Thu, 5 May 2022
Weekly Newsletter

DVN-I
Automotive Interior

NEWSLETTER #110

Editorial

DVN Interior Köln Workshop: More Technologies On Day 2

AMS Osram


Kurz, Poly IC

Today's DVN-I Newsletter is wholly dedicated to the second day of last week's Workshop. Instead of our usual departments, this week you'll find coverage of the interior lighting; functional surfaces, materials, and IAQ presentations—18 lectures and 4 Q&A sessions, representing a corpus of valuable knowledge and fresh innovations. All the presentations are available as videos on demand for DVN Interior members and all Workshop participants; anyone else can purchase access on an à-la-carte basis—just click the Video tab on the **Workshop page** of the DVN website.

This grand event demonstrated once again that DVN Workshops are the best venue for meeting and networking with your industry peers. The exhibition hall, full of technology from 11 companies, gave rise during coffee breaks and lunch so many fruitful discussions around products, innovations, and new business opportunities. We thank and applaud AMS Osram; Elmos; Everlight; Forvia/DesignLED; TechnoTeam; Ansys; Novem; PolyIC; Scio, and Inova for their terrific contributions. Special recognition, of course, for Forvia/DesignLED—winners of the Best Exhibition Booth award.

Thanks again to all participants and attendees! Events like this always generate an influx of new community members, and we heartily welcome them here. Ready to join in? **Click here**. Got questions? **Drop us a line**.

And last but not least, I personally and professionally thank the whole DVN team and particularly session leaders Carsten Befelein; Wolfgang Huhn, and Gerd Bahnmuller for their contribution to this report.

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Interior Lighting in the Digital Revolution

Keynote II • BMW

BMW's Dr. Martin Enders started the second day of the DVN-Interior Workshop in Köln with a keynote entitled Natural Evolution Meets Digital Revolution.

Dr. Enders worked at BMW first as general manager for lighting and vision, before becoming the electric/electronic process owner for Mini. Today he is the general manger of electric/electronic driving experience and advanced Innovation.

In his presentation he explained the evolution of vision from animal eyes in the deep sea (bioluminescence; pattern recognition, visual perception) to sensor fusion—spectral sensitivity; electromagnetic radiation to the human visual spectrum; spectral brightness sensitivity, and the human visual perception with the sensors and image processing in our eyes and brains. He showed us amazing examples for human vision: perception and recognition depending on static patterns; position of pictures; human luminance adaptation; light direction, dynamically changing light patterns, and more.

Visual information is crucial to driving a car, and there's the dilemma that the view of the road needs far vision while controls and displays need short vision, and the time to re-accommodate (short to long or long to short) and react increases with the age. New digital technologies are needed to improve and augment visual information for the drivers; for example, AR-HUDs to improve day and night vision with the help of cameras and sensors. Enders also showed a future for improved human vision with artificial digital eyes. His lecture was a perfect transition to the interior lighting sessions.

Session III • Interior Lighting 1

Beyond Basic Functional Interior Lighting Communication
Bentley Motors

Mohamed Abd El Ghani is a lighting engineer excited by innovation and the evolution of the automotive landscape. He is convincedthat interior lighting is growing as a form of functional communication within the industry. Lighting has a rich opportunity to elicit emotion, state, and character beyond function. Within this framework, lighting can become the body language of the car. In addition, it could also become the medium to explain the “thinking” of the vehicle. Both concepts require dynamic animations across multiple lighting units that work seamlessly, pushing lighting beyond just optics and into software and electronics.

He is of the opinion that smart electronic solutions are needed from suppliers and partners to keep up with the speed of development. The Interior lighting industry is moving quicker than automakers' own internal departments—this could shift the exterior lighting dominance towards a very profitable interior lighting revenue stream. Electronics and software are the key enablers in evolving interior lighting as a true experiential medium.

WHAT IS NEXT – BEYOND FUNCTION

Can an emotional experience be the answer?

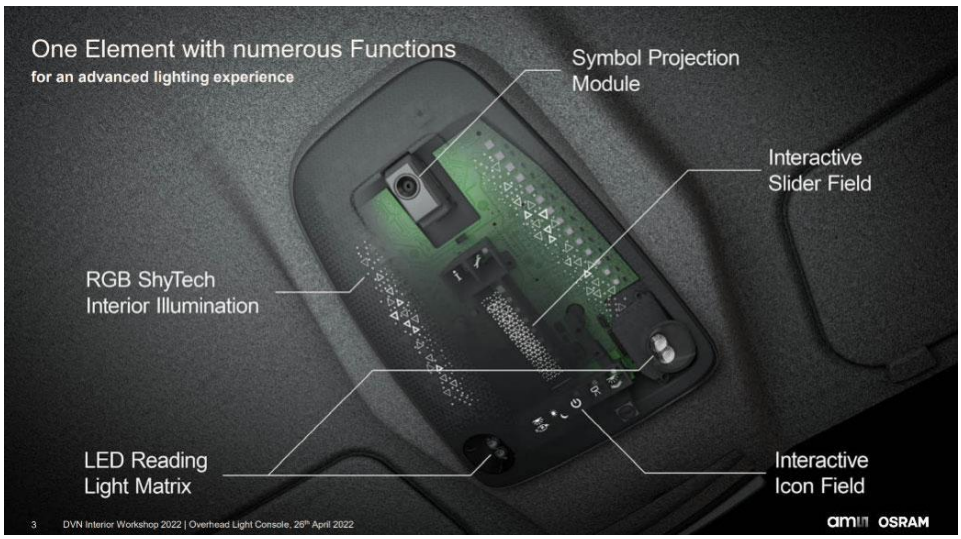
How can lighting drive an evolving car experience?

The car is getting smarter, there is an opportunity to elicit emotion or state of the car.

Lighting can become the body language of the car & the medium to explain it's "thinking".

Overhead Light Console for High-Quality and Individual Interior Lighting
AMS Osram AMLS

Tobias Huber is the advanced development team leader at AMS Osram Automotive Lighting Solutions (AMLS). He is responsible for intelligent lighting system development consisting of light modules; electronics and algorithms.



Huber described interior lighting trends with the focus on a multifunctional overhead lighting console with a small symbol projection module; interactive slider and icon field; LED reading light matrix, and RGB shy tech interior illumination.

The symbol projection module enables static, dynamic and digital projections on decorative surfaces with single-color or RGB LEDs. The LED reading light matrix provides dynamic focus lighting with customized spots for flexible reading fields. The shy tech illumination creates a dynamic ambient lighting with RGB LEDs and has integrated sensors; sliders, and touch icons. Huber called it a holistic, clean surface approach that meets design aspects, combined with advanced lighting technologies.

AMS OSRAM IMAGE

Future Shapes of Interior Lighting Applications
Forvia·Hella

Michael Bantel from Forvia studied photo-engineering, and for two decades now has worked in the field of vehicle lighting. He is in charge of interior lighting system development and smart-light overhead consoles, a role in which he succeeded Dr. Herbert Wambsganss.

Bantel presented a dynamic surface smart interior light with high-power LEDs; slim light systems, and decoration surfaces. He explained technical details of a warning and information array based on smart lighting, and presented the whole layout of the multifunctional system with main features of the PCB, array of smart LEDs, and decorative surface.

ILaS Network—The New Lighting Architecture
Inova

Stefan Hoffmann is Inova Semiconductors' application manager, a post he's held since 2017.

His lecture included a look at ISELED and ILaS product portfolio, ecosystem and roadmap; insights into the network architecture and it's functionalities, and discussion of new possibilities and advantages in vehicle lighting design.

ILaS is the **I**SELED **L**ight **a**nd **S**ensor network with embedded system of light, sensors, and actuators; efficient daisy-chainability for high speed lighting sequences and easy synchronization; simplification of colour homogeneity and system design, and minimum installation space.

Hofmann explained the ILaS topology with the digital LED ISELED; the ILaS transceiver INLT220Q; the communications protocol to address up to 4,079 network participants and data rates up to 2 Mbps; the ILaS network segmentation, and the central network architecture.

Q&A PANEL FOLLOWING SESSION 3

Session IV • Interior Lighting 2

Blurred Lines Between Automotive Displays and Lighting
Forvia + DesignLED

FORVIA IMAGES

DesignLED is now part of Faurecia Clarion Electronics Group with Forvia, and James Gourlay is their technical director. They described how within the context of HMI, display systems are becoming the main interface for visualization of crucial indicators, so access must be quick and intuitive. The future is perceptual and immersive UX within a human driven cockpit, thanks to adaptive digital and seamless surfaces. These bring new challenges.

New use cases need to be addressed in multiple locations within the cockpit to evolve from distributed UX to Immersive UX.

Convergence of lighting and displays; embedding displays and surface backlighting with decorative surfaces —these are key for immersion.

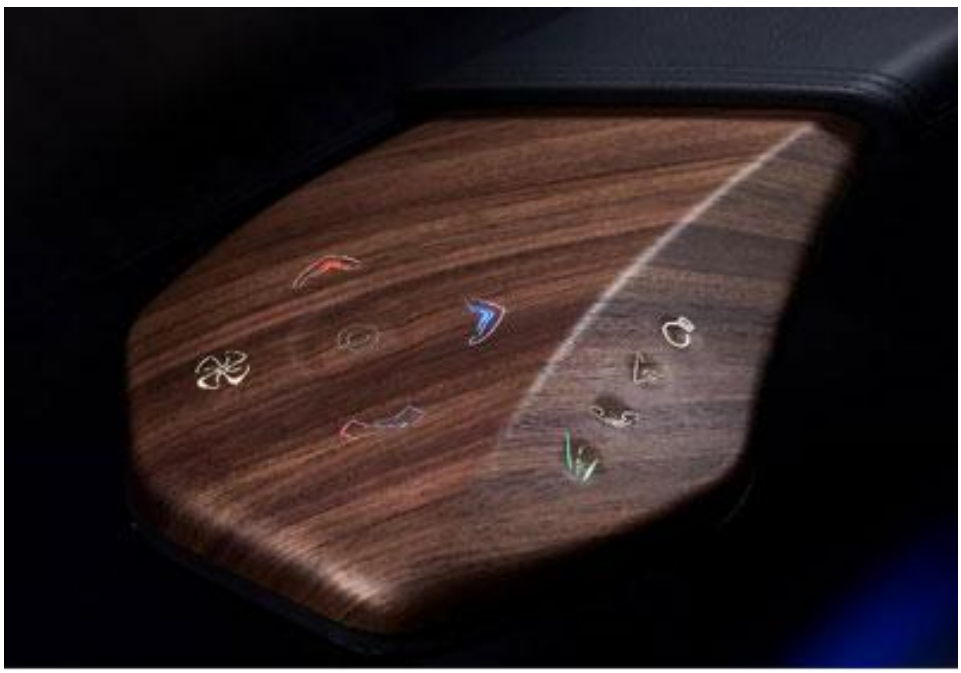
A backlighted surface could be considered as a low-resolution RGB LED matrix display. It extends the display surface and minimizes cost and power consumption for a given use case.

Immersive display enables the creation of continuous digital UX with seamless continuity between cockpit displays, adapting the UX to a situation, a person, or whatever other element at a cockpit-wide level. This can enhance safety (e.g., dynamic ambient light in e-mirror in case of a hazard); awareness (color and movement in the event of irregular driving), and alertness (blue light, etc).

Cost and power consumption can be minimized by the optimization of LED count. Multi-density light-tile technology can maintain a thin system form factor to save space, while enabling an optimization of the LED count.

Integrated Interiors, a New Seamless Design Layer

Novem



INTEGRATED HMI (NOVEM IMAGE)

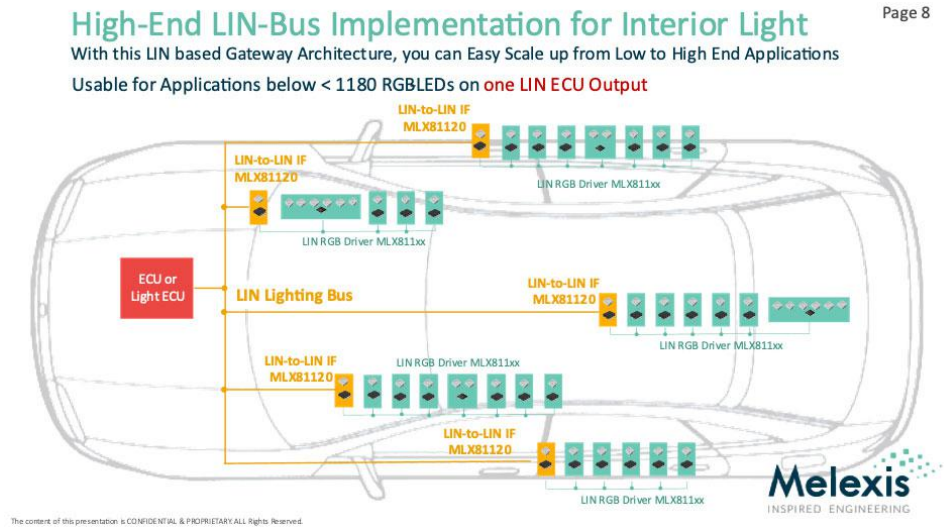
Novem's Dominique, in his presentation, described how we are in the midst of a mobility revolution and creating new car interiors, more or less disruptive. People should be in the center. Therefore, he opined, it is worth looking at what we are and what we want. In contrast what we live like and which interiors result for car interiors.

The Integrated Interior is a new seamless design layer, built around dimensions of shape; material and surfaces; light, and functions. It creates a living space where Novem contributes wood-trimmed surfaces;

sustainable materials like linen; elegant touches like brushed aluminum, or premium composed surfaces. The next step is integration with material, surfaces, and HMI. Then, integration with light allows information when needed (as shown in photo, displaying temperature and other such information).

Ambient Lighting Goes Functional
Melexis

Michael Bender is Melexis' embedded lighting product line manager. He talked about how for Melexis, "functional" means it has to fulfil the ASIL requirements to support ADAS. Bender's talk covered the evolution of RGBs on first LIN and then MeLiBu buses, and an example of an ASIL-relevant application.



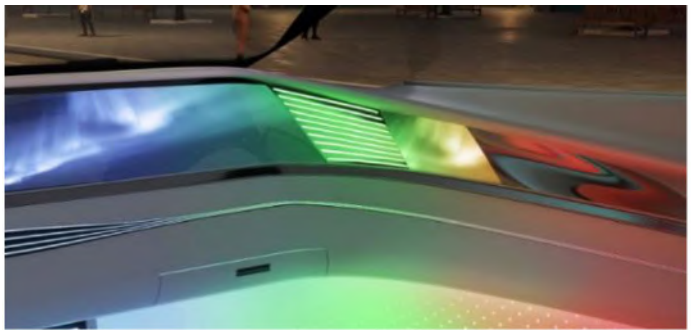
LIN supports static; animated, and dynamic lighting. High-end LIN-buses will be implemented in the future. A LIN-based gateway architecture provides easy scalability from low- to high-end applications.

For highly dynamic RGB applications, MeLiBu architecture from Melexis is the appropriate network, he said. It combines LIN and CAN-FD. It is a master/puppet based solution with self-diagnosis capability.

A scalable architecture, then, could combine LIN, MeLiBu, and ethernet,

An application example was presented with a steering wheel communication bar. Several architectures are possible for ASIL requirements: communication via CAN-FD or ethernet with the ECU, or direct communication with the ECU via MeLiBu.

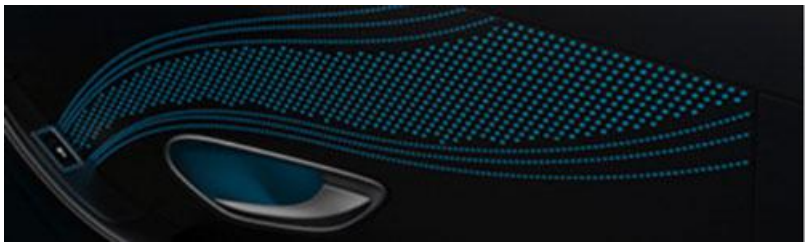
Automotive is Colorful, Unlimited Possibilities using RGB LED Solutions
AMS Osram



AMS OSRAM IMAGES

AMS Osram Automotive's head of systems solutions Michael Bender set up the lighting scene as a mikado sticks jumble: RGB; color mixing; data matrix code; discrete colors, and more. Starting from common RGB requirements—what is needed to get intelligent RGB with accurate and fast color control. Next is combinations of discrete monochrome LEDs; discrete RGB LEDs; RGB with individual color information, and RGB with integrated IC.

AMS Osram ICs and ISELED architecture represents the top of the RGB Pyramid (shown here).



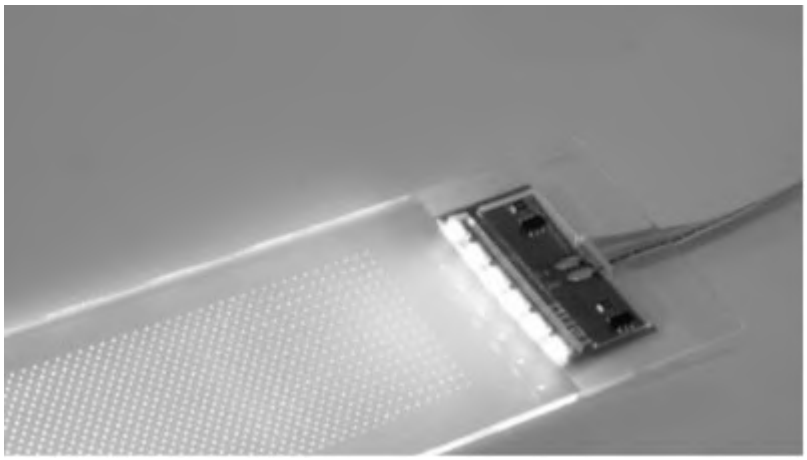
PMMA Light Guides With Laser Etched Microstructure: Ultra-Thin Surface Lighting *Feno*

FENO IMAGE

Feno project manager Tobias Seidl talked about Feno's roots in light art and architectural lighting, where the company started over 20 years ago. Getting experience with artists is their way to understand permanent technological creativity challenge.

They focused on surface lighting systems, with a new dimension into interior lighting, bringing perception, comfort and wellbeing into the car. Surface lighting faces a lot of challenges: minimal thickness because of limited space and close transitions to other parts; homogeneity requirements; high efficiency and light output due to limited transmissivity of interior parts, and fine decors and veneers.

The symbiosis of dedicated electronics and extruded PMMA light guides is Feno's answer. Dedicated electronics are perfect match for surface lighting with light guides, integrating new functionalities as touch sensing, dynamic lighting, and flexible PCBs.



Seidle gave an example of current serial production: a light module with side-shooting LEDs and a laser etched light guide, used in an illuminated sill plate.

The concept has big advantages for larger surfaces, where injection-molded parts have to get a lot thicker to handle material flow.

Light guide production has two main steps: Cutting the PMMA plate to the desired geometry, and etching the desired microstructure to achieve the targeted appearance. This solution fits whenever you need to spread light over a larger area homogeneously with a high efficiency and minimal integration space.

Q&A PANEL FOLLOWING SESSION 4

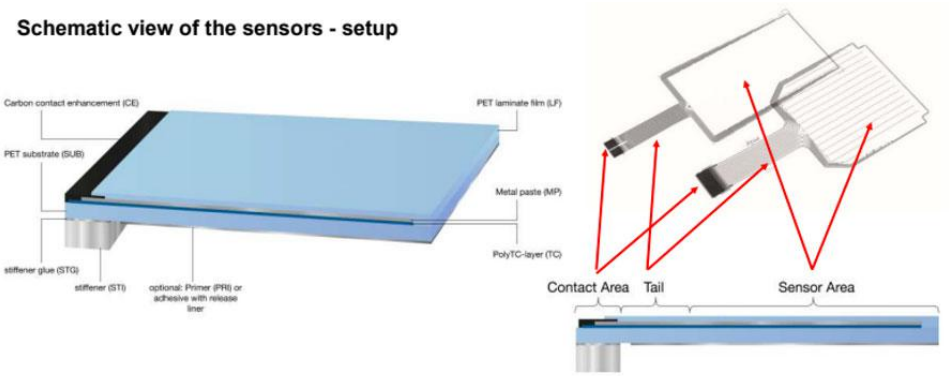
Interior News

Session V
Decorative HMI Surfaces With Embedded *Functions PolyIC*

INTERIOR NEWS

POLYIC IMAGES

Dr. Wolfgang Clemens is head of product development and business development at PolyIC. First, he gave a short overview about the Kurz group, PolyIC's owner. Kurz is a service provider for fully integrated solutions in plastic decoration. Clemens described the trend in interior as "Complex geometries combined with design, lighting effects, a delicate feel, and transparencies". PolyIC provides capacitive touch sensors based on transparent conductive films to enrich the decorative surfaces with buttons and switches. Their PolyTC® technology is based on roll-to-roll production of silver metal mesh less than 100 nanometers thick on a polyester substrate.



This allows for high electrical conductivity and optical quality in a thin; flexible, lightweight package. It's amenable to customized high-volume production with multiple integration options, all at affordable prices.

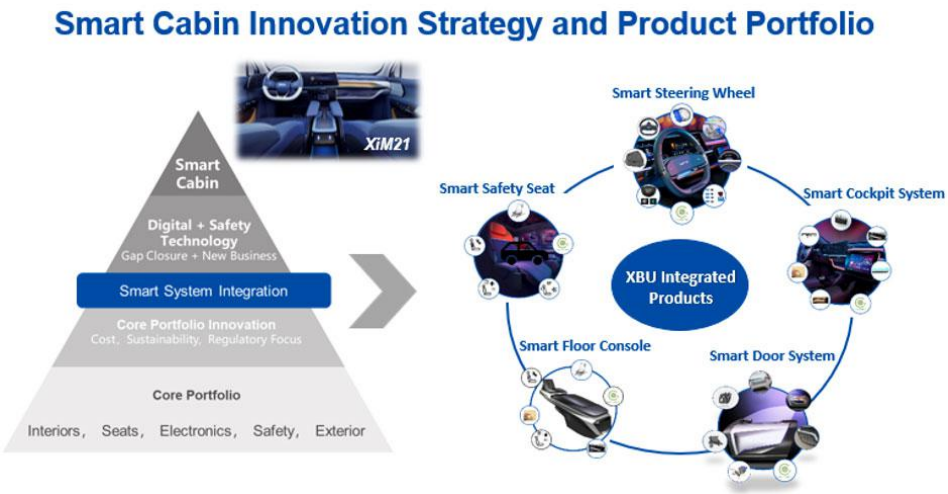
The application of the sensor foil behind the decorative part can be done by lamination; functional foil bonding; insert molding, or in-mold labelling. Complexly-shaped surfaces can be handled and the sensor foil can be directly integrated or shaped before application by a hot stamping process. The technology is already in series production, for example in the 3D panel on the steering wheel of the VW ID family. Many other applications and prototypes were shown.

Session V
Functional Surfaces, an Essential Part of Integrated Products
Yanfeng

INTERIOR NEWS


YANFENG IMAGES

Dr. Dirk Blomeyer is technical sales director at Yanfeng, and he gave a fine overview about the requirements and the system approach to developing interior components. First the interior market trends were briefly described and smart cabin and attributes were explained.



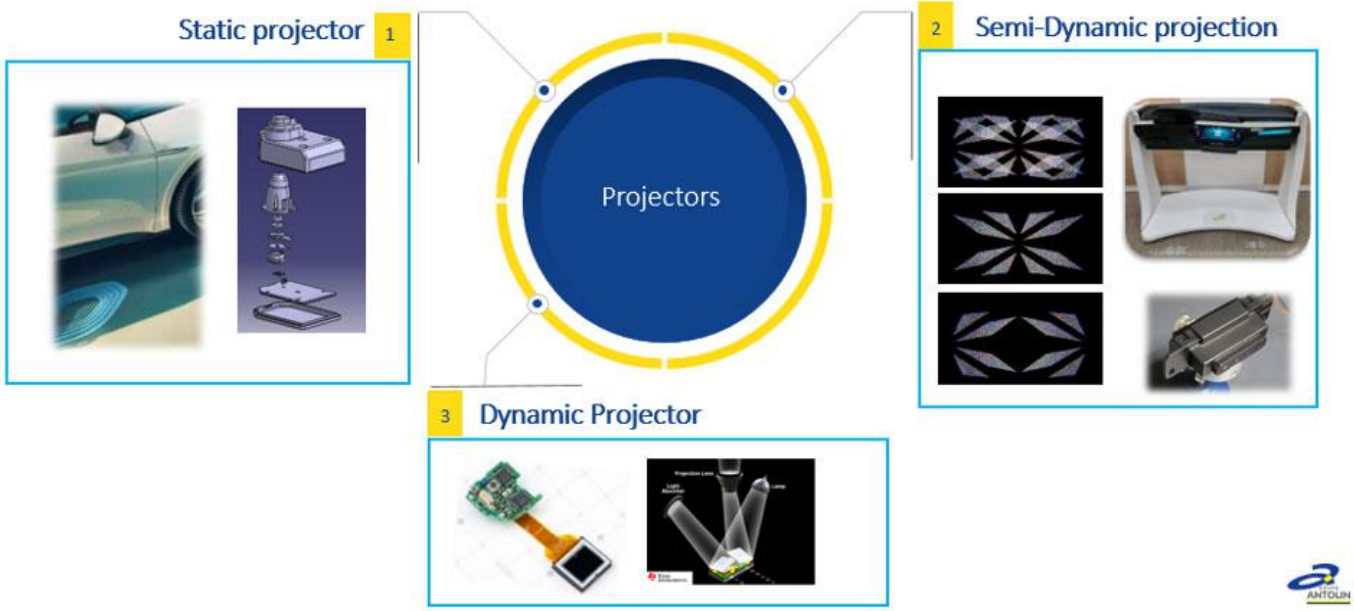
Part of the strategy and supported by the wide product portfolio and know how of Yanfeng is the smart system integration. This idea was explained in detail on the example of a smart steering wheel as shown here:

The benefits for the end user include ease of mind due to a distraction-free function (“shy tech”), and all relevant driver functions ergonomically integrated and easy to access.

Finally, a selection of smart functional surfaces was shown and the concept, value and benefits were detailed using three examples: a smart door panel top bolster with translucent TPU; control panel based on TIMI (triple injection-molded icons) and a luxury smart real wood application with touch display.

Session V
Car Interior as a New Living Space • Light Projections
Grupo Antolin

INTERIOR NEWS



GRUPO ANTOLIN IMAGES

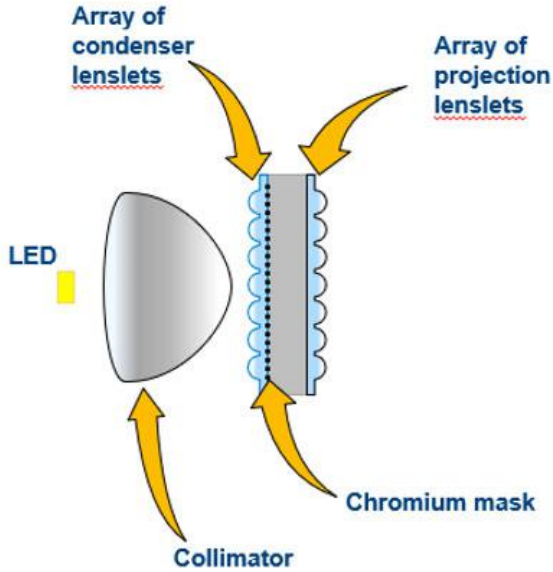
Vanesa Hortelano Santos is a senior photonic technology researcher with Grupo Antolin—the biggest automotive supplier in Spain. She sees the car interior of the future as the new living space. Light in the interior and the illumination of the surfaces will support efforts to increase wellbeing and comfortable feelings. Santos' lecture described the different projection possibilities and focused on dynamic digital projection.

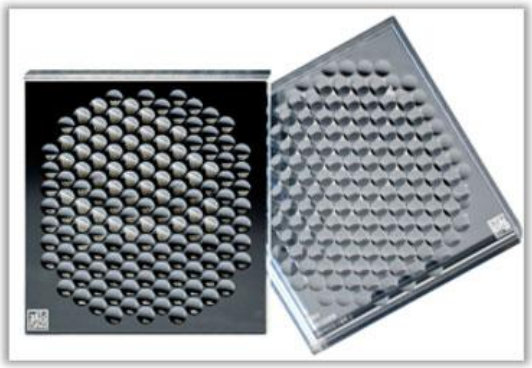
The example in the presentation showed dynamic projections such as videos projected on the headliner.

Santos described optimal component placement and challenges (reading lamp shadows, thermal management). She concluded her lecture with use case simulations and a video.

Session V
Demanding Requirements for Microöptical Interior Projection
Suss

INTERIOR NEWS

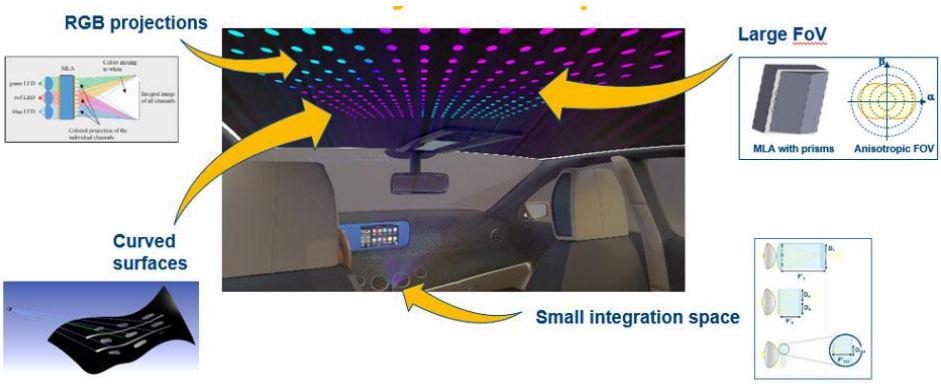




SUSS IMAGES

Christopher Bremer is a development engineer and Dr. Patrick Heissler is business development director at Suss. They gave an excellent presentation in close competition to the best lecture of the workshop. The principle of microlens arrays (MLA) was shown and very well explained. The technology of MLA is based on a waver process with a single lens size of 10 µm.

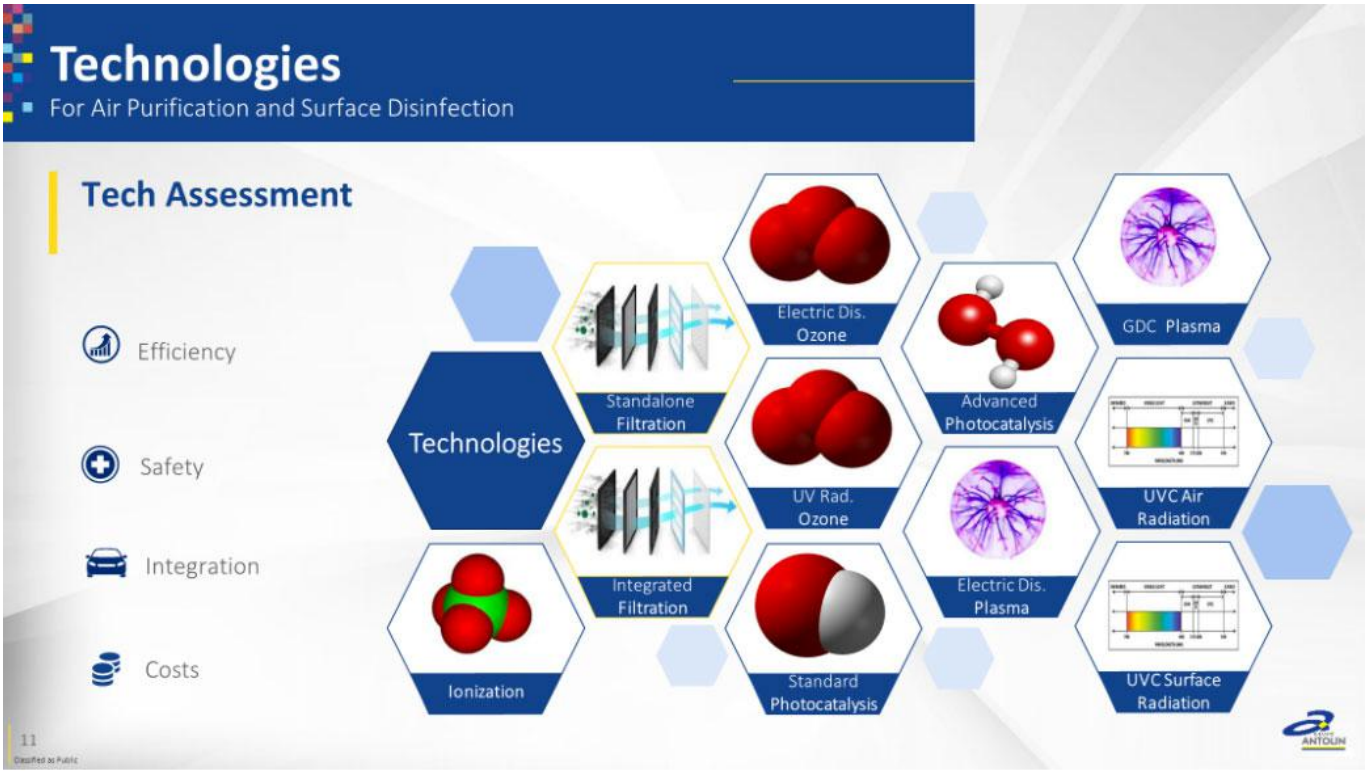
The challenges for interior projection include the clashes among small integration space; curved surfaces, and RGB projection with a large field of view. Bremer and Heillser described usig microlens arrays to vanquish these obstacles. To meet the need for an extended field of view, an additional design of prisms in front of the MLA is required. Also, the color shift at the border area of the projection has to be taken into account.



Series applications and prototypes were presented to give a realistic overview about the impressive results achievable.

Session VI
The Challenge of Passenger Compartment Sanitation
Grupo Antolin

INTERIOR NEWS



GRUPO ANTOLIN IMAGES

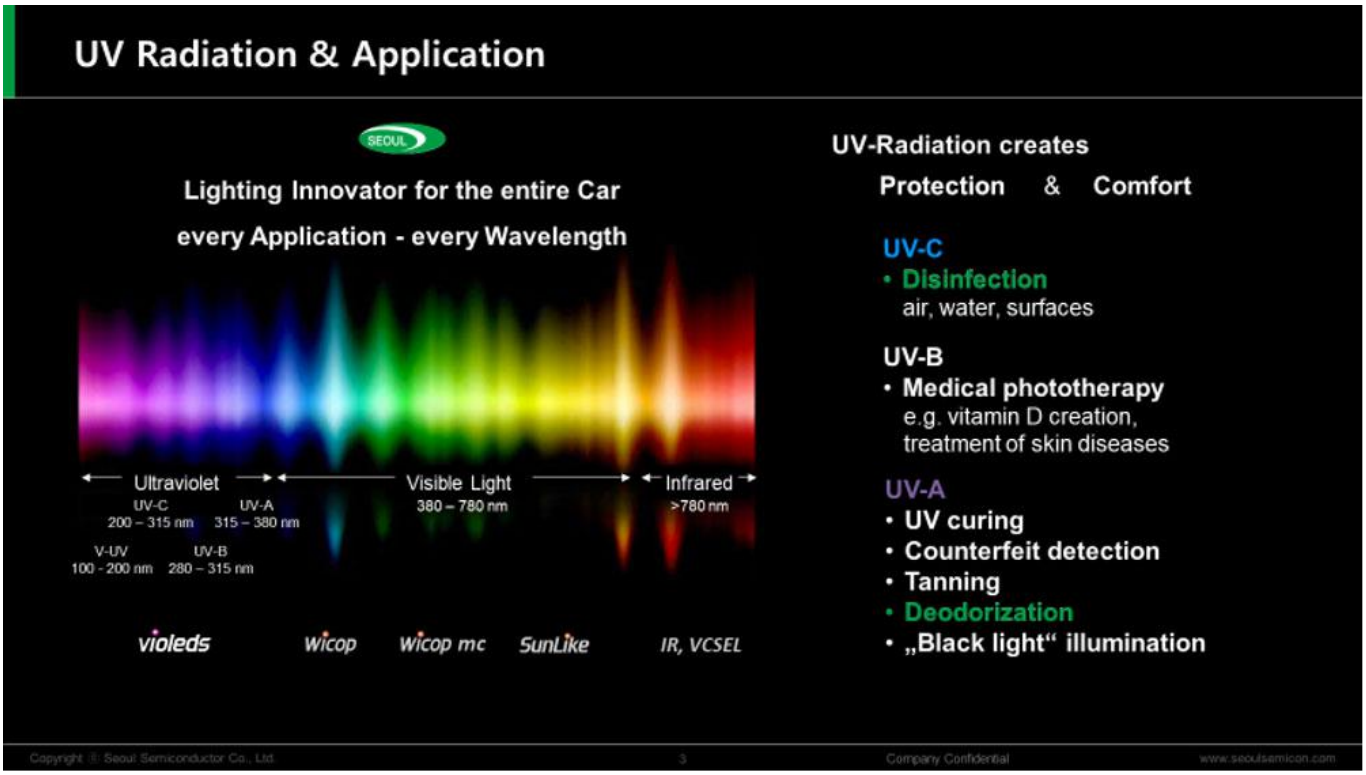
The professional career of Grupo Antolin's Diego Val Andres includes extensive work in the fields of light alloys; nanotechnology; thermal management, and interior sanitization. The title of his lecture was The Challenge of Passenger Compartment Sanitation. Aware of the general importance of preserving clean and healthy environments, Grupo Antolin is working on a global strategy of vehicle interior sanitation with the aim to ensure that the cabin is a bubble of health and comfort for the wellbeing of vehicle occupants. This strategy is one of the four main axes of Grupo Antolin's innovation strategy: Sustainability · Life on Board with Air Purification and Surface Disinfection · Safety & Assistence · Performance.

Grupo Antolin has been working on air purification and surface disinfection for a long time, and the pandemic has accelerated this effort. developments. Andres explained the different pollutants, the motivation for air purification and surface disinfection, and the apposite technologies' efficiency; safety; integration, and costs.

The main air purification features are three-stage filtration; adaptable integration in car components; quiet operation; real-time sensing of PM, VOCs, and NO_X, an air quality indicator, and automatic and manual modes.

Session VI
Passenger Protection & Comfort by Violeds—LEDs With UV Radiation
Seoul Semiconductors

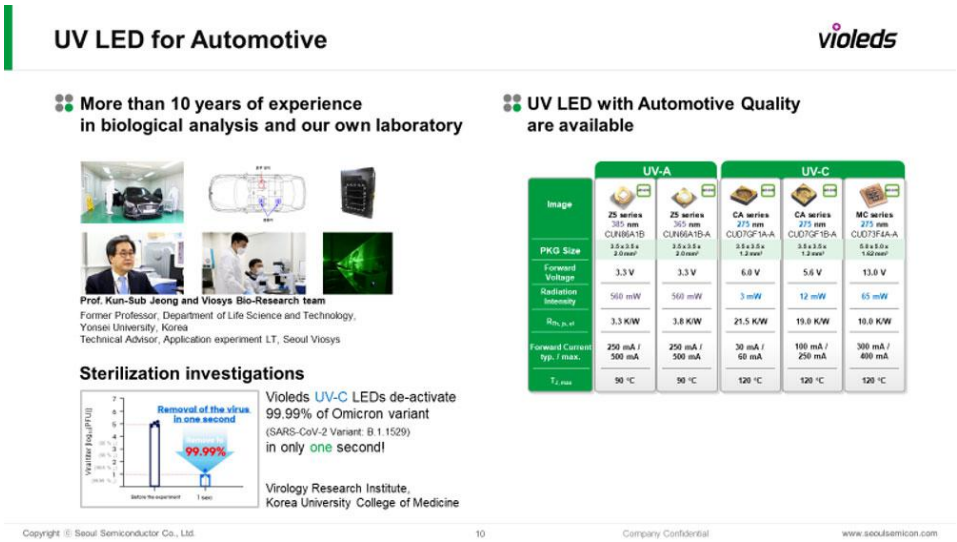
INTERIOR NEWS



SEOUL SEMICONDUCTOR IMAGES

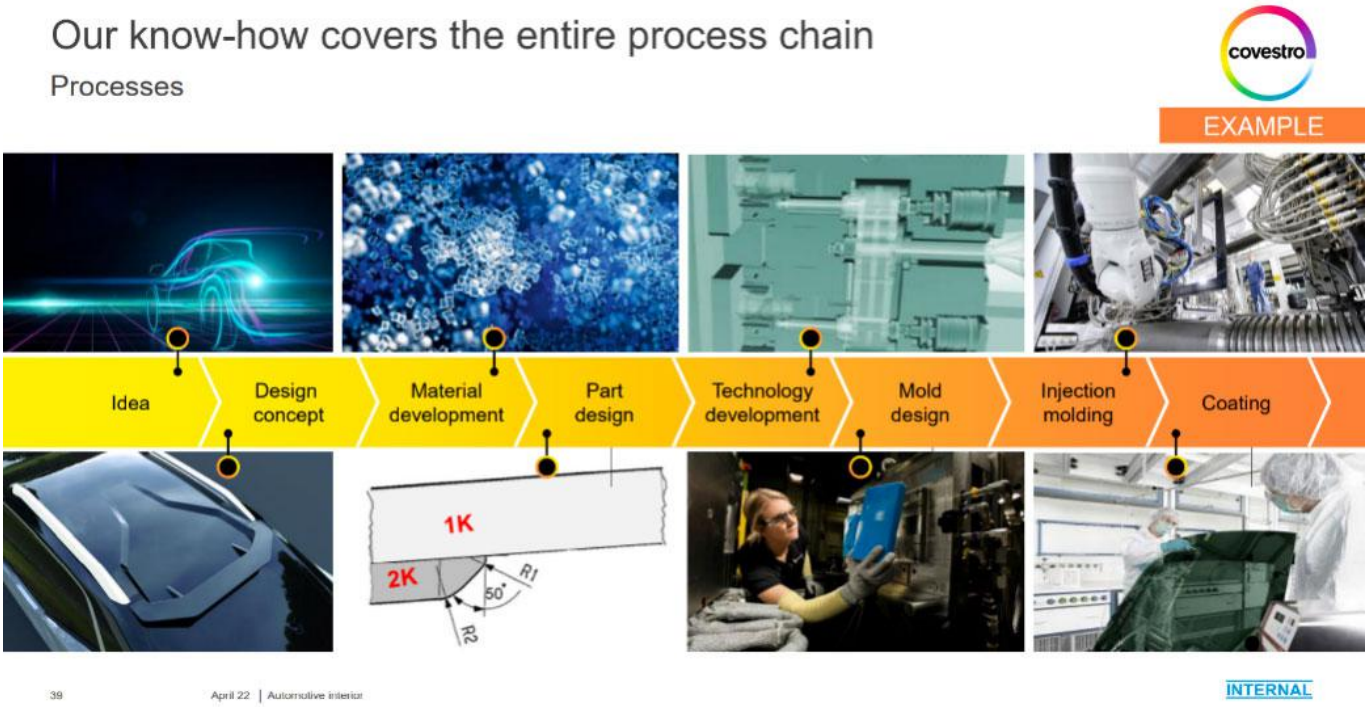
Nils Benter is a Physicist who started his professional career at Philips Automotive Lighting as an application engineer. In 2021 he joined the Seoul Semiconductor team in Europe as business development manager with a focus on automakers.

Benter started his lecture with a short introduction to the automotive relevant biological and chemical effects of UV radiation, and introduced some early examples of automotive applications. He explained the different effects of UV radiation and the results of deodorization with UVA in combination with a photocatalyst, and sterilization with UVC using his company's "Violeds" UV LED technology. Results in sum: UVA purification removes bad odors and VOCs faster than ionizers, and UVC effectively disinfects air in vehicle HVAC systems, and deactivates 99 per cent of bacteria on interior surfaces.



Session VI
Challenging Status Quo: High Tech Materials For Future Auto Interiors
Covestro

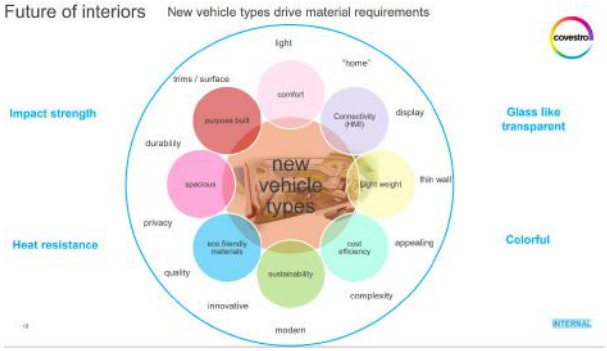
INTERIOR NEWS



COVESTRO IMAGES

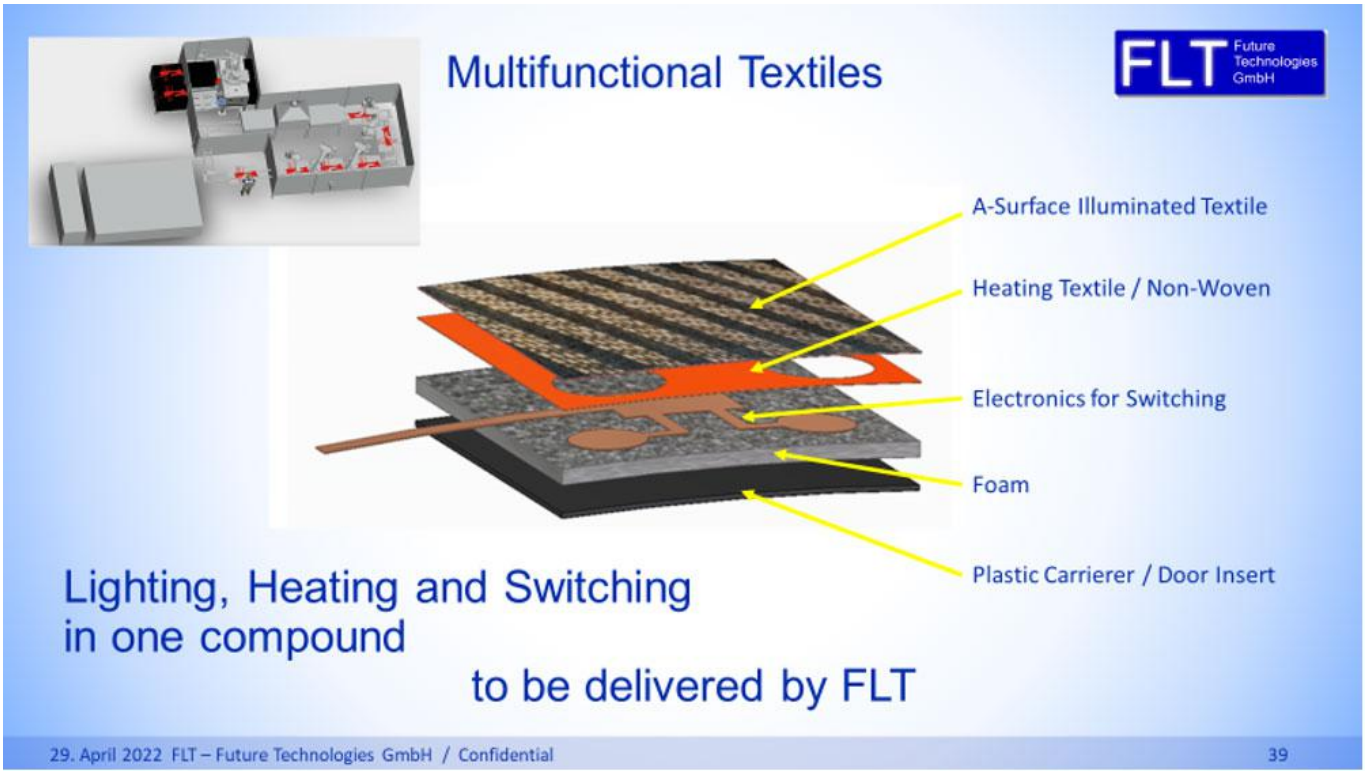
Ciro Piermatteo is the interiors global marketing manager in the Engineering Plastic Mobility business unit of Covestro. He is passionate about design; cars; and related aesthetic aspects, and has long expertise with textiles; inks; coatings, and plastic. In his lecture, he explained that the transition to future interior designs will not be a simple evolution of today's designs, but more a new and disruptive interior with new technologies. This will require innovative materials and production processes to fulfill the emerging specifications in terms of sustainability; optical purity; lighting performance; surface decorations, and the ability to integrate functional electronics.

Piermatteo talked about trends and Covestro's solutions; processes; and products for car interiors. He emphasized transparency as a key to the new-material world. Large displays require seamless integration in high-quality surfaces; ambient lighting needs advanced molding processes, and sensors need a hidden integration. Carmakers increasingly require natural materials and functional integration in high gloss and and transparent surfaces with 3D reliefs and premium appearance and touch. Covestro works on solutions like polycarbonates with glasslike appearance; natural materials with integration of electronics; special translucent glass fiber filled or combined with wood or stone surfaces (Makroblend) for backlighting function, and more.



Session VI
Multifunctional Textiles
FLT

INTERIOR NEWS



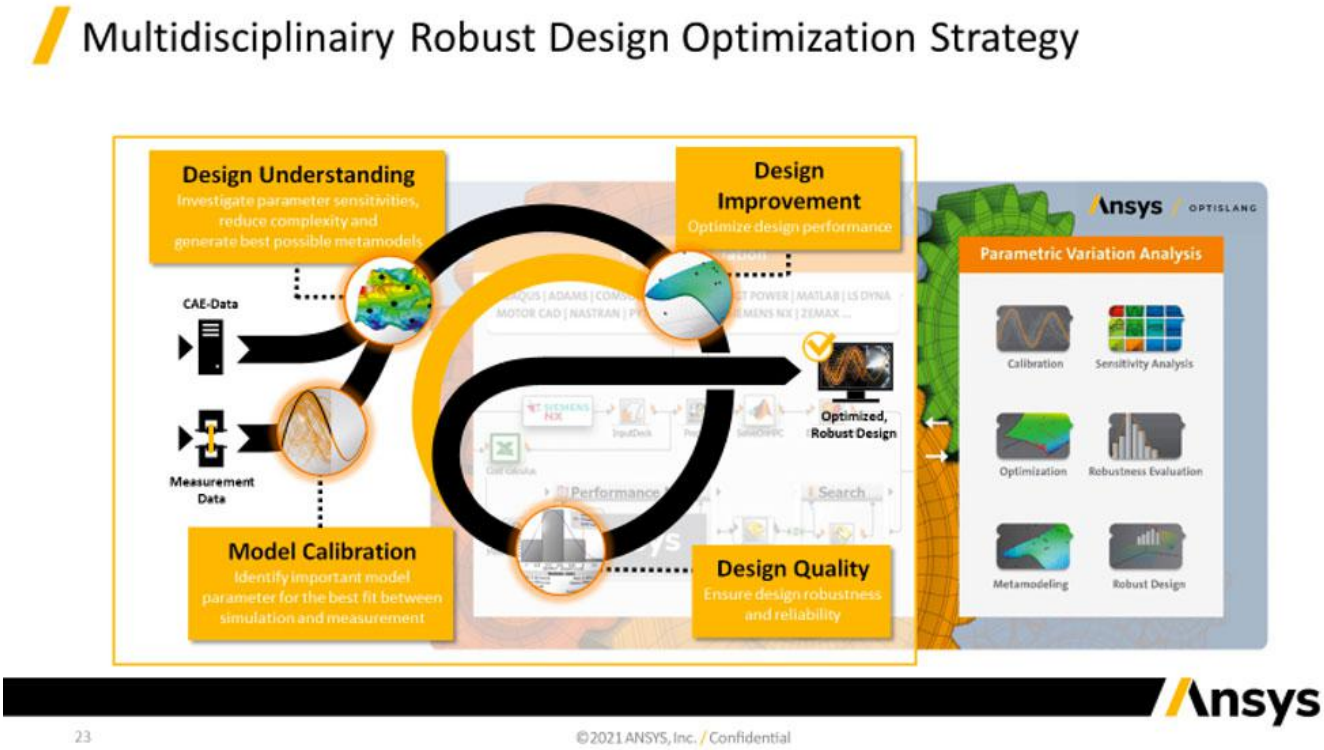
FLT IMAGES

Björn Sobischek is thefounder and CEO of FLT **(**Future Lighting Technologies). He is a chemical engineer who started his professional career in 2000 at Hella Interior Lighting Systems as a key account manager and project leader for BMW and Audi. In 2013 he founded his company FLT with a focus on flexible and 2.5-dimensional lighting applications like multifunctional textiles.

Multifunctional textiles have proven highly amenable to new automotive applications. They are flexible and can therefore be adapted without tools to existing component designs. There is also great flexibility regarding light design with an optimized illuminated linear or square-dot design and textiles with overcross connections. The possibilities are broad and deep for day- and night-design. The basis of multifunctional textiles for lighting, heating and switching are heating and carbon fabrics; carbon fleeces; and non-wovens with steel and carbon.

Session VI
Creation & Optimization of Virtual Prototypes With Material Properties
Ansys

INTERIOR NEWS



ANSYS IMAGES

Günther Hasna worked for over 20 years at Optis and Ansys, where he is now the application engineering director and strategic products team leader.

His lecture covered material properties according to VDI 5596 (optical design for manufacturing). The target is to meet all customer specifications and photometric requirements with a robust system of multi-objective analysis, kept to a minimum number of simulations for efficiency.

Hasna explained his company's "multidisciplinary robust design optimization" strategy with respect to a light guide application. It starts with the initial design; followed by a multi-objective optimization of the lightguide; a sensitivity and robustness analysis of the light guide; then parametrization, and finally a result optimization.