

## Editorial

### Ferdinand Piech Is Dead At 82

Sad news last week: Ferdinand Piech has died, aged 82. Like many who make at great success in their field and achieve much during the course of their lives, he had talent allied to a pretty forceful character. I met him two times: once in my former job at Valeo in Bobigny when he visited the lighting facilities. I was impressed by his blue eyes and the sharp technological questions he asked me about components, lenses, reflectors, and light sources—it really showed his passion about every kind of automotive technology. The second time was at one of the IAA autoshows in Frankfurt, where he greeted me with "Hello, Valeo guy!". He had the same blue eyes reflecting the passion of what he was seeing at this show.

Piech was the architect of an industrial strategy that saw the VW Group expand into a major global force on the back of brand acquisitions and a design and manufacturing overhaul framed around consolidating models to common group platforms across the brands. He was CEO of VW Group from 1993-2002 and thereafter wielded considerable power as chair of the company's supervisory board until 2015. He had a reputation as a tough manager who would sometimes force his ideas through despite internal resistance. His industrial strategy from the 1990s to build the Volkswagen Group into a major global force built on scale economies and at the same time acquire premium brands such as Bentley, Bugatti and Lamborghini, leaves a considerable legacy.

We will never forget this talented engineer who spent two decades as head of Audi before moving to the top job at VW Group in 1993.

And a lesson for all of us: the passion in his job is the first level to succeed !

Sincerely yours

DVN President



## In Depth Lighting Technology

### DBM: Grand Expertise in Optics and Injection

DBM Group are a Canadian company, established in Quebec in 1972, the main product being at that time nickel needles to mould catadioptric inserts. Year after year, DBM have accumulated expertise in the domain of precise machining and moulding of optical components. A passionate team of development and manufacturing engineers allow DBM and their customers to benefit as projects are brought to fruition.

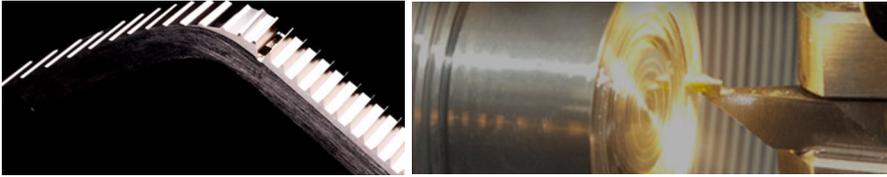
By the early 1980s, DBM Reflex began manufacturing injection moulds for retro-reflectors, and in the late '90s DBM began designing optical systems for their customers. In 2007 they started making optical components for non-automotive companies, and later expanded that service to include automotive customers. In 2014 DBM Optix's incorporation became official.

DBM currently employ 400 people and operate mainly in the automotive industry, more specifically in automotive lighting and signalling. There are two main activities grouped under the names DBM Reflex and DBM Optix. From DBM Reflex come moulds and tools; from DBM Optix come optical components.

DBM Reflex operates in two buildings. Since April 2019 the electroforming and plating activities have moved to a new facility with state-of-the-art plating equipment. The other plant houses the mouldmaking activity and the new expanded optical insert manufacturing. This includes a new white room for optical machining and a metrology area for high-precision measurements on moulded optics and mould inserts.

There are also two DBM Optix sites. One is dedicated to thick lenses, silicone optics, and special products. The second plant is dedicated to light pipes and light screens. There are two photometric laboratories fully equipped to measure according to ECE,

SAE, and other standards and regulations.

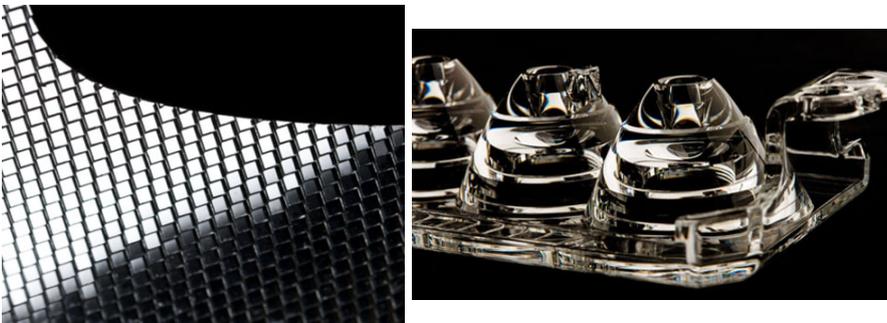


DBM have developed their own SIMOPTIC optical simulation software for the development of optical lenses and light guides mainly dedicated to the automotive market and lighting in general. SIMOPTIC is very powerful, with tools to make correlations between moulded parts and actual lab results. They also have three diamond machining centres.

The great expertise of DBM allows to machine free-form surfaces with mirrored finishes with Ra up to 3.0 nm and precisions of 0.15mm peak to valley. This same expertise allows to make the optical inserts required for complex and precise optical shape moulding, often required in light pixelisation solutions. This equipment allow DBM to machine diffractive optics. All diamond cutting centers and related CMM are installed in a dedicated room with temperature control within  $\pm 0.1^{\circ}\text{C}$ .

Electroforming from single mandrels, machined with great precision: This technology allows to reproduce the surface of an original piece (of a master) in nanometres. DBM have the ability to electroplate alloys suitable for diamond cutting up to several millimetres thick on optical inserts, and to make measurements at the nanometre level.

Ribs, shapes and roughness are measured on both inserts and moulded plastic parts. For this, the available equipment includes high-precision CMM (up to 0.7 microns), laser scanning microscopes, and contactless dot scanning allowing the measurements of transparent parts.



DBM OPTIX have developed Dual-Step™ technology and other multilayer moulding technologies for molding thick optical lenses in extremely short cycle times. These technologies are particularly suitable for high volume productions. About thirty of the latest-generation injection machines on site are perfectly adapted to optical components and ranging from 100T up to 650T and from 1 to 3 sleeves. Laser degating is used on most of the products. Artificial vision for quality control of appearance defects is used where warranted.



DBM can also do compression moulding, as necessary for parts with large thickness variations. Silicone moulding is another DBM capability attractive to customers interested in silicone optics.

In the Silicone area DBM offer one-stop shopping: the tooling, the optical insert, and the production of moulded parts are all handled in-house.

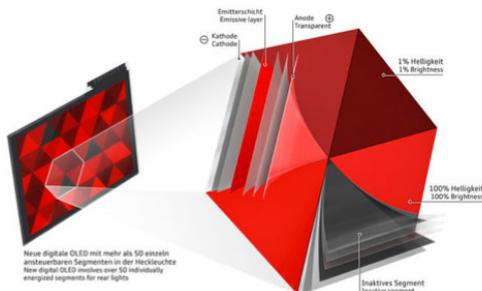
TEXILIT™ is a DBM technology to make surfaces evenly lit when backlit with LEDs. In it, the optical structures are analysed and mould inserts are made. The great advantage is to have a molded screen with normal molding means giving a piece with exceptional optical characteristics.

# LIGHTING NEWS

## Audi's Latest OLED at ISAL

At the 13th ISAL coming up at the end of the month, Audi will be presenting their insight into the next generation of OLED lighting technology. The new digital OLED technology enables customisable lighting designs and allows communication using light

in exterior installations. Audi's speakers will present the latest trends and developments in the field of lighting.



The first series production of Audi OLED technology in 2016 was in the tail light of the Audi TT RS. In contrast to point light sources such as LEDs made of semiconductor crystals, the OLEDs are surface radiators. Their light reaches a homogeneity on a new level and can be dimmed steplessly. It does not cast shadows and does not require reflectors, optical fibers or similar optics, making the OLED units very efficient and lightweight. Another advantage of OLEDs is the possibility to divide them into small segments that can be controlled with different brightness. The OLED lights can also implement animation effects in Audi models such as coming home and leaving home scenarios.



Digital OLED enables personalized lighting design in the rear lighting. The OLED light source is divided into a significantly larger number of individually controllable segments. These more than 50 segments can be activated as desired and infinitely adjustable in their brightness. This enables Audi designers and developers to display a wide variety of lighting designs with a single hardware. The OLED advantages are in addition to a perfect contrast, high homogeneity and minimum segment distances. The high system efficiency as area light in a one millimeter thin light element is retained. The digital OLED is therefore the perfect technology to present personalized lighting design with high precision and great variability.

In addition to the versatile design of lighting designs, the digital OLED can be used as a display element in the rear lighting and thus as a Car-to-X communication element. For example, pre-defined icons may be displayed to alert other road users early to local hazards such as slipperiness or an upcoming traffic jam.

## Auer Pour Millions Into Precision Glass Moulding



Auer Lighting have launched an ambitious investment program to expand their plant and equipment portfolio. New kinds of highly complex lighting systems require optimal glass materials and highly precise optics, whether for advanced consumer electronics or for advanced vehicle lighting.

To respond to these needs for increased precision, Auer's multimillion-euro investment program peaked this past month with the installation of highly advanced precision glass moulding equipment. The upgrade of their in-house tool and die department with another fully automated 5-axis CNC machine is next in line.



## Half of U.S. Pedestrian Traffic Deaths Happen At Night

26% of American pedestrians killed in traffic died between 6 and 9 p.m. Another 24% died between 9 p.m. and midnight. Pedestrian motor vehicle crash deaths have increased 45% since reaching their low point in 2009, and account for 16% of crash fatalities. The rates of pedestrian deaths in motor vehicle crashes per 100,000 people are highest for people ages 70 and older.

Year	2010	2011	2012	2013	2014	2015	2016	2017
number deaths	4,300	4,450	4,800	4,780	4,900	5,500	6,100	6,000

*Number of pedestrian deaths in USA*

Pedestrian deaths occur primarily in urban areas. Engineering measures that separate vehicles and pedestrians such as sidewalks, refuge islands, overpasses and underpasses, and barriers can reduce the problem. But it's been robustly shown that there is an unbroken causal chain between inadequate headlighting caused by lamp lens degradation or poor aim, and dead pedestrians.

## Koito By the Numbers: 2019 Annual Report

Koito Group's consolidated net sales decreased 2.7% year on year to ¥826bn (€7.06bn, \$7.8bn). This was attributable to a decrease in the automobile production volume and the status change of Shanghai Koito from a consolidated company to a company accounted for by the equity-method in the end of September 2017, and its non-consolidation in the end of March 2018. Operating income decreased 2.2% year on year to ¥101bn (€863m, \$950m), and recurring profit decreased 2.3% to ¥105bn (€897m, \$988m), an effect of non-consolidation of Shanghai Koito and increased R&D expenses.



Production volumes are expected to remain flat in the fiscal year ending 31 March 2020; net sales are expected to decrease slightly due to the effect of currency exchange. As to earnings: compared to the previous fiscal year, operating income, recurring profit, and profit attributable to owners of parent are all expected to decrease due mainly to the effect of currency exchange, an increase in R&D expenses and the increase in depreciation cost for strengthening of development capability.

Koito currently conduct business activities across 33 companies located in 13 countries. They are aggressively developing high-value products, such as LED headlamps and ADB. At the same time, they are also developing headlamps for low-priced vehicles in emerging countries, and other products to meet respective market needs. Competition is expected to intensify due to changes in mobility, such as connectivity, autonomous driving, sharing, and electric vehicles, so Koito are collecting information on ADAS and AV technologies, as well as developing next-generation lamps. Aside from vehicle lights, Koito also provide road traffic control systems, LED displays, and electronic aircraft components.

## Infiniti Has New Design Chief

Taisuke Nakamura is Infiniti's new Head of Design, replacing Karim Habib, who has left the company.



Karim Habib



Taisuke Nakamura

Nakamura has been with Nissan since 1993, and has been Infiniti's program design director since 2018. Prior to this he was the head of Nissan Design Europe. He reports to Alfonso Albaisa, SVP of Nissan Global Design, and has served as program design director of Infiniti and contributed to Infiniti design since 2018. He is currently responsible for global design strategy and concept car and production vehicle design. Nakamura joined Nissan in 1993 after graduating from Kyoto City University of Arts with a BA in Product Design. He is responsible for the design of iconic EV concepts such as Infiniti QX Inspiration, Prototype 10 and Qs Inspiration, among other vehicles.

Habib's departure—which joins something of a list of upheavals at Infiniti this year—comes after his two-year stint in charge of Infiniti's design direction. He joined Nissan's luxury marque in March 2017 after a 9-year run at BMW. He spent the final five years at BMW as the core brand's design chief.

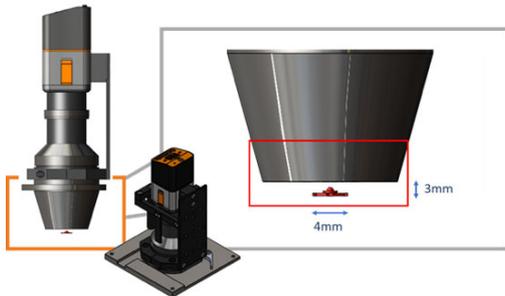
In March Infiniti announced the end of their Q30 and QX30 crossovers, as well as a withdrawal from the European market by 2020. And since 2018, a number of prominent foreign-born executives have left the Japanese automaker—including Jose Munoz, the company's chief performance officer, and Tresor Mann, chief operating officer of Mitsubishi.

## RVS: Measuring Radiant Intensity to Evaluate NIR Light

3D sensing technology is the foundation of multiple new applications, such as eye tracking and iris detection, automotive lidar for autonomous vehicle sensing, and multimodal sensing for vehicle gesture and motion control.

The Radiant Vision Systems NIR Intensity Lens system is an integrated camera/lens solution that measures the angular distribution and radiant intensity of 940 nm NIR emitters. The NIR Intensity Lens system utilizes Fourier optics to capture a full cone of data in a single measurement to  $\pm 70^\circ$ , giving extremely fast, accurate results ideal for in-line quality control.

Manufacturers of 3D sensing technology can apply the NIR Intensity Lens solution for angular measurement of NIR LEDs, lasers, and structured light patterns produced by Diffractive Optical Elements (DOE).



The NIR Intensity Lens captures the complete angular distribution of an NIR light source (to  $\pm 70^\circ$ ) in a single image, and achieves an angular resolution of  $0.05^\circ$  per CCD pixel. Paired with the Imaging Radiometer featuring a 16-megapixel CCD sensor, the NIR Intensity Lens has the capability to measure radiant intensity, power, and radiant flux with a high degree of accuracy at each view angle.

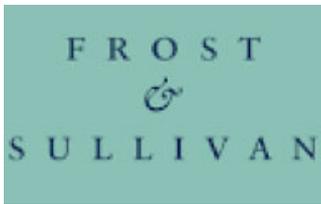
So, the NIR Intensity Lens provides an efficient measurement solution for NIR sources such as LEDs and lasers. This camera/lens solution offers high-resolution imaging to address both off-line and in-line applications:

- Angular measurement for devices used for 3D sensing applications
- Evaluation of 940 nm light sources for accurate radiant intensity output at all angles.
- Measurement of NIR LEDs, lasers, and structured light patterns produced by diffractive optical elements (DOE).
- Fast operation for in-line measurement for quality control during production

## DRIVER ASSISTANCE NEWS

### 25% of Vehicles Will Be At Least Level-3 by the '30s

Frost & Sullivan's new AV study predicts that vehicle and mobility automation will bring technology entities together to monetise vehicle and user data to deliver value-added services.



The research outfit's recent Global Autonomous Driving Industry Outlook analysis highlights key market trends and autonomous vehicle technology. Technologically, the study focuses on platform-level developments to add redundancies, merge sensory data, and build the necessary computing ecosystem. In parallel with trends, the outlook is for one in four new vehicles sold worldwide will have L3 or better automation—mostly L4—in the 2030s.

Significant progress is yet to come; the report calls 2018 and '19 years of technological breakthroughs in the autonomous driving market. The development and deployment of L4 and L5 vehicles will take time, goes the prediction, so automakers and tier-1 suppliers should encourage L2+ features to add value to the proposal on the market.

Frost & Sullivan Senior Mobility Research Analyst Ayan Biswas says "The fusion of sensors will be a major aspect of the development of autonomous vehicles. The transition from sensor processing to sensor fusion will be done either by raw sensors or intelligent sensors based on E/E architecture...in the meantime, the introduction of the L2+ and L3 features will provide opportunities for the integration of ADAS domain controllers. This will reduce architectural complexity and weight on the chassis by reducing cabling and facilitating high-speed communication and data transmission".

## Velodyne Lidar for Optimus Ride



Optimus Ride, a self-driving vehicle technology company who describe their mission as transforming mobility, will soon be operating their self-driving systems in four U.S. states. And now it's been decided: their entire fleet will use Velodyne's lidar sensors.

Optimus Ride CEO and cofounder Dr. Ryan Chin says "For Optimus Ride to operate a fleet at SAE Level 4 requires significant sophistication, intelligence, range and resolution. Velodyne's technology meets these high standards".

The Optimus Ride model: self-driving vehicles that provide passenger transport at low speeds within defined, geofenced areas such as planned communities, campuses, and self-driving zones in cities. The company's vehicles are currently deployed in Massachusetts at Boston's Seaport District and in South Weymouth; and at the Brooklyn Navy Yard in New York. Forthcoming expansion is set to include Paradise Valley Estates in Fairfield, California and a property development in Reston, Virginia.

Using Velodyne sensors, Optimus Ride can precisely locate the position of people and objects around the vehicle, as well as calculate their speed and trajectory.

## New Puck Lidar from Velodyne

Velodyne have introduced their new, compact Puck 32MR™ sensor to address key markets in the autonomous-systems industry. It's said to be a cost-effective perception solution for low speed autonomous markets including industrial vehicles, robotics, shuttles, and unmanned aerial vehicles (UAVs).



Besides featuring Velodyne's patented surround-view perception capability, the Puck 32MR boasts a range of 120 m and a 40° vertical field of view to enable navigation in unfamiliar and dynamic settings. Generating a high-resolution point cloud with minimal noise in all light conditions, it accurately detects crosswalks, curbs, vehicles, pedestrians, bicycles, and obstacles for safe and efficient operation in roadway, commercial and industrial use cases.

## Great Wall, Ibeo, LiangDao in Lidar Pact



In what is being billed as the world's first solid-state lidar mass production agreement with a Chinese automaker, last week LiangDao Intelligence established a strategic coöperation agreement with Great Wall Motor and German lidar experts Ibeo Automotive Systems. Great Wall have chosen Ibeo as the lidar supplier and LiangDao for validation services to support Great Wall's mass production.

- Ibeo Automotive Systems specialise in automotive lidar sensor technology; they're located in Hamburg, Germany.
- LiangDao Intelligence are a testing and evaluation service provider aimed at shepherding L3-L5 AD into mass production. They offer expertise in lidar and multi-sensor fusion technologies.

## US Regulators Consider Dipping Toe In Mirror-Cam Water

Camera/display systems are gaining traction in Japan and Europe as modern replacements for side- and rearview mirrors...but not in the United States, where Federal Motor Vehicle Safety Standards require mirrors, flat mirrors (on the driver's side), and nothing but mirrors. There's a new glimmer of hope on the distant horizon, though: NHTSA have released a "notice and [request for comments](#) on a proposed collection of information" related to camera-based rear vision systems.



It's a baby-step, to be sure; NHTSA aren't requesting comment on a proposed rule, but rather on a plan to collect data which the agency would then study to see if it looks like camera-based vision systems might reduce safety compared to mirrors. An American law called the Paperwork Reduction Act of 1995 prohibits NHTSA proposing data collection like this to the US Office of Management and Budget without first providing a 60-day comment period. Specifically, NHTSA must allow two months for the public to have their say on whether the proposed collection of information is necessary for the proper performance of the agency's functions, including whether the information will have practical utility; whether the agency's estimate is accurate of the burden of the proposed collection of information and how to minimise the burden of the collection of information on those who are to respond, and how to enhance the quality, utility, and clarity of the information to be collected.

Once the comment period is over, then NHTSA can ask the OMB for permission to go about collecting the data. NHTSA say they want to *perform research involving the collection of information from the public as part of a **multi-year** effort to learn about drivers' use of camera-based systems designed to replace traditional outside rearview mirrors. Initial research will focus on light vehicles and be followed by research examining camera-based visibility systems on heavy trucks.* (emphasis added).

As far as experimental design, NHTSA plan to test driving behaviour and lane-change manoeuvre execution. They say the systems to be tested will be *foreign production or prototype systems fitted onto U.S. or European-specification vehicles. At least two test vehicles will be equipped with both camera and mirror technologies, while the other test vehicles will be equipped with camera-based visibility systems and no outside mirrors.*

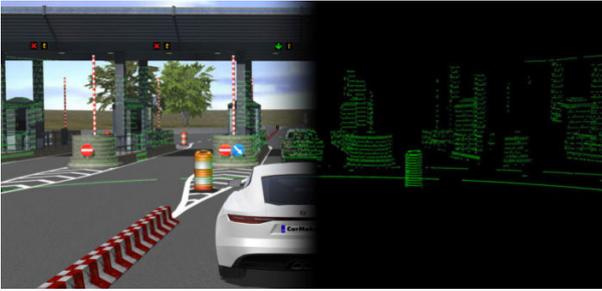
In March 2014, the Alliance of Automobile Manufacturers—a trade group representing BMW, FCA, Ford, GM, JLR, Mazda, Mercedes-Benz USA, Mitsubishi, Porsche, Toyota, VW Group of America, and Volvo Cars USA—petitioned NHTSA to use cameras instead of mirrors on passenger cars, and a similar petition for heavy-duty trucks was filed by Daimler in 2015. Those petitions are still pending.

Toyota began selling a Lexus ES in Japan last year with cameras instead of side mirrors, and Audi's e-Tron has sideview cameras in Europe as of last December. In the Land of the Free and the Home of the Brave, though, both cars—all cars—will have to have regular mirrors for the foreseeable future.

## Lidar Sensor Virtual Trials in CarMaker 8

IPG Automotive have launched version 8.0 of their CarMaker virtual testing suite with new integration of lidar raw signal

interface (RSI), a physical sensor model based on ray tracing for detailed lidar sensor modelling. This completes the list of physical sensor technologies available for simulation in the software.



A lidar determines the distance to its surrounding objects by measuring the time of flight. CarMaker version 8 enables virtual modeling and individual definition of specific lidar properties. This allows users to define the mounting position and orientation, cycle time or transmission power, for instance, and even the beam pattern. In addition, it is possible to model rotating lidar systems for 360 surround view.

IPG simulation software product manager Dr. Andreas Höfer says "With the option of real-time capable modeling and generation of raw signals from radar, lidar, camera and ultrasonic sensors, our software solutions offer all that is needed for the virtual development of raw data-based fusion and detection algorithms or driving functions based on these". Whether the tests are focused on detecting objects or on the resulting decisions, error sources can be identified and eliminated in early developmental stages. Moreover, for accelerated testing, the revised software can make parallel use of multiple GPUs. This enables real-time tests of complex sensor configurations such as those needed for (semi) autonomous driving. For dealing with large test catalogs, parallel testing is possible on an HPC system or in the cloud.

## GENERAL NEWS

### VW Eye Chinese Supplier Buy-Ins



Volkswagen Group, jockeying for access to key technology in the world's largest auto market, are looking at potential investments in Chinese automotive suppliers.

Options under discussion include buying equity stakes or getting into joint ventures especially with companies providing EV technology. Battery technology is a critical area for VW as they work to secure vast purchasing volumes needed to power the auto industry's largest push into electric cars, which is led by China.

The Chinese market will take on a bigger role for VW as both a production hub and research centre, according to CEO Herbert Diess. The VW Group plan to deliver 22 million fully electric vehicles worldwide by 2028, with more than half of them made in China.

VW also are considering expanding their automaking joint ventures in China—with SAIC and FAW—and exploring options to acquire a stake in its smallest local partner, Anhui Jianghuai Automobile Group, as part of a reshuffled strategy that will also include working with partners on mobility offerings and rolling out a smaller electric-car platform specifically for China's megacities.