now investing in their car ambitions; they've just bought—for about €65.5m—Beijing tech startup DeepMotion, founded by former Microsoft Research Asia employees. It's a big investment in autonomous driving technology development.

DeepMotion CEO Cai Rui is an expert in virtual reconstruction of real-life scenarios, which have become essential for driver assistance systems and autonomous driving. CTO Li Zhiwei, who worked on the Hololens AR project at Microsoft, now works on projects like DOF camera tracking. DeepMotion's R&D director Zhang Chiis a pioneer in the field of 3D stereo vision, and Xiaomi has also recently invested in the likes of lidar startup Hesai Tech; millimeter-wave radar startup Geometrical-pal, and ADAS startups Zhongmu Tech and Momenta.

Xiaomi founder and CEO Lei Jun announced last March his intent to take his company into the auto-sphere by investing USD $10bn in a new automotive division over the next decade.

Chinese Automotive Supply Top-100, per Gasgoo

ARCFOX (BAIC) ALPHA-T (CHINA AUTO NEWS IMAGE)

Chinese automotive industry news service Gasgoo has released their 2021 Top-100 list of China's automotive supply chain. These are the companies Gasgoo expects to contribute the most toward the transformation of China's automotive industry.

The list focuses on ten segments including autonomous driving; intelligent cockpit; software; automotive chips; powertrain electrification; thermal management; body and chassis; interior and exterior; environmental friendliness; new materials, and service providers.

The list is the results of an expert committee's evaluation and millions of online votes in a total of 172 days. The committee members include Fu Yuwu, Honorary President of the SAE China (Society of Automotive Engineers) and the China Automotive Talents Society, Fuquan (Frank) Zhao, a professor and the Director of Tsinghua Automotive Strategy Research Institute (TASRI), Zhu Mingrong, president of the China Automotive Talents Society, Shi Jianhua, the Deputy Secretary General of the China Association of Automobile Manufacturers (CAAM), and other industry experts from such automakers as SAIC Motor, GAC Group, Dongfeng Motor, Geely, Great Wall Motor, NIO, BYD, Li Auto, Chery and JAC Group.

Chinese companies are playing a leading role in the innovation of intelligent and electric vehicles. Among the 100 companies, 68 are local ones including global suppliers like Yanfeng, Joyson Electronics, Desay as well as such cross-border players as iFLYTEK and Huawei. Notably, a lot homegrown suppliers stand out from all candidates, including Horizon Robotics, Deeproute.ai, PLUS.AI, Qianxun Spatial Intelligence, Freetech. It also includes western global suppliers, such as Bosh, ZF, Continental, Faurecia, Valeo, Lear, Adient, Mahle, Brose, Plastic Omnium and others.

On the list, over 70 per cent of suppliers are awarded for their advanced technologies in autonomous driving, software, chip, intelligent cockpit or powertrain electrification, such as domain controller, digital key and HUDs.

Top 100 Players of China's New Automotive Supply Chain
(In no particular order)

Supplier	Awarded Technology	Segment
Bosch	Intelligent cockpit domain controller	Intelligent cockpit

Mahle China	High-voltage PTC heater	Thermal management
Plastic Omnium	IV Hydrogen Storage Tank	Powertrain Electrification
Gestamp	GES-MULTISTEP® hot stamping technology	Body and chassis
DANA China	SmartConnect ™	Body and chassis
Brose China	800V/55cc electric air conditioning compressor	Thermal management

Company	Product	Category
ZF	Automated Valet Parking	Autonomous Driving
Continental	Body High Performance Computer (Body HPC)	Body and chassis
Faurecia	70MPa IV hydrogen storage system	Powertrain Electrification
Lear	ConfigurE+	Intelligent cockpit
Yanfeng	Smart Cabin1 XiM21s	Intelligent cockpit
Aptiv (China) Technical Center	Smart Vehicle Architecture	Autonomous Driving
BorgWarner	BorgWarner 800V SiC controller	Powertrain Electrification
Mahle China	High-voltage PTC heater	Thermal management
Plastic Omnium	IV Hydrogen Storage Tank	Powertrain Electrification
Gestamp	GES-MULTISTEP® hot stamping technology	Body and chassis
DANA China	SmartConnect™	Body and chassis
Brose China	800V/55cc electric air conditioning compressor	Thermal management
Joyson Electronics	Innovative intelligent cockpit	Intelligent cockpit
Infineon Technologies	Highly-integrated tire pressure sensor SP40+	Chip
Antolin	New instrument panel/cockpit interior cover with double slush skin	Interior and exterior
Webasto China	Roof Sensor Module	Intelligent cockpit
Garrett	E-Turbo	Powertrain Electrification
Visteon	first production-intent Wireless battery management system (BMS)	Powertrain Electrification
Vitesco Technologies (China)	High voltage axle drive EMR3	Powertrain Electrification
Veoneer China	Restraint Control Systems	Software
NVIDIA	NVIDIA DRIVE Orin™ (SoC)	Chip
onsemi	VE-Trac Dual - NVG800A75L4DSC	Powertrain Electrification
Sensata Technologies	PyroTactor EDP	Powertrain Electrification
Harman China	Harman intelligent cockpit platform	Intelligent cockpit
Eastman	Top Coat Hydroguard™	Environment-friendly lightweight and new materials
Siemens Digital Industries Software	Simcenter™	Software
Benecke Changshun	Soft TPO Material	Environment-friendly lightweight and new materials
ThunderSoft	Kanzi Hybrid	Software
Fuyao Glass	Fixed panoramic sunroof	Interior and exterior
iFLYTEK	Multi-mode sensing system for Intelligent cockpit	Intelligent cockpit
Desay SV	Blue Whale 4.0	Software
Huawei	AI BMS	Software
GD HAN'S YUEMING LASER GROUP	High power and high precision Automotive Airbag Laser Cutter	Service Provider
HBIS Group	2000MPa High toughness hot formed steel	Environment-friendly lightweight and new materials
Foryou Multimedia Electronics	In-vehicle Wireless charger module	Intelligent cockpit
PLUS.AI	Automated driving system PlusDrive	Autonomous Driving
Qianxun Spatial Intelligence	Space-Time Intelligence V2X Roadside Unit Tuling	Autonomous Driving
PATEO	PATEO AI platform	Software
Horizon Robotics	high-performance AI chip Horizon Journey	Chip
Deeproute.ai	L4 autonomous driving solution	Autonomous Driving
Mind Thermal System	Heat pump air conditioning and battery interactive thermal management system	Thermal management
HRC	Carbon fiber body side outer technology	Body and chassis
Unity	Embedded HMI solution for intelligent vehicle	Software
Freetech	Domain control unit ADC20 Development of visual system platform	Autonomous Driving
Neusoft Reach	NeuSAR	Software
Arcsoft	VisDrive automotive vision solution	Software
ArcherMind Technology	Intelligent driving cockpit software platform	Intelligent cockpit
iSOFT Infrastructure Software	ORIENTAIS AUTOSAR	Software
NOBO Automotive Systems	Domain controller IN9.0	Intelligent cockpit
ECARX	Geely Yinhe OS	Intelligent cockpit
Ambarella	CVflow® AI vision chip	Chip
Melexis	0-50A isolated 5V integrated hall current-sensor MLX91220	Powertrain Electrification
ABUP	OTA solutions for automobiles	Software
Hongjing Drive	High-level autonomous driving computing platform and full-stack system solutions	Autonomous Driving
Suzhou Zhito Technology Company	L3 autonomous driving integration system	Autonomous Driving

Company	Product	Category
Freetech	Domain control unit ADC20 Development of visual system platform	Autonomous Driving
Neusoft Reach	NeuSAR	Software
Arcsoft	VisDrive automotive vision solution	Software
ArcherMind Technology	Intelligent driving cockpit software platform	Intelligent cockpit
iSOFT Infrastructure Software	ORIENTAIS AUTOSAR	Software
NOBO Automotive Systems	Domain controller IN9.0	Intelligent cockpit
ECARX	Geely Yinhe OS	Intelligent cockpit
Ambarella	CVflow® AI vision chip	Chip
Melexis	0-50A isolated 5V integrated hall current-sensor MLX91220	Powertrain Electrification
ABUP	OTA solutions for automobiles	Software
Hongjing Drive	High-level autonomous driving computing platform and full-stack system solutions	Autonomous Driving
Suzhou Zhito Technology Company	L3 autonomous driving integration system	Autonomous Driving
MAXIEYE	MAXI-PILOT intelligent driving system	Autonomous Driving
HYCET Technology	High torque compact highly-efficient hybrid powertrain	Powertrain Electrification
Shanghai Edrive	SiC motor controller based on double-sided welding and double-sided cooling technology	Powertrain Electrification
SiEngine Technology	7nm high-performance SoC for intelligent cockpit	Chip
Black Sesame Technologies	Huashan-2 A1000 computing chip	Chip
Wuhan Heading Data Intelligence	Vehicle-cloud integration full stack space-time data solution	Autonomous Driving
FinDreams Technology	New generation direct cooling and direct heat pump air conditioning system	Thermal management
Shanghai Baolong Automotive Corporation	Binocular camera and system	Autonomous Driving
Coligen	Super resolution 4D point cloud imaging millimeter wave radar technology	Autonomous Driving
SONGZ AUTOMOBILE AIR CONDITIONING	Integrated thermal management system for electric vehicles	Thermal management
Irdeto	Vehicle digital key solution Keystone	Software
Semidrive Technology	X9 Series processor	Chip
Longsys	FORESEE eMMC	Chip
Tianjin EV Energies	590 Pouch Module	Powertrain Electrification
ChipON	MCU KF32A156	Chip
BiTECH Automotive	Smart cockpit domain controller platform	Intelligent cockpit
NASN Automotive Electronics	L3/L4/L5 autonomous driving redundant drive-by-wire solution	Body and chassis
INGEEK	Vehicle digital key	Software
HYCET	DP-EPS	Body and chassis
Shenzhen Hangsheng Electronics	Open platform Internet of Vehicle 3.0	Intelligent cockpit
RoboSense	Second-generation intelligent solid Lidar RS-LiDAR-M1	Autonomous Driving
Untouch Tech	High-performance, high-safety automotive middleware	Autonomous Driving
Sixents Technology	Network-cloud-end integrated high-precision positioning solution	Autonomous Driving
Jet Wagon Automotive Parts	Aluminum alloy hot forming and quenching technology	Body and chassis
Raythink	AR-HUD with a true wide angle view	Intelligent cockpit
BDStar Intelligent & Connected Vehicle Technology (BICV)	vision controller (CV-BOX)	Intelligent cockpit
Hexagon Manufacturing Intelligence (Qingdao)	Intelligent body virtual assembly solution	Service Provider
ruhlamat Automation Technologies (Suzhou)	Flexible automated production line solutions	Service Provider
Deco Automotive	Fully-redundant intelligent steering system	Autonomous Driving
Shenzhen Farben	Software information technology and services in SDV era	Software
MXNavi	High precision lane-level navigation	Software
PanoSim Technologies	Integrated simulation test of autonomous driving	Autonomous Driving
Yuxin Automobile Thermal Management Technology Co., Ltd.	R&D of NEV power battery thermal management system	Thermal management
APT Electronics	3020 Dual Color automotive parts	Interior and exterior
Technomous	Domain controller for intelligent driving	Autonomous Driving
JWD Auto	iCAS-Brake, Drive-by-wire chassis, Three-in-one hardware and software closed loop AEBS, iCAS-AEB	Body and chassis
Longji Machinery	Aluminum iron riveted brake disc	Body and chassis
PRATIC CNC Technology	Battery pack tray solution	Service Provider
Elite Robot	Collaborative robot	Service Provider
Harxon Corporation	High-precision multi-network integrated glass antenna for intelligent & connected vehicles	Autonomous Driving
Chongqing Tsingshan Industrial	7 speed DCT hydraulic module	Powertrain Electrification
Norel Systems	AVT (Automotive Video Transport)	Chip

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Oculii	4D imaging millimeter wave radar	Autonomous Driving
Enpower Electric Systems	Integrated chip powertrain	Powertrain Electrification

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