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Weekly Newsletter

DVN
Interior

NEWSLETTER #235

Editorial

Interior Decoration Combines Design, Comfort

NISSHA IMAGE

Interior decoration combines design with comfort and ergonomics to transform a car from a mere transport module into a personalized, enjoyable, and functional space. Uniquely decorated interior designs help differentiate brands and models, making cars recognizable and memorable. Sophisticated designs communicate luxury and quality.

Seamlessly-integrated 'smart' features promote high perceived quality, and that is vital. This week's in-depth report goes into detail of key technologies used for interior decoration.

If you haven't yet seen the DVN Torino workshop review, **it's here**, and in it you'll see that design and sustainability are now pivotal points—especially in-car decoration techniques like combining plastic with film and electronics. Speaker presentations available **here** (when released by the speaker).

The next DVN Interior Workshop will be in Köln, Germany on 8-9 April, 2025, Save the Date! The theme is to be **Progress in Interior UX & Sustainability**.We are looking forward to your contributions of lectures and exhibits, so by all means, bring your A-game!

Sincerely yours,

Philippe Aumont
DVN-Interior General Editor

In Depth Interior Technology

In-Car Decoration Extends Far Beyond Aesthetics

NISSHA IMAGE

Car designers have a passion for decoration because it goes beyond aesthetics to create an emotional connection between the driver and the vehicle. Decorative elements make a car feel personal, luxurious, and unique. They guide perceived quality and craftsmanship, which are pivotal in the competitive automotive environment. The interior is where drivers and passengers spend most of their time, so optimizing that space significantly drives the overall user experience.

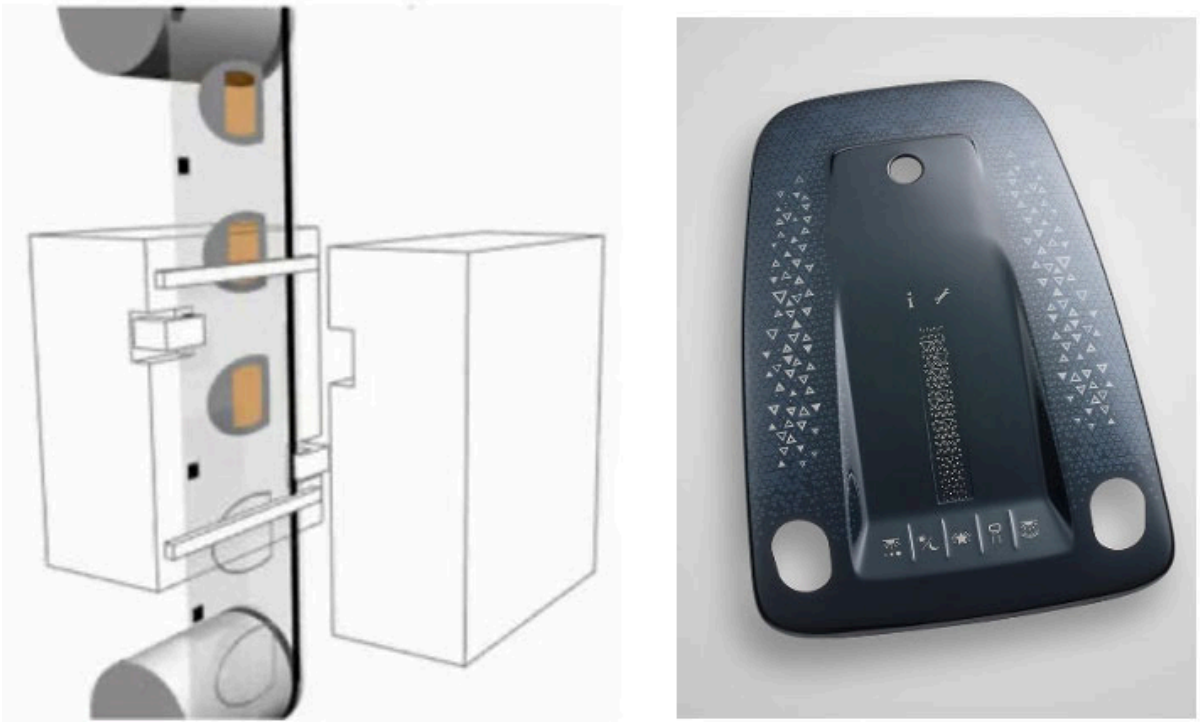
Innovative decoration techniques like IMD, IML, and IME allow designers to incorporate functional elements seamlessly into their designs, making the car not just beautiful but also functional and technically advanced.

IMD COVER LENS AND IML MECHANICAL BUTTONS IN CENTER STACK (SUBARU IMAGE)

In-mold decoration (IMD)

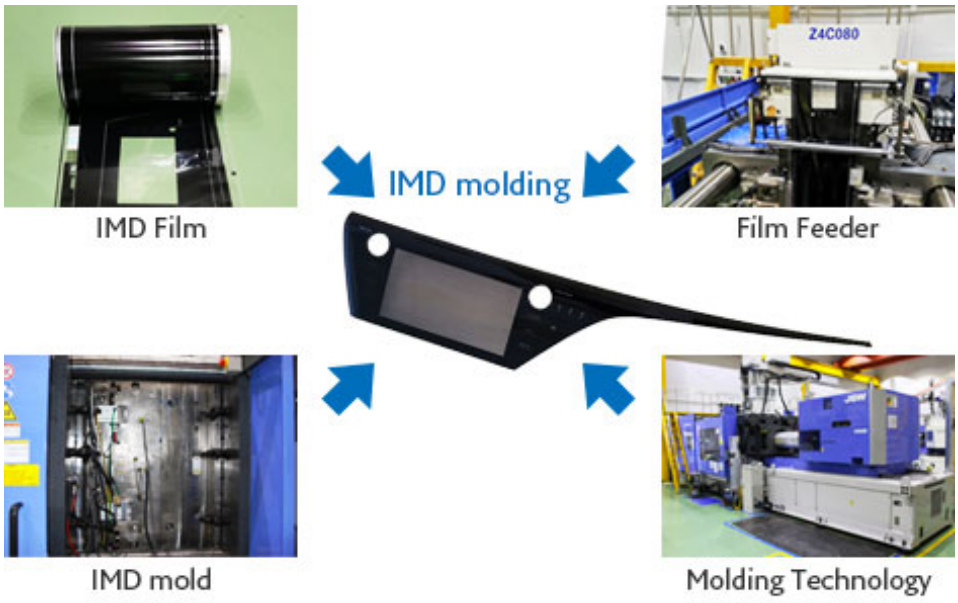
IMD/IML PARTS (NISSHA IMAGE)

IMD is used to create visually attractive surfaces on automotive parts. It involves printing patterns on a film, which is then placed into a mold and injected with plastic in a single step operation. This process is used for dashboards and dashboard inserts; door panels and inserts; steering wheels; trim panels; seat backs, and storage compartments.



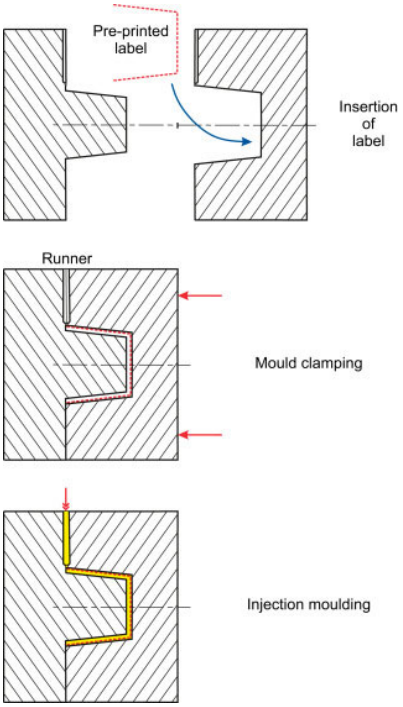
IMD FOIL FEEDER WITH CONTINUOUS FILM ROUTED THROUGH MOLD PARTING LINE FOR OVERHEAD CONSOLE (KURZ IMAGES)

IMD parts use a roll-to-roll heat transfer process such as those from Kurz or Nissha. A gravure-printed roll of film passes through the parting line of a specially designed mold, indexed and located using a specialized film feeder mounted to the platen of the molding machine. The carrier film with decoration is formed to the cavity geometry using vacuum. Only the decorative ink layers are transferred from the carrier film to the resin during the molding process, and the carrier film is no longer present on the part after molding. Common materials include polycarbonate (PC), acrylic, ABS, and PC/ABS.



IMD PROCESS (NISSHA IMAGE)

In-mold labelling (IML)



In-mold labelling is the use of paper or plastic labels during the manufacturing of parts by injection molding, blow molding, or thermoforming processes. The label serves as an integral part of the final product, which is then delivered as a pre-decorated item. This technique is used for the likes of dashboards, interior trims, and control panels.

The IML process requires special considerations for part and tooling design. Depending on the thickness of the chosen film —usually 180 to 380 µm—a minimum draft of 2° is required to ensure any hardcoat or first-surface printing won't be damaged during ejection from the mold. Required applique coverage must be evaluated to keep the film from being caught at the parting line and to gauge potential edge light leaks. Excessive draw depth and resulting stretch during thermoforming can thin-out printed inks so they become translucent, and hardcoats can lose chemical resistance.

Many films are available for the durable IML process, with popular materials including polyester, polycarbonate, acrylic, and acrylic-capped PC. Formable hardcoats are used in many applications, which allow the decorated films to be thermoformed and then cured via UV exposure and placed into the mold. Typical cured coating pencil hardness ratings are 2H, which prevents most scratches on an automotive display lens.

Inks used in the IML process are specifically designed to survive exposure to the high temperatures seen during injection molding, and good bonding to films and molding resins. Tie-coats and primers can facilitate bonding between dissimilar materials. Color matching of the inks must be carefully checked using the full production material construction for the product; resin color can bleed through the inks and shift the observed color, so using finished molded parts for color evaluation is key.

IML often is used interchangeably with FIM.

Film-insert molding (FIM)

FIM involves inserting a thermoformed, die-cut screen or printed film into a mold and then injecting plastic around it. The film stays with the molded part.This method is used for decorative surfaces, functional components, and integrated sensors to improve the design, aesthetics, functionality, and durability of parts while streamlining the manufacturing process.

For successful FIM, factors to be considered include:

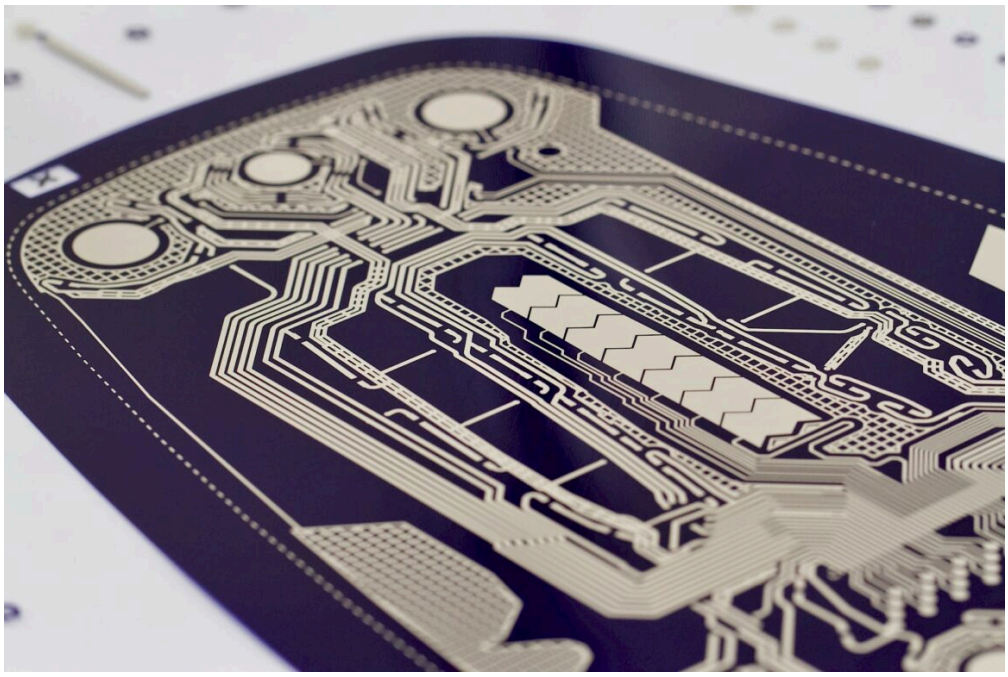
• Chemical resistance, environmental exposure—humidity, temperature cycling (inside the car it could be as harsh as -40 to +90 °C), heat aging and UV resistance; scratch resistance, finish requirements, and color and mechanical requirements such as flex modulus or impact strength.

• Proper design: typical molded-part design principles still apply, including consistent wall thickness, potential weld line locations, minimum draft, maximum rib-to-wall ratio to prevent sink marks, and minimum radii to reduce stress concentrations. Injection-molded parts and their tooling can be complex, as modifications to traditional molded part design and additional in-mold specific considerations are required.

• Birefringence (double refraction, as covered previously in DVN-I **here** and **here**), transmissivity and haze are reviewed when the decorated part is used as a cover lens for a display. Optical attributes mostly come from the molding resin, but the applique also will contribute to the optical qualities of the finished part.

• Resistance: film often is the first surface of the finished part, the part the user can touch. That means scratch and chemical resistance evaluation, along with various environmental exposure requirements, will determine whether the film passes or fails performance testing.

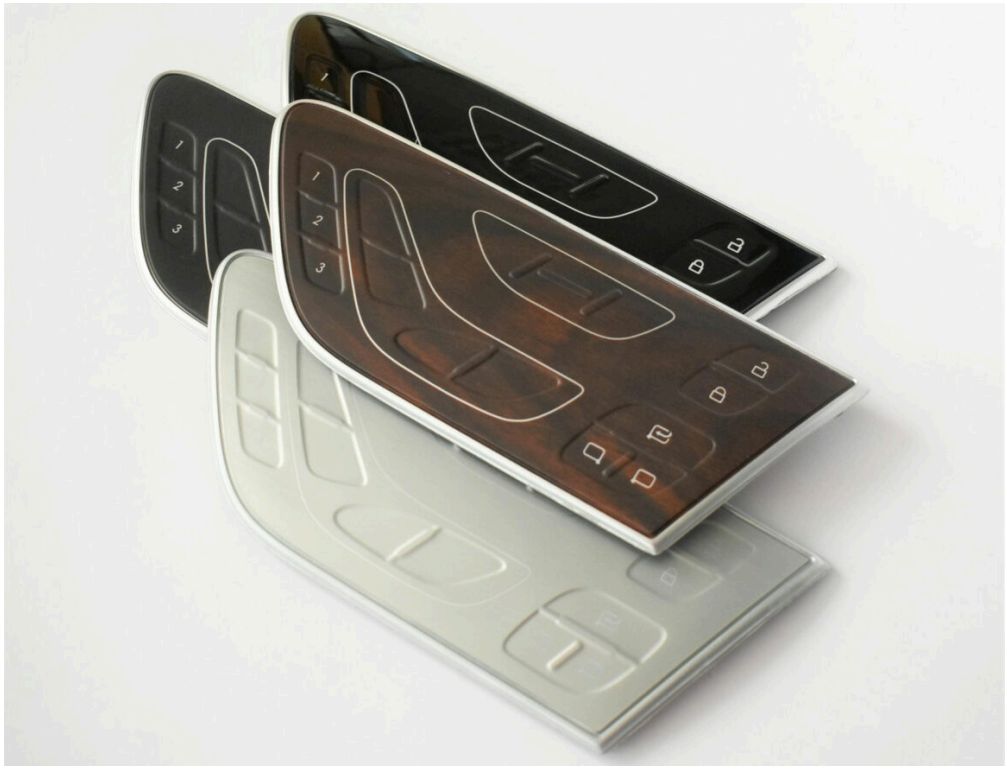
In-mold electronics (IME)



PRINTED IME APPLIQUE READY FOR FORMING (TACTOTEK IMAGE)

IME integrates electric and electronic parts like LEDs and conductive traces directly into the surface of molded plastic components. That adds functionality such as capacitive touch-switches or indicator lighting. The form factors and design envelope are not limited to planar parts; this technique is used for touch-sensitive control panels, lighting elements, human-machine interface elements (HMI), and remote controls. Specialist companies include Tactotek, Antolin, and Novares.

Antolin, WalterPack, and e2ip technologies, along with HMI partners, in 2023 established the IME Alliance, a global initiative focused on IME technology and manufacturing.



ANTOLIN IMAGE

Interior Lighting

Static ambient lighting is a decoration element. Whether monochromatic or colorful lights, direct or indirect, premium and mainstream vehicles alike are equipped with static ambient lighting—"light is the new chrome", so goes the philosophy, as described in detail many times in DVN-Interior Newsletters and Reports.

NISSHA IMAGE

Sustainability

Combing plastic injected parts with film and/or electronics has to be evaluated for sustainability and potential end-of-life disassembly. It means the key ingredients of sustainable design and materials are crucial, as presented at last week's Torino Workshop: eco-friendly materials, recycled plastics, natural fibers, plastic-free solutions, compatibility with circularity, reduced or even zero carbon footprint.

All in all

Materials, colors, and surface finishes for decoration are limited only by the creativity of the designers and manufacturing engineers, though high gloss continues to be popular for automotive applications. Textures can be screen-printed on the first surface, either full coverage or select areas. Texturing the mold will impart a texture to the final part, though the results often are visually different when compared to a part without an applique. If the applique is hard-coated, mold texture can fracture the hard coat and allow for chemical attack.

AUDI A5 (AUDI IMAGE)

For an example of imaginative interior decoration, take the fascia of the instrument cluster and the center console of the new Audi A5. They bear several decorative inlays in aluminum trigon as well as two types of wood: walnut dark brown and fine grain ash natural.

In-mold decoration continues to progress with ever-more-complex designs and manufacturing processes. There are many options available to decorate almost any molded part this way. Material suppliers, printers, and molders cooperate to discover incremental improvements to push the limits of what can be achieved. There have been many failures along the in-mold product development road, of course, as with any other technology or technique. Nevertheless, the future has never been brighter for in-mold decoration manufacturers and their supply chains.

References in DVN Interior

Kurz, Novares, Techniplas, Antolin

Interior News

Genesis Ergo Motion Seat Approved by German Health Institute

INTERIOR NEWS

GENESIS IMAGES

Germany’s leading back health institute, Aktion Gesunder Rücken (AGR), has approved Genesis' Ergo Motion seats, which are designed to provide optimum spinal support to reduce back pain.

AGR says the seats provide optimal support of the spine, following a rigorous independent testing process by industry professionals from within AGR’s network of 15,000 experts from 40 independent medical associations.

The Ergo Motion seats are designed to promote healthy spinal posture and reduce fatigue and tension. According to a Public Health England report, one in six adults in England suffers from back pain, with an estimated nine million people living with the condition. The findings also suggest sick days due to back pain contribute to £10bn (USD $13bn) of indirect costs annually, and place a burden on health and social care systems.

AGR expert and chairman of the board of the Federal Association of German Back Schools Ulrich Kuhnt said of the Genesis seats: "The four-way lumbar support was highly effective, and the adjustability of the headrest was also excellent. Overall, the seats met the back-specific AGR requirement criteria, the seats were also particularly comfortable, and the workmanship was of high quality".

Ergo Motion seats feature Smart Posture Assist, which automatically engages seven air pockets to adjust and regulate the posture for the driver and front passenger. The technology activates one hour into a journey, with configurable massage settings to reduce ache and fatigue. The seats also automatically adjust based on the drive mode, offering comfort and postural support to suit individual driving situations.

It took Genesis engineers two years to develop and deliver the seats. The technology is now a key feature of the Wellbeing package available in the GV60, GV70, Electrified G80, and G90.

Loomia, Yanfeng Collaborate on 'Smart' Interiors

INTERIOR NEWS

LOOMIA-YANFENG IMAGES

Yanfeng and Loomia have announced a strategic partnership to develop smart interiors using Loomia's e-textile circuits with Yanfeng's expertise in automotive interior design and engineering.

Loomia, started in 2014 as a design and technology studio called The Crated in Brooklyn, New York, has worked with automotive companies and manufacturers on car interiors with various integrations. For instance, Loomia integrated a user interface and heater into a vehicle's leather upholstery.

E-textiles can bring value to automotive interiors by directly integrating into trims, removing the necessity for plastic housings and bulky wires. Loomia Electronic Layer technology is enabling future car designs that are safer, more comfortable, eco-friendlier, and more connected to technology. Yanfeng and Loomia aim to take these concepts to production together; the partnership will explore innovative ways to integrate technology into vehicle interiors.

Know Labs Sensor Could Prevent Drunk Driving

INTERIOR NEWS

KNOW LABS IMAGE

Know Labs is seeking to embed their sensor technology in automobile steering wheels to prevent alcohol-impaired individuals driving the car.

The sensors have demonstrated in laboratory conditions that they can non-invasively determine blood alcohol levels. Know Labs has retained the Stanbridge Group to secure a strategic relationship with an automaker to embed the sensor technology.

In 2022, drunk driving was responsible for 13,524 deaths in the USA according to the National Highway Traffic Safety Administration. The Know Labs innovation directly addresses upcoming regulations pertaining to this; by 2026 at the earliest, all new vehicles sold in the USA will need to be equipped with passive alcohol-detection systems.

Know Labs CEO Ron Erickson said the company has "paid close attention to the many diverse fields of use in which our technology could be applied. Determining driver health and wellness is one of those fields of use. We believe our sensor technology, can keep drunk drivers off the road and become the standard for the global auto industry".

Gentex Dimmable Visor and Full Display Mirror

INTERIOR NEWS

GENTEX IMAGE

Transparent, dimmable sunvisors from Gentex can be darkened automatically or manually to protect the driver from the glare of the sun during the day and from dazzling headlights at night. They can be folded down like a conventional sun visor.

Unlike conventional opaque sun visors, the Gentex item allows forward vision and safe recognition of traffic lights, obstacles, and other road users, even in a dimmed state. The latest generation of dimmable sun visors transforms into a full-surface cosmetic mirror at the touch of a button. The technology can also be used in panoramic glass roofs and vehicle windows.

Controlled by a button or automatically via light sensors, the glass darkens continuously and thus not only protects against the glaring sun and unwanted glances, but also offers a new experience for the driver and passengers with its see-through view even when darkened. Each passenger can control their own lighting experience by individually operating the glass roof above their seat and the side windows.

The supplier's Full Display Mirror (FDM) records the video image from a rear-facing camera and transmits it to an LCD display integrated into the rear-view mirror, providing an unobstructed view to the rear of the vehicle. The mirror can be used as a normal automatically-dimming rearview mirror, or as a video display for the rear area. Gentex sees the FDM as a cross-platform place where new functions can be integrated in and around the mirror, such as glare protection, cameras, microphones, displays, transaction modules, car-to-home automation, safety and ADAS functions, and driver monitoring systems.

Samsara's Drowsy Driver Detection

INTERIOR NEWS

SAMSARA IMAGE

Samsara is a startup, founded in 2015 by two MIT graduates and headquartered in San Francisco. Their new drowsiness detection system uses 'AI' models trained on a large data set to detect signs of drowsiness.

The system triggers real-time cabin audio alerts for drivers, and notifies managers via text or email to triage fatigue-related events. These can be viewed as reports within the Samsara platform, enabling managers to discern patterns of fatigue across a fleet, focus on driver coaching, and ultimately improve safety and efficiency.

The US National Safety Council reports that drivers are three times more likely to be in a crash if they are fatigued, and according to the AAA Foundation for Traffic Safety, over 17 per cent of all fatal crashes involve a drowsy driver. The commercial trucking industry, in particular, involves long hours and monotonous roads, leading to drowsiness. Although 'AI' advancements and 'machine learning' have made proactive alerts possible, Samsara calls drowsiness a difficult behavior to train 'AI' models to detect. Evan Welbourne, the company's VP of 'AI' and Data, says "It’s hard to detect when someone is truly drowsy. It’s more than a single behavior, like yawning or having your eyes closed. Drowsiness can be less common than other risky driving behaviors, so accurate detection is only as good as the data that feeds and trains" the 'AI' models.

Samsara’s drowsiness detection system is trained to consider several behaviors that indicate fatigue, in accord with clinically validated standards for defining drowsiness. These behaviors include head nodding, slouching, prolonged eye closure, yawning, rubbing eyes, and more.

Yawning alone is often not a sufficient detector of drowsiness. Samsara first announced drowsiness detection at their annual 'Beyond' conference in June, which hosted more than 2,000 physical operations leaders from the industry.

Samsara’s petabyte-scale dataset collects more than 10 trillion data points each year, and is used to train 'AI' models to automate workflows, accelerate time to value, and provide personalized, actionable insights for customers.

Screen Fatigue Puts 'Re-Buttoning' Expert in Demand

INTERIOR NEWS

The whee-look-what-we-can-do frenzy of touchscreens has been **setting off alarms** for awhile now, and spurring **new incentives** for automakers to tap the brakes. Now there's an intriguingly apposite interview in Spectrum, the magazine of the IEEE (Institute of Electrical and Electronic Engineers). The interview is with Rachel Plotnick, an associate professor at Indiana University in Bloomington, and the leading expert on buttons and how people interact with them; she literally wrote the book on the subject.

The interview is a short but rich one, looking at the questions from angles not often considered; it is well worth reading in full. About cars in particular, Plotnick says:

"There was this kind of touchscreen mania, where all of a sudden everything became a touchscreen. Your car was a touchscreen, your refrigerator was a touchscreen. Over time, people became somewhat fatigued with that. That's not to say touchscreens aren't a really useful interface, I think they are (…) it's actually unsafe for my car to be operated in that way. It's hard to generalize and say, buttons are always easy and good, and touchscreens are difficult and bad, or vice versa.

"(…) people seem to have a hunger for physical buttons, both because you don't always have to look at them —you can feel your way around for them when you don't want to directly pay attention to them—but also because they offer a greater range of tactility and feedback.

"Buttons tend to offer you a really limited range of possibilities in terms of what you can do. Maybe that simplicity of limiting our field of choices offers more safety in certain situations."

Telechips, P3 Partner for Infotainment Systems

INTERIOR NEWS

TELECHIPS IMAGE

Automotive semiconductor company Telechips and P3 Digital Services have announced a partnership to create a pre-integrated software-plus-system-on-chip solution to transform automotive infotainment.

As a result, the Telechips TCC805x Dolphin3 processor is now fully integrated with SPARQ OS, P3's in-vehicle infotainment (IVI) system. This lets vehicle manufacturers bring new products featuring advanced infotainment to the marketplace faster.

A 'hypervisor' is a software layer between the hardware and the OS. It allows multiple virtual machines, managed and resourced individually, to run on the same hardware. This can reduce system complexity and overheads to deliver better performance. Without it, virtualization capabilities are built directly into the hardware or host OS.

Key features of Dolphin3 are flexibility and functionalities related to media and video display options. The system supports dual- and triple-display configurations, and multichannel camera input, and includes an image signal processing subsystem and MICOM subsystem to support an isolated safety island. Dolphin3's flexible architecture enables different IVI system requirements and deployments based on Android Automotive IVI, instrument cluster and ADAS.

The Design Lounge

BMW Turns the Windshield into a Display

THE DESIGN LOUNGE

BMW IMAGE

COFFEE CORNER DVN Interior

Electric cars still don't look very futuristic, and BMW wants to change that so new models project key information onto the windshield. It's the company's "Panoramic Vision" concept, a kind of holodeck in the car.

Anyone driving a BMW in the future will be looking at a light strip projected onto the windshield. "The introduction was decided at a very early stage in the development of the New Class," says Stephan Durach, BMW's Head of Connected Cars. "You could say we practically built the car around the display." Technically, the Star Trek feeling is created by a combination of simple elements. The standard instrument cluster behind the steering wheel disappears and is replaced by a projection in the lower part of the windshield. This creates the holographic effect of a display floating in space.

Powerful diodes use the black printed part of the windshield as a kind of cinema screen to create a permanently visible projection for all occupants. Only the essentials are displayed. The driver is shown the speed on the left side, while the middle and right areas can be used for music tracks, temperature, time, and the like. There is also a head-up display for the driver, which shows direction arrows for navigation above the information band.

BMW plans to present the complete concept at CES in early January 2025. “The projection display is intended to be brand-defining,” says Durach. BMW wants to diverge from the trend towards ever-larger displays, as set by Mercedes, Audi, and the Chinese manufacturers. Buttons and levers will also be reduced to a minimum in the car of the future. "The driver's eyes should always remain in the area of the road, which is another reason why we want to reduce the number of screens in the car to an ideal level," says Durach.

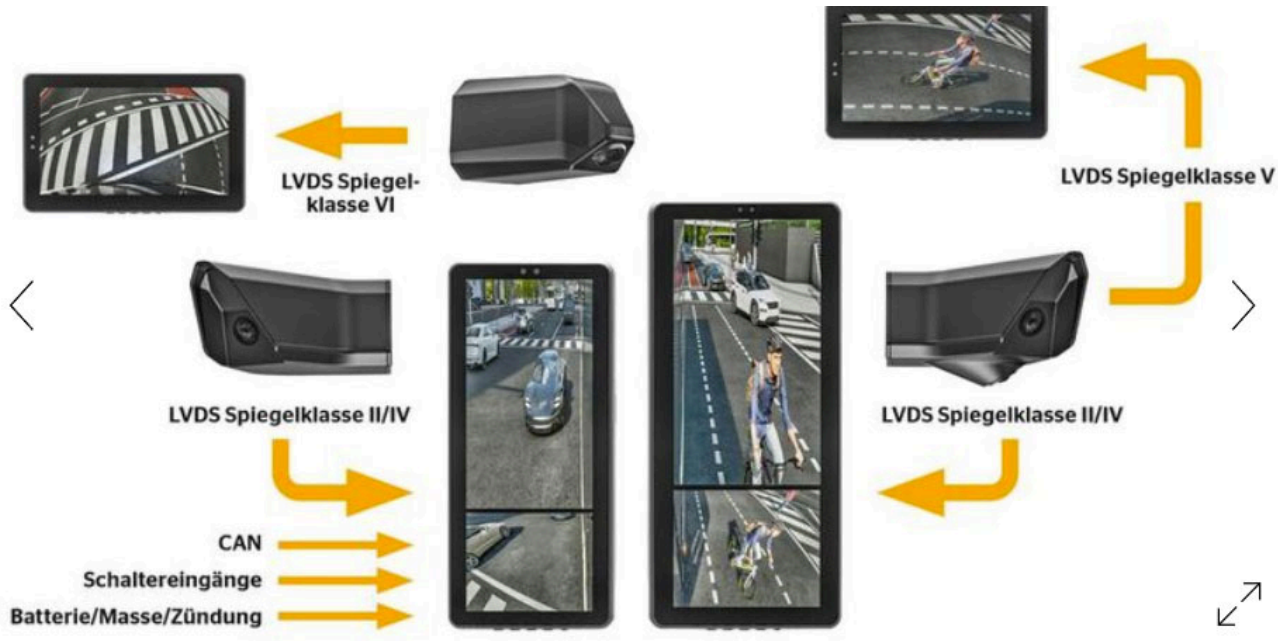
News Mobility

Continental Security Technology Mirror

NEWS MOBILITY

CONTINENTAL IMAGES

Continental presented their digital exterior mirror for the first time at the IAA Transportation trade fair. With its modular design, the system offers flexible configuration options for different commercial vehicles as original equipment or for retrofitment.



Conventional exterior mirrors have shortcomings including constrained visibility, blocked fields of vision, and blind spots—all safety threats, especially in commercial vehicles. Continental's Proviu digital exterior mirror addresses these.

The digital vision system offers a precise real-time view of the vehicle's surroundings. The cameras are based on LVDS technology (Low Voltage Differential Signaling), which, Continental says delivers a frame rate

of 60 images per second. The image latency is less than 80 milliseconds, significantly faster than the 30 image-per-second, 200-millisecond latency minimum requirements prescribed by UN Regulation № 46.

With a 3-megapixel resolution, the camera can be used flexibly and adapted to different vehicle types. The extended field of view allows drivers to adjust the settings individually while complying with legal regulations. The displays that show the camera image are available in a range of size—10, 12.3, or 14.5 inches—and resolutions. With a brightness of at least 800 cd/m^2 and a contrast ratio of 1,000:1, the displays can provide a clear view even in difficult lighting conditions. Compact design and flexible power supply of 9 to 32 volts make the digital mirror system integrable into a wide range of vehicles.

Starvis technology automatically adjusts the brightness of the display to the ambient light conditions. This is particularly useful in bad weather and at night, when visibility is poor anyway.

Strong light or backlighting can dazzle the driver. HDR technology is designed to ensure that both bright and dark areas of the image remain clearly visible without important details being lost. In addition, the LFM (LED flicker management) function reduces the flicker of LEDs and ensures a clear image. The camera modules are also equipped with an integral lens heater, which reduces the effects of rain, ice, and snow.

The system's high image frequency makes it possible to integrate additional functions for ADAS via the integral CAN interface. For example, the parking assistant expands the field of vision as soon as a reversing signal is received, and adds parking guidance lines to make parking easier. The turning assistant enlarges the field of vision on the side into which the driver wants to turn as soon as the blinker is activated, and switches on the camera blinker. It is also possible to transmit and display warning messages from the BSIS (blind spot information system) to the digital mirror system.

How Far Off Are Robotaxi Services, Really?

NEWS MOBILITY

WAYMO IMAGE

After more than a decade of development, robotaxis are already being used commercially in more places and in greater numbers than ever before. However, all involved companies face financial and technical challenges. Here's a look at the latest developments.

In March, Waymo received approval from Californian authorities to expand their commercial driverless service to most of the San Francisco peninsula and the greater Los Angeles area. Outside of California, the company plans to bring the service to Austin, Texas, next year. Waymo plans to purchase vehicles from Chinese manufacturer Geely in the long term. The two companies have developed a robotaxi based on Geely's electric Zeekr platform.

NHTSA launched an investigation into more than two dozen incidents involving the company's self-driving Jaguar vehicles in May; officials say some of the incidents involved collisions that "a competent driver could have avoided."

GM's Cruise has gradually recovered after the negative events of last fall—they'd been testing self-driving cars with human safety drivers on public roads in Phoenix, and one of their cars hit a pedestrian in San Francisco and dragged them six meters. Now, though, there is every indication that the company will continue to operate.

Tesla's owner Elon Musk has been promising robotaxi services "soon" for almost a decade. So far, no fleets of self-driving Teslas are in sight, and Tesla's so-called "Full Self-Driving" system is only operating at L^{2+} of autonomous driving: the driver must keep constant watch over the system and always be able to take over driving immediately.

Croatian company Mate-Rimac has developed a robotaxi called the Verne, with two seats and without a steering wheel or pedals. The service is set to launch in Zagreb in 2026, with further cities planned in Germany, the UK, and the Middle East. It is not known whether Rimac already has permits to operate their fleet, or when. It would be the first robotaxi service to operate with a purpose-developed vehicle; existing companies like Waymo and Cruise use converted production cars such as the Jaguar I-Pace or Chevrolet Bolt. In these vehicles, passengers sit in the passenger seats, and a steering wheel and pedals are still present.

MATE-RIMAC VERNE (MATE RIMAC IMAGE)

Zoox expects to launch their service in Las Vegas by the end of this year. Zoox was also confronted with a NHTSA investigation, because two motorcycles crashed into a Toyota Highlander equipped with Zoox's self-driving technology following a sudden braking maneuver.

Wayve, a British startup, has been developing a self-driving system since 2017 in which 'artificial intelligence' makes driving decisions without human intervention. Wayve is focusing on a step-by-step approach to automation, starting with driver assistance functions in their own vehicles.

Mobileye and Volkswagen are working together on the introduction of robotaxis. They want to bring new driver assistance functions into production soon. The cars should be able to overtake autonomously on the highway and stop automatically at traffic lights in the city. In 2026, the driverless electric van will go into series production and will initially be used for a robotaxi service in Hamburg.

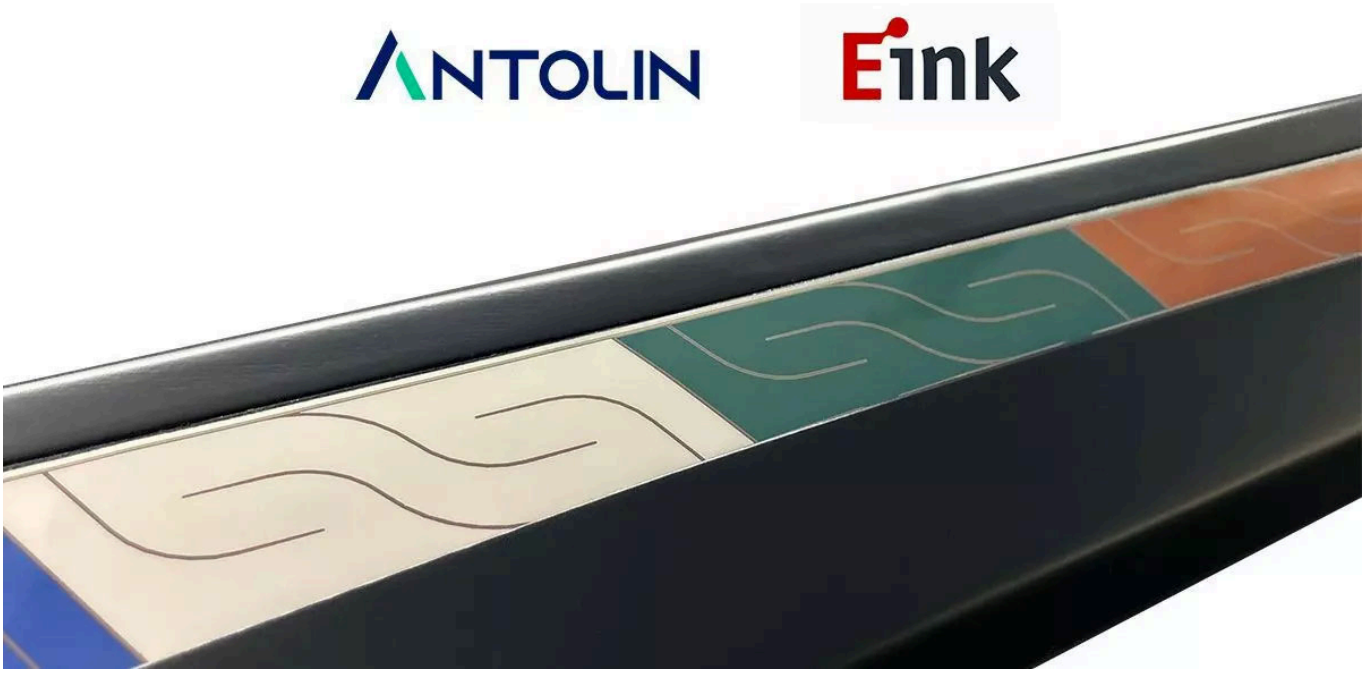
Toyota-backed company May Mobility took their first step towards the robotaxi future in December; they launched a driverless service in a retirement community in Sun City, Arizona. In addition, May is running pilot projects in Ann Arbor, Michigan; Arlington, Texas, and Grand Rapids, Minnesota with human safety drivers on board.

Chinese company Baidu is in the middle of an extensive expansion phase with their autonomous ride-hailing platform Apollo Go. It operates in more than ten cities in China and is the first company to offer a fully driverless service in Beijing, Wuhan, Shenzen, and Chongqing. Baidu plans to deploy a fleet of 1,000 robotaxis in Wuhan by the end of the year. The company is starting to deploy their sixth-generation robotaxi, which costs less than half the cost of the previous model.

General News

Antolin, E Ink Partner for Interior Dynamic Designs

GENERAL NEWS



Antolin will collaborate with electronic-ink company E Ink, to integrate E Ink's 'Prism' technology into vehicle interiors. This was announced during the IZB trade fair, aligning with this year's IZB theme, "Empowering Partnerships".

E Ink Prism uses electronically-controlled colored particles, and enables the creation of dynamic surfaces with endless experiential designs that can change color and patterns on demand or automatically based on functionality, such as alerts or call notifications. Unlike traditional backlit solutions, it consumes power only during color transitions, contributing to greater energy efficiency and, consequently, improved driving range in EVs.

Tim O'Malley, Associate VP of E Ink's US business unit, says, "This collaboration marks a significant step towards creating dynamic, energy-efficient vehicle interiors that not only enhance user experience but also contribute to a sustainable future. Together, we are redefining personalization for automotive designs, combining our novel ePaper technology with Antolin's portfolio of technological solutions for car interiors".

This technology has been showcased in exterior applications at events such as CES in 2022 and 2023. For over two years, Antolin and E Ink have been tailoring this technology to vehicle interiors. The companies say this alliance will allow the development and validation of the technology under real automotive use conditions. The final goal is to offer automotive manufacturers and end users new surfaces that are customizable, 'smart', and green while reinforcing automaker branding.

Foxconn Becomes Supplier, Carmaker

GENERAL NEWS

PININFARINA MODEL D (PININFARINA IMAGE)

Foxconn subsidiary Foxtron presented two new models at their Tech Day in Taiwan: a seven-seat electric MPV called the Model D, and a 21-seat electric bus called the Model U.

Foxconn continues to pursue their strategy of diversification in various areas of the manufacturing industry. The company works with car components such as chips, engines, and platforms, and with entire vehicles for other brands. They are also expanding into medical technology and robotics.

They call their business model CDMS, for "contract design and manufacturing service", and their most important competitor is diversified Canadian-based Magna, who supplies the world's automakers with all sorts of parts and also builds complete cars such as the Jaguar I-Pace and now 33 other models for eleven automakers, including BMW, Toyota, and ArcFox.

Foxconn is trying to do something similar to Magna. They have founded a joint venture called Foxtron with Taiwanese car manufacturer Yulong, which sells EVs under that brand. Above all, Foxtron wants to promote these as prototypes for other brands.

Meanwhile, parent company Foxconn continues to produce components of all kinds for automakers worldwide, such as Tesla. The calculation is that the vertical integration of the supply chain will continue to increase. This should have a favorable effect on the procurement prices of raw materials and individual parts.