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Weekly Newsletter

DVN-I
Automotive Interior

NEWSLETTER #140

Editorial

Interior Premiumization; LA Auto Show Report

BMW IMAGE

This week's news explores the ongoing 'premiumization' of high-segment car interiors. Features and technologies are diverse, and examples abound: the BMW i7 with an elegant cockpit interaction light bar, and an impressive rear seat cinema with a 31" screen. Or the Toyota Crown, with voice control in a cabin with superlative insulation—acoustically optimized materials under the carpet and above the headliner to reduce frequencies that interfere with conversation. Or the Lucid Air Grand Touring with a 21-speaker Surreal Sound immersive audio system and a 34" cockpit screen. The auto interior community keeps innovating with new features; technologies, and techniques, which is great, but all this amazing stuff costs more and more money!

This week's in-depth report is an exclusive interview with the president of Europur, the association of flexible polyurethane foam slabstock manufacturers. He shares unique and thoughtful perspectives, particularly with regard to the sustainability of polyurethane.

Also, today our Car Interiors at the **Los Angeles Auto Show report** goes live! What a grand show it was, with so many fascinating details, themes, and trends brewing inside the cars and trucks on display. Read the report to take a virtual walk with the DVN-I team with over a hundred big, annotated photos.

Thanks for being with us; we're glad you're here.

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Interview: Europur President Bart J. ten Brink

DVN Interior's Philippe Aumont: Bart, thanks for talking with us. What is Europur?

Europur's Bart J. ten Brink: Europur is the association of flexible foam slabstock manufacturers. It includes all the value chain players from raw material producers to foam producers, including equipment suppliers and service providers. We represent today approximately 150 member companies. We are the voice of that industry and the contact point for our members, where they can meet, interact in working groups on hot topics, like regulation changes.

We have existed for many years, but we completely changed the organization seven years ago to include all value chain members; for foamers, importance and fees are defined according to production volume; others have flat fees. Every member wants to have a forum where they can pass their messages.

DVN-I: What sectors do your members serve?

BJtB: 50 per cent is going into the furniture industry; 35 per cent into the mattress industry, and 15 per cent in automotive and other industries.

SLABSTOCK FOAM (EUROUR IMAGE)

DVN-I: What are the main applications of slabstock foam in automotive?

BJtB: The main application is seats, for the surface material backfoaming. But also headliners; side trim; parcel shelves, and damping parts. In seats, we talk about textile backfoaming using either polyether foam or polyester foam, depending on the application.

DVN-I: What services do you offer to your members?

BJtB: We are the contact point, the voice of the industry. There are working groups to support research; stewardship, and sustainability. We conduct market research and feasibility studies, and publish one or two market reports per year.

DVN-I: What are the main challenges in your industry?

BJtB: Since 2017, the main challenge is sustainability. We also have challenges with availability of raw materials, and the value chain has a hard time to cope with that. Of course, high energy prices are also a big issue.

DVN-I: How do you define sustainability in your industry?

BJtB: Europur is facilitating sustainability of our members, together with more traditional health, safety, and environmental factors, to be a responsible industry.

For me a sustainable product is one which closes the loop. It means products which at the end of their first life are brought back as raw material. This circular system is the perfect and sustainable PU. Sustainability is also usage of scarce resources at an optimal way. Within the target of carbon-neutrality that the industry is announcing—recently BASF and Dow, for example—for 2050, it must include everything. Will it be solved by using only natural materials? Of course not; that would be too simple!

DVN-I: How are your members working toward sustainability?

BJtB: To anchor sustainability in a company means working on the product and the process with people. Most importantly, people are making the difference on this route. Their enthusiasm should be fed by looking for solutions; you need a purpose to be an enthusiast, and sustainability is that purpose.

DVN-I: Have you developed a sustainability label for your members?

BJtB: The only label we have now is for the use of non-harmful substances. However, it's amazing to see all the companies, including our members, accelerating on these topics, working on products and processes (you cannot separate the two). In the end, people will be able to understand the CO_2 impact of any product, like they get the calorie and nutrient information of any food today from the label.

DVN-I: Are you supporting your members in front of raw material price increase?

BJtB: We can't sit at the discussion tables. And price index does not always reflect reality, and commercial discussions remain commercial discussion—it is not the result of an equation. We are going through a price revolution; we've never before had such instability.

DVN-I: How do you see the automotive sector?

BJtB: A year ago, the industry was going to a transition to EV and hybrids, which means for foamers that the product should be redesigned because of the completely new acoustic context—no engine noise; more presence of aerodynamic and rolling noise. Governments; regulators, and stakeholders underestimated all the necessary means for this transition, and because of increasing electricity prices, the whole business model is getting weaker. For sure the transition will take longer; 2035 was always coming too soon to make such a transition. A dialog must start between regulators and the industry, and the timeframe has to be revised, with a feasible implementation plan.

DVN-I: What role will Europur have in this?

BJtB: Europur is acting to make the PU industry more sustainable—more circular—to anchor sustainability in all companies' strategy. It's only one piece of the puzzle, but it's important, and we support all our members to really look into the future. That is what gives me, and the Europur team, the energy and the enthusiasm to wake up every morning.

Video: how PU is made

Interior News

Marelli Surface Technologies Enhance Vehicle Personality

INTERIOR NEWS

MARELLI IMAGE

At CES next month, Marelli will showcase their latest technology portfolio that drives vehicle personality and performance. In-demand features will be brought to life in the space through Marelli's latest concept models and digital configurators.

Customers will be invited to define their brands' personalities by configuring their own vehicle—choosing from a curated selection of lighting; sensing; electronics, and interior options featured in Marelli's Digital Design Studio. Users will select their features from designated personality styles or create their own unique design.

The Marelli showcase will also highlight surface solutions that enhance vehicle personality and user experience. Visitors will get to explore the natural meeting point of electronics and interior design through Marelli's surface solutions. Realized through the Digital Design Studio; the material collection display; and the interactive cockpit demo, visitors will be able to experience interactive, informative, and decorative options.

Interactive surfaces provide a seamless and optimal solution for software integration into the vehicle's interior, providing a unique expression and enhancing function and style—providing voice recognition options and replacing mechanical buttons with haptic switches. Informative surfaces provide customizable information and alerts without compromising aesthetics. Decorative surfaces use illumination to increase cabin sophistication and broaden styling options, providing a signature look that can range from luxurious to casual and cool to warm.

Faurecia's Retrofit Smart Massage Cover

INTERIOR NEWS

IMAGES: FAURECIA

Faurecia has developed what they're calling the Smart Massage Cover, based on experience gained in making pneumatic components and high-quality outer wraps for premium seats. With its slim, ergonomic design and massage programs specially designed for long car journeys, the SMC evens out blood circulation in the back; mobilizes the spine, and activates the entire musculoskeletal system. This increases comfort and wellbeing. Back pain, soreness, and tension can demonstrably be alleviated, as certified by the *Aktion Gesunder Rücken* (Healthy Back Association).

A free app for iOS and Android allows the user to adjust settings including the SMC's massage strength and intensity. And iOS users can start SMC programs via Siri voice control—the massage can be started or stopped even while driving. Multiple SMCs in a vehicle can be identified with different names in the app and controlled separately. These new iOS app functions will also be available for Android users soon.

Inside the SMC, the massage system comprises eight large, separately-controllable air chambers. Depending on the program and adjustments, the chambers are filled with air. When the SMC is not in use, the air chambers empty completely so the mat is unobtrusive. A complete safety validation process has been used, to certify full compliance to the highest standards.

The Smart Massage Cover can be purchased for about €300.

Antolin's Sustainable Low-Mass Door Panels

INTERIOR NEWS

GRUPO ANTOLIN IMAGE

In an EV, every gram saved increases the driving range before a recharge is needed. Grupo Antolin, having already been the first to market with lightweight plastic window regulator rails, also use chemical foaming for lightweight door panels. It's a new application of a technique they premiered in 2014 on the visible part of a trunk trim. Very soon, the company plans to introduce solutions with chemical foaming combined with the use of recycled materials.

Sustainability is an important objective, and Grupo Antolin delivers solutions for the door panels that include recycled materials like polypropylene; recycled textiles developed from plastics recovered from the sea for use on the likes of armrest covers, and recycled PET for pillar covers. Soon, recycled materials will also be used in more visible parts. New sustainable materials like this are being used with excellent structural performance, and recyclability is developed with disassembly in mind, with removable adhesives to facilitate sort-out of components at end of life.

Lighting is nowadays part of the overall interior design, with door panels playing an important role. Antolin provides solutions that include ambient lighting with RGB modules and plenty of backlight solutions for a wide range of decorative materials—and they're about to release theirr first slim backlight door inserts for serial production.

From a production perspective, 100 per cent automatization is the target. Antolin is a good ways along toward that goal, which includes machine flexibility; machine vision; machine learning, and quick-change tooling.

BMW i7 Brings New Luxury Interior Features

INTERIOR NEWS

BMW IMAGES

BMW's top model is mostly a chauffeur-driven vehicle, and sales are predicted at 45 per cent in China; 20 per cent in the USA, and only 9 per cent in Europe—the car is 5.39 m long, and doesn't fit easily in tight European cities.

The doors open electrically via app or at the touch of a button on the handle. At first they open a crack and then sensors on the sill detect whether there is enough unobstructed room for them to open the rest of the way. If you're standing in their way, they'll wait for you to move.

The high-quality materials and workmanship show genuine luxury, including wool-cashmere fabric with leather in the shoulder area. The seats are comfortable, with good lateral support for aggressive driving. Seat massage, ventilation and heating are all first-class.

The crystal-look light strip on the dashboard known as the 'interaction bar', and the 31" theater screen in the rear are probably the most striking elements in this car. The 'Rear Seat Entertainment Experience', with cinematic 8K resolution, is supported by the new BMW Operating System 8—there are more functions to explore on the screens, along with ready access to streaming services. Touchscreens integrated in the door handles in the format of a full-grown smartphone help with operation and encourage adult play.

The wideband screen with the driving instruments is slightly curved toward the driver, a subtle nod to BMW's long tradition of driver orientation. The head-up display, integrated in the top of the dashboard, complements HMI with the right amount of optimally-placed information.

BMW IMAGE

Audio, presented through a Bowers & Wilkins sound system, includes 'e-sounds' created by film music composer Hans Zimmer. As an extra, speaker boxes built into the seats acoustically perfect the cinema experience. The top sound system offers 1,965 W of '4D sound'. Thanks to the battery in the floor, the i7's center of gravity is low. In combination with standard air suspension; self-steering rear axle; and roll stabilization, the delivers both luxurious comfort and sporty capabilities all in one go.

Voice Control, Ultra-Hushed Cabin in Toyota's Crown

INTERIOR NEWS

TOYOTA IMAGE

All versions of Toyota's new Crown feature a new audio multimedia system with a 12.3" touchscreen. The system benefits from a range of connectivity and convenience features, and can be updated over the air. In addition to the touchscreen interface, voice commands can be used for navigation; audio; HVAC, and more.

And voice activation works especially well because outside noise is notably minimized in the cabin. That's because Toyota engineers have designed components including a high-strength TNGA-K platform, which curbs vibrations felt through the steering; floor, and structure of the car. Noise is further reduced by dint of specially tuned suspension; strategically-placed insulation, and special adhesives in the inner rockers and bulkhead. But wait—there's more! Acoustic glass and premium insulation and body sealing materials within the structure and engine bay.

TOYOTA IMAGE

On the XLE trim, there are heated 8-way power front seats finished in a black woven fabric, with adjustable lumbar support for the driver. On the Limited and Platinum trim levels, there are leather-upholstered ventilated front seats and heated rear ones.

The XLE has a six-speaker sound system; Limited and Platinum cars have a JBL system with 11 speakers; a rear subwoofer, and an eight-channel amplifier. Toyota's Audio Multimedia enables simultaneous dual Bluetooth phone connectivity and support for wireless Apple CarPlay and Android Auto.

Lucid Air GT: Very Fast Luxury with Spectacular UX

INTERIOR NEWS

LUCID IMAGES

Lucid 's luxurious Air Grand Touring car is launching in Europe. Despite its weight of just under 2,400 kg, 597 kW / 812 hp and 1,200 Nm haul the car to 100 km/h in around three seconds and provide a top speed of 270 km/h.

The Air's interior offers plenty of luxury and a touch of Scandinavian simplicity—leathers; woods; and, on request, soft wool even on the door panels. Heated; cooled; ventilated, massaging front seats are upholstered in black leather; comfortable rear seats are done in brown leather. A 21-speaker Surreal Sound immersive audio system with Dolby Atmos is also standard equipment, and an ultra-fast 900V+ charging system, enabling users to add up to 500 km of range in 21 minutes' time at a 350 kW DC fast charger.

The 5K-resolution screens, arranged in a 34" horizontal crescent, team up with the portrait touch display in the center console, which self-stows at the touch of the lower edge to reveal capacious shelves. The other functions are controlled by voice or rotary knobs on the small steering wheel. Unlike the Mercedes EQS, the side and rear windows can be shaded at the touch of a button, but not (yet?) the panoramic roof.

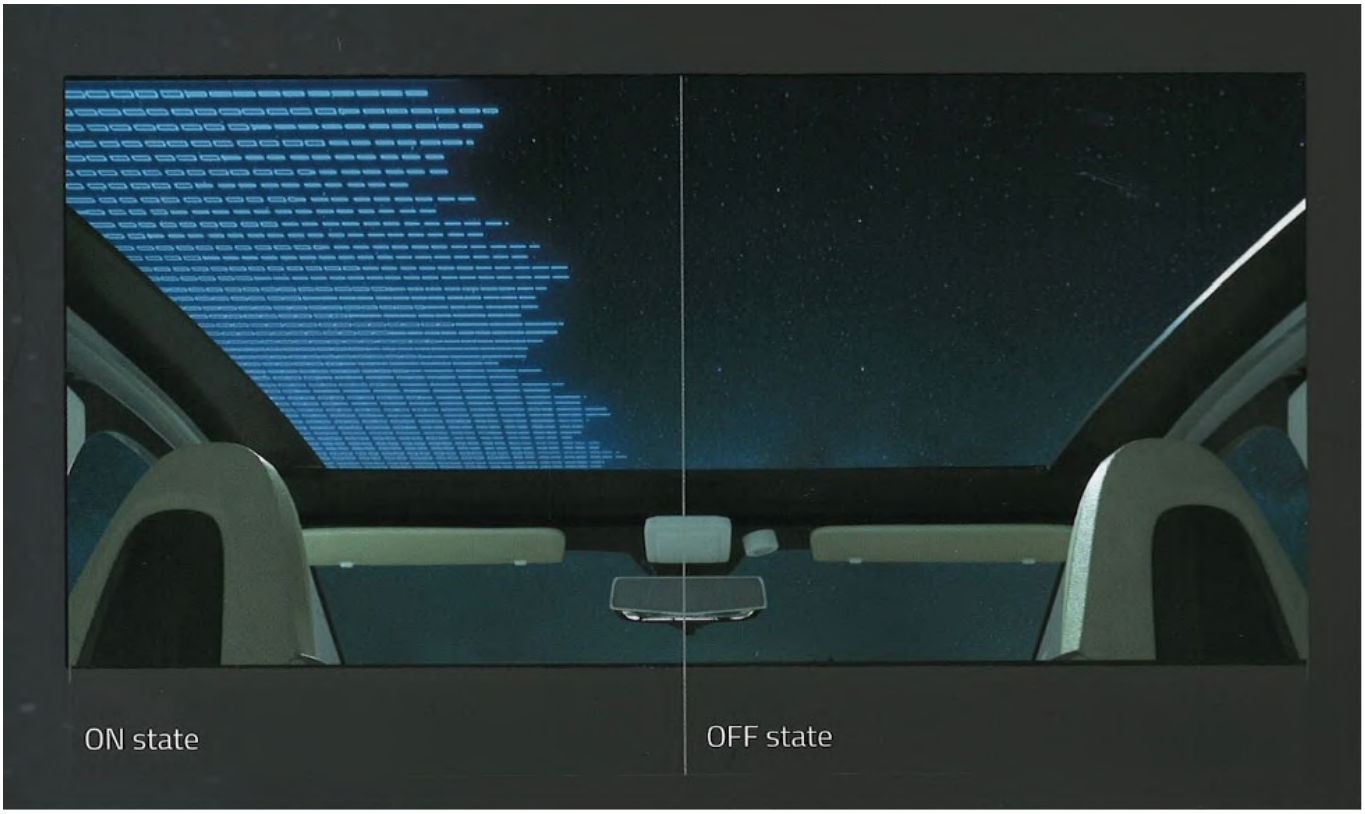
The interior is roomy, even if headroom is limited due to the low roofline and the battery pack in the underbody. The windshield merges into the panoramic roof without interruption. Thanks to the flat design, the rear trunk is just under 650 liters (23 cubic feet) in size, but the 'frunk' (under the front hood) offers an additional 280 liters (just under 10 ft^3) and can be operated electrically.

The Design Lounge

Panoramic Roof: Is it Exterior or Interior?

by Robert Miller, Designer

THE DESIGN LOUNGE



AGP'S E-GLASS DEMONSTRATION (AGP IMAGE)

I am forever amazed by all cars' terrific automotive interior aspects today. Lighting; new materials; filtration; health and wellness, and the endless array of designs push our interior automotive environments to new levels.

Recently I sat in a new vehicle; stared out the enormous windshield; gazed up at the beautiful panoramic roof; and asked myself whether the glass is part of the interior or exterior. The answer came to me suddenly: it's both!

I paid a visit to AGP Automotive Glass in Aachen, Germany, and was astounded at the level of development of a new generation of panoramic glass roofs. AGP's latest advance, called VarioLux, is a new kind of e-glass panoramic roof. Embedded inside the sunroof, this combines two technologies to enhance the user's comfort and transform the vehicle cabin into an immersive experience.

Their tabletop demo has three buttons that control a variety of surprise-and-delight functions. Pushing the middle button activates the e-glass and produced a beautiful colored-line pattern along the edges of the glass extending into the middle. AGP calls this Lux Fractal. The integrated RGB lighting allows unlimited colors, making the e-glass quite spectacular. Pushing the two outside buttons offers two different pattern expressions, virtually painting a unique design in this fantastic e-glass.

Another of AGP's new cabin experience offerings is Vario Plus. Here again, the occupant inside the cabin gets to set the tone. Vario Plus replaces the mechanical roof shade by turning the glass neutral grey, filtering out harsh sunlight and enabling instant comfort and privacy on demand. The roof is divided into segments, allowing the user to touch the edge of the glass and instantly make the selected segment clear for a perfect sky view.

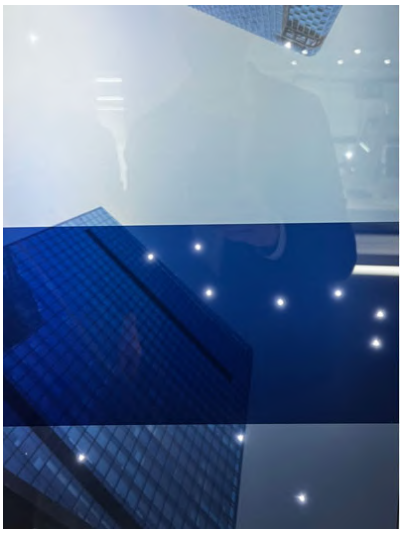
AGP has also developed e-glass coatings to offer the best solar properties for all-season thermal comfort and a minimum level of reflectance to enjoy a clear view from inside the cabin.

All of this technology inside the glass has benefits too. For example, AGP glass roofs offer significant weight savings compared to movable roofs, eliminating the complexities of traditional panoramic roofs. They also free up headroom, and allow for customized patterns and shapes to augment the vehicle's brand and model identity.

PANORAMIC ROOF GLASS BECOMES A BEAUTIFUL SCENE—MAGIC! (AGP IMAGE)

Glass capabilities are evolving. Users can control tint; density; and patterns, and add integrated color-on-demand lighting built into the glass. AGP is pushing the boundaries of conventional glass to the future to turn every journey into a magical in-cabin experience.

As we all move forward, e-glass will occupy more vehicles—offering new experiences and integration with embedded sensors; touch systems; and LEDs, forming communication matrices and starfield patterns. Luxury brands are starting to incorporate these advanced technologies, and before long some of this advanced technology will filter down into mainstream vehicles. So, it will be an exciting time for all of us to see and look at the e-glass in our cars and houses. Next time you look out the window, take note: glass straddles our exterior and interior worlds.



UPWARD VIEW THROUGH PANO ROOF: STARS AND E-GLASS WITH CONTROLLABLE TINT AND SHADING (AGP IMAGE)

Parking Meters

THE DESIGN LOUNGE

WIKIMEDIA IMAGE

Parking meters are arguably among the most hated public objects. How did it all start? The idea of a controlled parking space was initiated by merchants. They complained their sales were affected by low traffic turnover, since parking spaces next to downtown businesses were occupied by the same cars all day. At the receiving end was Carl Magee, an attorney and newspaper editor who joined the Oklahoma City Chamber of Commerce traffic committee in 1933 and was assigned to manage the escalating traffic congestion.

Magee conceived the idea of a coin-operated timer that could be used to increase traffic turnover in busy commercial streets, and he sponsored a competition at the University of Oklahoma to develop such a device. The first prototype was powered by a clock-type mainspring, which required winding by the parking customer after putting coins into the meter. This configuration lasted more than 40 years, with only a few changes in the exterior design, such as a double-headed design to cover two adjacent parking spaces, and the use of new materials and production techniques.

Pentecostal Reverend C.H. North was the first person in the United States to receive a parking ticket for an expired meter payment. His citation was dismissed when he said he had gone to a grocery store to get change for the meter. It was August 1935, and the first parking meters ever had been installed in downtown Oklahoma City just about a month earlier. Local businesses benefited greatly from the decreased parking congestion, but some angry citizens protested and initiated legal action in response to their installation. Proceedings failed to stop the practice, while the added financial benefits spurred other cities to install parking meters.

In 1952, the Supreme Court of North Carolina, in ruling that a city could not pledge on-street parking meter proceeds as security for bonds issued to build off-street parking decks, said "*Streets of a municipality are provided for public use. A city board has no valid authority to rent, lease or let a parking space on the streets*

*to an individual motorist '**for a fee**' or to charge a rate or toll therefor. Much less may it lease or let the whole system of on-street parking meters for operation by a private corporation or individual".* This ruling essentially affirmed an Oklahoma case from the mid-late 1930s, in which it was adjudged that parking meters may be used only to regulate parking, not to raise revenue.

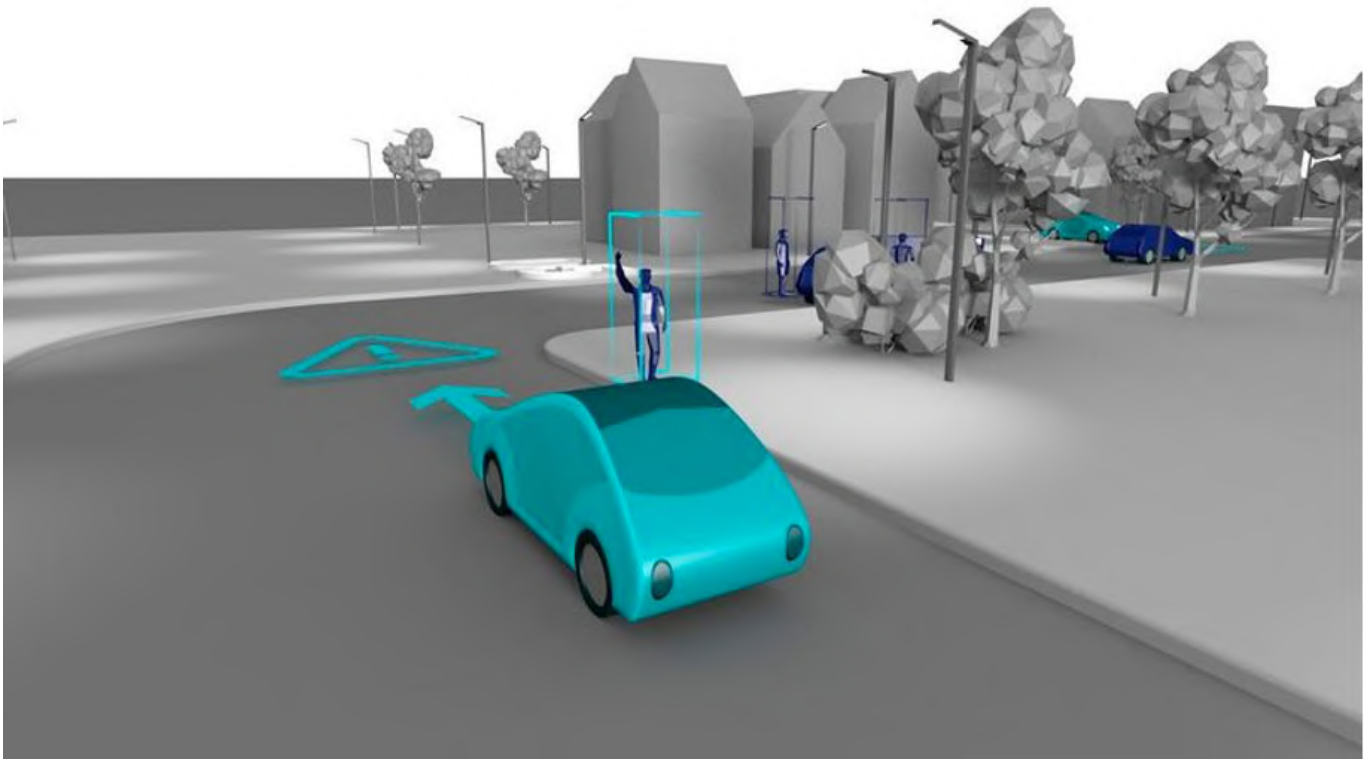
Nevertheless, as with many other things formerly held sacrosanct as not-for-profit public utilities, parking meters are now commonly leveraged as a revenue stream. Would Magee's financial model withstand today's smartphone-app paying methods…?

(Fun fact: In 1960, New York City hired parking enforcement officers—all women, so-called 'meter maids'. The first male parking warden wasn't hired until 1967!)

News Mobility

Project: AI to Detect and Predict Pedestrian Behavior

NEWS MOBILITY



PROJECT CONSORTIUM INITIATIVE IMAGE

Communication with other road users plays a crucial role in driving. This is where AVs, especially, still have a weak point. Now, researchers want to eliminate it with the help of artificial intelligence.

The Fraunhofer Institute of Optronics; System Technologies, and Image Exploitation (IOSB) has developed a system that enables AVs to detect and interpret pedestrians' behavior. The Karlsruhe researchers presented a prototype as part of a research project called Intelligent Human-Technology Communication in Mixed Traffic. It is aimed at recognizing pedestrians which could become relevant to the equipped vehicle.

What a human driver usually perceives intuitively—for example on the basis of location and direction of gaze and gestures—must first be 'taught' to an automated system. Artificial intelligence techniques have the potential to analyze video images to this end, according to an IOSB release. However, they must first 'learn' to draw the right conclusions based on large amounts of training data.

IOSB computer scientist and research associate Manuel martin says "We have now implemented a research prototype that estimates whether a pedestrian wants to cross the street, analyzes [their] gestures, and thus creates the basis for interaction". The system comprises a stereo camera and an AI algorithm that detects the positions of pedestrians' limbs and draws conclusions from them.

The researchers' big goal is to enable AI-supported adaptive communication among various traffic participants—drivers, pedestrians, AVs—in order to integrate automated vehicles into mixed traffic scenarios.

Bosch–Mercedes Driverless Parking Approved for STR

NEWS MOBILITY

MERCEDES-BENZ IMAGE

Private individuals will be able to send their cars off without a driver to a parking space at STR (Stuttgart Airport). The Automated Valet Parking system developed by Bosch and Mercedes-Benz has received approval for this purpose. It is an L^4 driving function, and the companies say they aim to put the application into operation this year.

Initially, owners of Mercedes S-Class and EQS models built after July 2022 with the necessary software will be able to use the system. Drivers will be able to park their car in a defined area of a parkade at the airport. They will then be able to send their car to a pre-booked parking space via an app and retrieve it in exactly the same way when they return.

Normal cars will also be in operation in the parkade. To ensure they don't get in the way of the driverless cars and that everything else goes smoothly, the parkade has a host of Bosch sensors to monitor the driving corridor and its surroundings. This sensor network provides the driverless cars with the information they need to control the system. The technology in the vehicle then translates this into driving maneuvers. In this way, the cars will be able to drive up and down ramps, change floors, and recognize obstacles.

General News

Ansys Optical Simulation for Optimal Light Designs

GENERAL NEWS

ANSYS IMAGE

Design teams increasingly use optical simulation to design and optimize illumination systems to meet increasing demands for devices and systems in the automotive industries and beyond.

With Ansys OpticStudio and Ansys Speos, the optical design process can be accelerated: model; analyze, and predict a system's optical performance, and evaluate the design's final illumination effect based on human vision. Through a user-friendly, intuitive interface in Speos, the propagation of light can be explored within a 3D platform with many possibilities in a realistic setting.

More than a dozen optic tools in OpticStudio can be used to design such systems, including non-sequential ray tracing; freeform optics; ray splitting; ray scattering, and optimization. Speos, allows for the design, optimization, and validation of optical systems with built-in features including lighting system modeler and analyzer; robust design optimization; optical part design; an extensive optical library, and a human-vision component. The optical design optimizer in Speos helps bridge the gap between optics and CAD models, so any type of optical component can be created—lamps; switches; displays; and luminaires, for example—then implemented directly in CAD software.

The lighting system modeler provides an in-depth understanding of how light works in a system by modeling and analyzing the luminous flux. Stray light; hot spots, and uniformity of a homogenously-lit appearance can accurately be predicted, which ensures the system's performance while evaluating illuminance and luminous intensity in the visible light range. The lighting system analyzer lets study and compare lighting systems and material efficiency while calculating spectral luminance—the amount of light coming from a direct or secondary light source—which extends the analysis of the light spectrum from ultraviolet to near infrared.

By using OpticStudio and Speos in tandem, designs can be created from scratch or existing ones can be improved. Through automation and intuitive tools, calculations for colorimetry and photometry can be simplified. With these verified values, material and light source choices can be validated to ensure the system meets the design requirements. For automotive illumination system designs, the system's compliance can also be checked against industry and legal standards in the Ansys Customer Portal.

Lightyear Solar Car to Enter Production

GENERAL NEWS

The Lightyear 0 (formerly Lightyear One) is the world's first long-range production solar car. Announced by the Dutch company in June 2019, the initial production run of 946 vehicles is scheduled to start shortly by contract manufacturer Valmet, at a rate of one car per week, with the aim of proving mass-market production is possible from 2025.

The car is said to offer the most aerodynamic profile in the industry with a drag coefficient of 0.175, and solar panels sufficient to get 43.4 miles of range per day from the sun. Depending on the amount of sun in the car's locale, Lightyear says owners will be able to get between 6,000 and 11,000 kilometers of range from the sun alone each year. The hood; roof, and hatch are covered in 782 IBC monocrystalline silicon solar cells, with a peak solar charging capacity of 1.05 kW.

Sustainable design is built right in; the car's premium interior is made of plant-based leather; recycled PET bottle fabrics, and sustainably-restructured rattan. There's a 10.1" touchscreen display for infotainment control, and side and rear views are provided by a camera-based system rather than mirrors.

Valmet, founded in 1968 in Uusikaupunki, Finland, has become well known for their Roof & Kinematic Systems business. They develop and make convertible roof systems; active spoilers, and loading flaps for electric vehicles; all these are products wherein highly complex electric drives are central. Here, Valmet is a tier-1 system supplier and one of the world's leading providers.

The company also has well-proven capabilities for vehicle manufacturing on behalf of the likes of Mercedes-Benz; Saab, and Porsche. They started manufacturing the Fisker Karma while focusing on electric mobility, with a new battery factory in Salo, Finland.