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Automotive lighting and driver assistance technologies

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Editorial

100 Companies Registered At Frankfurt DVN Lidar Conference

The second Frankfurt DVN Lidar Conference is just a week away now, and this year exceptional lectures will be given from VIPs including a keynote by Velodyne SVP and past SAE International President and Board Chair Dr. Mircea Gradu. There will be presentations from CEOs and directors of lidar developers and makers, automakers and lighting suppliers, organisations, research institutes, and universities…. And then, two panel discussions to kick around the ideas raised in the lectures.

100 entities are already registered! There's still time to **sign up** up if you haven't yet done so, but **only a few entries remain available**; registration will soon close for safety and security reasons. So far, the roster includes automakers Audi, Ford, Honda, Hyundai, Kia, Nissan, Opel, Porsche, PSA, Toyota, and Volvo; tier-1 lighting suppliers FlexNGate, Hasco, Hella, Koito, Marelli (Automotive lighting), Mobis, SL, Stanley, Valeo, Varroc, and ZKW; tier-1 sensor suppliers ADAS-MC, Aeye, ams Sensors, Blickfeld, Cepton, Continental, OQmented, Ibeo, Infineon-Innoluce, Innoviz, Jenoptik, CEA-Leti, Liangdao, Ouster, Plastic Omnium, Vedecom, Velodyne, and XenomatiX.

Tier 2 suppliers include 3M, AGC Automotive, Auer Lighting, Automotive Solutions, Covestro, Docter Optics, Elmos, Fastree, Freeglass, GXC Coatings, Hamamatsu Photonics, Hybrid-Lidar, Huawei, IAV, IMS, IPG Automotive, Johnson Electric, Kyocera, LeddarTech, Lumibird, Lumileds, Luminar, Luminit, Mitsubishi Electrics, MovingMagnet, Nanomotion, Nanosystems, Optics Balzers, Optoflux, OQmented, Osram, Riegl, Sabic IP, Seoul Semiconductor, Shott, Siemens, SLD Laser, Son-X, Synopsys, W.L. Gore, Webasto, Weisser+Griesshabe, Yole Development, Zanini Auto, and Zollner. And from the research and academic sector are coming TU Aachen, TU Darmstadt, Fraunhofer IMS, IPT, ISIT, and Mikroelectronik.

Meanwhile, this week we bring you a peek at some of the most intresting cars presented at the Los Angeles auto show.

Sincerely yours

DVN President

In Depth Lighting Technology

Los Angeles Auto Show

This year's Los Angeles Auto Show is offering a glimpse of the future, with more than 50 new production and concept vehicles on display, and many making their American debut. Here’s a look of the headlamps of the most significant models debuting at the L.A. Convention Center this year

Aston Martin DBX

The Aston Martin's front lighting package blends elements of conventional design, with the upper lamp's sideways-raindrop shape accentuated by the optics; it looks like the sun through an actual raindrop. Down in the bumper fascia, a trim, homogeneously-lit hoop for the DRL.

Audi e-tron

The e-tron brings yet another evolutionary iteration of Audi's calling-card lightstyle, and it's one of the most expressive yet. The lamp optics give an almost uncanny impression of intelligence, overscored by the linear DRL.

BMW M2 CS

Evolutionary iteration is also the order of the day at BMW, where the familial Angel Eye rings have morphed into wide fish hooks and the four-lamp look ties the M2 to its past and present siblings.

Hyundai Tucson

Hyundai bring an eye-catching lighting package. The eyebrow line's continuation in the lower lamp creates a tidy, integral appearance. Despite being smaller than the bumper they're set into, the lamps still present as the foremost design element.

Karma SC1

There are almost no lights visible on the Karma SC1—just a subtly hooked DRL, which may also provide the turn signal. The other lamps are hidden away in the bodywork.

Kia Optima

Far over at the other end of the price-and-volume continuüm, the Kia Optima goes for a rather conventional 4-eyed look, though the DRL accentuating the bumper's character lines is a neat touch

Land Rover Defender

Here's a pair of traditional Brits—at least nominally—bearing modern lighting technology in traditional round shapes.

MINI John Cooper Works GP Prototype

Production will be limited. 3,000 copies. Deliveries will start at the end of April / beginning of May.

Porsche Taycan 4S

The Taycan 4S continues the Porsche familial 4-dots look for its DRLs, though now the dots are rather more like horiz. lines, and the quartet of them are set into something of a lozenge shape.

Toyota Camry AWD

Toyota's evergreen Camry has Koito's impressive Bi-Beam LED projector with triple-hash DRLs inboard.

2021 Toyota RAV4 PHEV

And speaking of evergreen Toyotas, their popular RAV4 bristles with high technology in its equipment, specification, and design—including the lights, which are styled with compound angles and fascination lines; just look at the swooping fish hook design of that DRL!

Volkswagen ID.Space Vizzion Concept

VW's ID.Space Vizzion concept has mockup lights for the time being, but Volkswagen's talk of the EV future, together with the high content of their lighting systems lately, make us confident the lights on the production car will be well worth a whistle.

Mustang Mach-E

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Ford's first electric SUV, the Mustang Mach-E, presents with Mustang styling cues—perhaps most notably the trademark tri-bar taillamps. Full-LED headlamps adopt a technical appearance; it certainly is interesting to see the knock-on effects of that first domino knocked over by Audi to start the modern lighting era!

Lighting News

Ralf Klädtke on DVN's 2nd Lidar Conference

Ralf Klädtke is CTO of ZKW Group—his latest seat after former responsibilities on the Executive Board of Schaltbau Holding, CEO of Airbus DS Optronics, CEO of Carl Zeiss Optronics, Director of the German Space Agency's Space Transportation System, and he was a Captain in the German Air Force. So he brings a strong aerospace/defence background to the automotive sector. At ZKW he is responsible globally for innovation, predevelopment, engineering, and project management. Under his watch ZKW have initiated Project Dragonfly, led by the company's Head of Autonomous Driving Stefan.

DVN: Can you give us a short preview on what you will present at the Conference?
R.K: My lecture has the title "ZKW Project Dragonfly – 360° multiple sensor & digital lighting fusion". Since this past June, the first autonomous test drives have been completed on four approved routes in Austria. The aim of Project Dragonfly is to promote autonomous driving using an electronic all-round view. The new technology will make a decisive contribution to increasing road safety and could already be launched for serial production in three to four years.The headlamps and rear lamps are placed strategically to provide a 360° view of the vehicle using sensor systems. This is much like a dragonfly, whose gaze also covers 360°. The first stage of Project Dragonfly involves the integration of artificial intelligence cameras into the lighting at the 4 strategic corners of the vehicle (headlamps and rear lamps) in order to expand the field of view to 360°, allowing them to safely detect vehicles in front or oncoming traffic, as well as in cross traffic. By the end of 2019, the demo vehicle headlights will be expanded using lidar systems for optical distance and speed measurement as well as newly developed digital light modules. Gradually, additional sensors such as CMOS, infrared or multispectral cameras will be integrated into the lighting at 4 strategic corners of the vehicle. Thanks to artificial intelligence, these sensors can recognise other road users and traffic signs, calculate distances and speeds, as well as generate control commands for the vehicle. ZKW digital light with a resolution of 1.3 megapixels per light unit will support the sensors for autonomous driving. In the first experiments, ZKW demonstrated that objects such as pedestrians during the night or in bad weather can be detected by artificial intelligence at an even greater distance with a significantly higher detection rate, without blinding other road users.

DVN: What is your vision on automotive lidar?
R.K: Smart sensor fusion with artificial intelligence and cameras, digital lighting, radars as well as lidars will provide a very high confidence level to recognise other road users and will strongly contribute to road safety and achieving the goal of zero fatalities.

DVN: What are ZKW's ambitions with regard to automotive lidar?
R.K: ZKW have the goal to integrate automotive lidars into headlamps and rear lamps – realising smart sensor fusion with cameras, digital lighting, lidar, and radar for ADAS of our automaker customers. As 30-50 sensors will have to be integrated into autonomous vehicles in order to allow level 4-5 performance, ZKW can and will integrate the majority of the sensors into the 4 strategic corners of the vehicles – allowing 360° sensor coverage. Aerodynamically, functionally and as well designwise the integration into the headlamps and rear lamps has strong advantages that will be fostered by ZKW.

Digital Matrix Lights on Audi e-Tron

Audi's new e-Tron can be equipped with Digital Matrix Lights (DML), which Audi say give more capabilities and greater precision in dynamic beam shaping compared to their regular Matrix LED system.

DML is built around a staggering million micromirrors which can be shifted at up to 5 KHz to shape the headlight beam for an exact match with the scene in front of the car; a key improvement is that the shadow zones are much more closely trimmed, maximising the distribution of seeing light while dynamically maintaining tight control over glare.

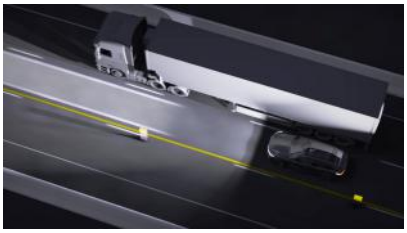
DML can also roll out a sort of white carpet of light conforming to the curves and angles of the vehicle's travel lane, with dual chevron lines indicating the width of the car.

Audi are saying they might position DML as an option costing €4,000 or so. Two movies have been posted.

2020 Audi E-Tron Sportback: A bit sleeker and a tad more range

Audi's e-tron Sportback has high-tech features that are illegal in the US

Hella's 30-Kilopixel Headlamps



Hella's newest headlighting system has over 30,000 pixels, each intelligently and individually controlled to provide new functions like optical lane markings. Automakers opting for the Hella "SSL | HD" system can implement—and end users can experience—enhanced individualisations such as welcome/farewell animations and a variety of communication functions.

As for additional safety functions, the optical lane assistant, for example, indicates the optimum lane to take when driving past road works; the driver gets supported in stable vehicle guidance.

Hella say the SSL | HD system's compact packaging requires less installation space but nevertheless provides greater efficiency while also giving vehicle manufacturers more freedom in their individual design of vehicles. A European automaker has already placed a production-quantity order for a premium brand; series production will commence in 2022.

Magna to Acquire Wipac Czech

Magna has agreed to acquire Wipac Czech s.r.o., a premium automotive lighting engineering firm located in Ostrava, Czech Wipac Czech s.r.o.'s engineering team designs and develops automotive forward lighting, primarily for European exotic and luxury brands.

With more than 40 engineers on staff, the company has significant technical competencies having served premium customers including Aston Martin, Bentley, Rolls Royce, McLaren, Lamborghini, Bugatti, Audi, Daimler, BMW and Porsche.

“We see Wipac Czech playing an important role in growing our global lighting business, particularly with forward lighting to European automakers,” said John O’Hara, President of Magna Mechatronics, Mirrors and Lighting. “Lighting represents a strategic growth area for us, due to increasing levels of electronic and sensor integration and the ongoing industry trend to differentiate vehicles through styling.”

With the 2018 acquisition of OLSA, a market leader in rear lighting technology, and now Wipac Czech s.r.o., Magna has added to its existing N.A. footprint and has a total of 11 lighting manufacturing facilities and three engineering centers globally. The company has the capability to design, engineer and manufacture advanced forward and rear lighting products in its key auto production regions around the world.

VW's Vehicle Software Ops to Go Independant

Volkswagen's new "Car.Software" organisation will operate as an independent business unit from this coming January. As a VW group company it will centralise workers and subsidiaries which develop operating systems and other software for cars and digital ecosystems. Car.Software will develop software for connected car and device platforms, intelligent body and cockpit, automated driving, vehicle motion and energy, and digital business and mobility services. The goal is one uniform software architecture for the group and consolidation of parallel development paths in the group's various brands.

By 2025 VW expect Car.Software to be a €7bn operation in which 10,000 people will be developing software for vehicles, digital systems, and customer-focused functions at dealers. Further development may see a software brand added to the VW group. Initially around 3,000 people will be grouped into the unit, based at Audi Electronics Venture with other German sites including Berlin, Bochum, Ingolstadt, Stuttgart, and Wolfsburg. International locations include Seattle, in the U.S. State of Washington, and in Beijing, China. Digital specialists at group brands and regions will also mix in their work. Expansion plans include recruiting skilled workers from the Volkswagen, Audi, and Porsche brands to transfer to the organisation.

Christian Senger, VW's head of digital car & services with group-wide responsibility for in-vehicle software, says "We will increase our competitiveness in the group by controlling a much larger share of the value creation in the digitalisation of our vehicles. We will also develop software on a cross-brand basis. This will allow us to achieve important synergies and economy of scale for all brands".

Odelo's New Bulgarian Operation Starts Production.

Odelo have started manufacturing headlamps for Mercedes vehicles near Plovdiv—the second-largest city in Bulgaria, after Sofia.. A year on from the construction of the 23,000-m^2 Plovdiv plant, Turkish-based Odelo are producing rear lights. Now they're working on projects transferred from the Group’s plants in Slovenia, and next year will start production directly for Mercedes-Benz and Renault. So far, the investment is over €20m with 150 employees. The whole project will be completed in 2023 when the investment will reach €40m, sales are projected at €60m, and the number of workers will triple.

Odelo President Ahmet Bayraktar (photo) says he thinks they'll be able to find enough people in Plovdiv to fully staff the ramped-up plant: "The workers here need more training, unlike Slovenia. They are more experienced there because Slovenia is more industrialised", Bayraktar said.

As soon as construction began near Plovdiv, it became clear that the company could significantly develop their initial plans after 2023 by building an electronics and park plant where its subcontractors will work.

Flex-N-Gate CEO Appreciates Trump's Tariffs

Flex-N-Gate CEO Shahid "Shad" Khan says he wants America's middle class to return, and he thinks U.S. President Trump's tariffs are a way to make that happen.

The Pakistan-born billionaire opened a $160m, 48,000-$m^2$ manufacturing plant in Detroit in October 2018—it was the largest investment in Detroit by an auto supplier in more than two decades. Over 600 employees make exterior trim components and other parts there, primarily for Ford.

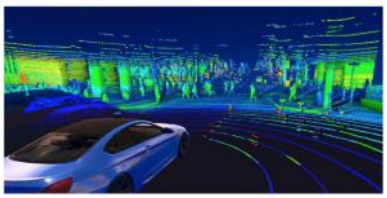
Khan said Ford Executive Chairman Bill Ford and Detroit Mayor Mike Duggan convinced him that opening in Detroit was critical and he agreed because he felt it important as the "middle class is the heart of the market."

During a wide-ranging speech and question-and-answer session at the Detroit Economic Club, Khan expressed his views about the downside of globalisation, and praised Trump's tariffs on materials and goods from China, Europe, and other countries. "He's really hit on the trade aspect," Khan said. "You can't have other countries really destroying our infrastructure. That's what has happened under this model of globalization. Any country you go to (…) they buy the local product first".

Khan immigrated to the U.S. in 1967 at 16 years old to study engineering at the University of Illinois. Flex-N-Gate hired Khan to work at the company during his college years; he bought the company in 1980, and Flex-N-Gate sales to automakers were more than $8bn in 2018. Khan believes investments like Flex-N-Gate's in Detroit will continue and the manufacturing sector will continue to gain momentum. Last month, he said "Times in the U.S. have never been better; we're entering [the] golden area for American manufacturing right now." Khan's positive outlook comes on a backdrop of slowing economic growth globally and in the United States, and recent data showing a U.S. manufacturing slowdown. This past September, U.S. manufacturers lost 2,000 jobs—compared to the 18,000 positions they added this time last year, according to the U.S. Government's Labor Department. Moreover, a trusted gauge of U.S. manufacturing showed its lowest reading in more than a decade for September, with exports declining due to President Trump's trade wars.

Driver Assistance News

Global Lidar Topography: 2019 Update



Many consider solid-state lidars a key technology to realise autonomous driving technology as they are much cheaper and lighter compared to mechanical lidars.
In 2019, many solid-state lidar providers have reported their technology developments and market expansion.

Quanergy, a solid-state lidar company, have been expanding their automotive activities. They've built a partnership with China's Chery Automobile, focusing on autonomous driving.

Cepton have debuted several new lidar products and systems in 2019 covering smart cities, autonomous driving, mapping, and more. Cepton's lidars are based on proprietary "Micro Motion" technology, which the company say enables accurate perception at low cost.

Sense Photonics announced a partnership with Infineon for creating a lidar without moving parts and with a wide field of view (FOV). Sense have raised USD $26m in their Series-A funding round. CEO Scott Burroughs says the company aim to extend their products' detection range to 200 metres by next year.

Velodyne, well known as mechanical lidar experts, in 2019 have introduced several new lidars and announced partnerships covering a wide range of applications including autonomous driving, ADAS technology, and more. Velodyne coöperated with Hyundai Mobis to launch a lidar-based ADAS, and Mobis plan to invest USD $50m million in Velodyne with the aim to commercialise advanced lidar system in 2021.

Ouster are a lidar startup known for producing low-cost mechanical lidars. The company expanded their business to Europe and Asia in 2019, opening new offices in Paris, Shanghai, and Hong Kong. They've supplied lidar sensors to Nvidia's DRIVE platform for applications including public transport. The coöperation aimed to push commercialisation of L3 to L5 autonomous driving systems.

Velodyne's "Most Advanced" Laser Radar Sensor

Velodyne Lidar say they have introduced the most advanced laser radar sensor on the market. It's called the Alpha Prime, and it uses Velodyne's patented surround technology.

The company say Alpha Prime, which is already avaialble in quantity, provides the highest specifications for the autonomous driving industry in a single sensor-with top performance in sensing, field of view, and distance measurement—as well as outstanding power efficiency.

Alpha Prime combines innovations to help vehicles move in unfamiliar dynamic environments. Features cited by Velodyne include:
• 360° surround perception and 40° vertical view.
• Excellent performance in all lighting conditions, including retroreflectors and direct sunlight.
• Excellent detection of distant dark objects or low reflectivity objects such as tires, dark vehicles, low reflectivity roads and low visibility pedestrians.
• Advanced negative barrier perceptions, such as perception of potholes and cracks on the road
• The highest resolution and powerful reflectivity return more than 4.8 million points per second, simplifying the detection and tracking of vehicles, pedestrians and other obstacles.
• High resolution and laser calibration make it easy to find the location of an outdoor or indoor vehicle without the need for GPS, providing precise positioning.
• Improve efficiency and extend vehicle travel time over a wide range of temperatures and environments without active cooling.

Velodyne President Anand Gopalan calls Alpha Prime "an important step forward in advancing the autonomous vehicle and robotics industry".

AI Now Detects Phone Usage, Smoking While Driving

Eyesight Technologies this week announce a new AI feature that can recognize when a driver is smoking or using a mobile phone.

Preoccupied motorists, specifically those absorbed in their phones, are responsible for 1.6 million accidents annually in the U.S. alone, according to the Israeli AI leader.
“There’s no greater distraction and danger on today’s road than mobile phones,” Eyesight Technologies CEO David Tolub said in a statement. “The average driver doesn’t realize that looking down at your phone to check a text is six times more likely to result in an accident than driving under the influence of alcohol*.”

The same dangers hold true for cigarette smokers, who are up to three times more likely to cause a crash if puffing while driving, the National Highway Traffic Safety Administration (NHTSA) found.

Eyesight Tech's existing DriverSense monitoring system already analyzes the vehicle operator's facial features, head pose, gaze vector, blink rate, eye openness, for signs of drowsiness and distraction.
This new update, however, increases the program's scope, enabling car manufacturers to intelligently alert the driver based on type of distraction.
"Our first priority is the safety of all people on the road, and eliminating the distraction created by our cell phones is a huge step toward a much safer road," Tolub said.

The feature may also have future applications in the shared-car economy, eliminating the habit of smoking in rental cars or autonomous taxis, where there are no drivers present to enforce policies.

Hella Gutmann's Modular Cam-Sensor Calibrator

Hella Gutmann say their CSC-Tool (for "camera and sensor calibration" tool) ably fulfills requirements for calibrating ADAS—with precision even better than manufacturers' specifications. The calibration function in the software of CSC-Tool is continuously adapted to new vehicles.

In 2019, the number of manufacturer-specific reference panels for front camera calibration increased to 20, so the tool now covers 25 common brands. Additional reference panels for all-round vision systems take account of increasingly diverse systems.

Another interesting new feature: For the first time, an image panel covering the entire width of the vehicle makes it possible to calibrate the new lidar on Audi models. These innovative optical sensors are equipped with a significantly larger measuring range and greater accuracy than radar sensors and could soon replace the latter in many vehicles.

However, not only the sensors themselves have evolved, their location in the vehicle has also changed. The radar sensors of SUVs and pickups for example are placed higher than in other passenger vehicles. The CSC-Tool can be easily adapted to these new conditions by means of a hardware upgrade.

The transition to the second evolutionary stage of the CSC-Tool takes place via the new system mount 'Radar Kit I EVO'. The system mount forms the technical basis for the stepless vertical movement of the new angular adjustment plate 'EVO'. This radar reflector is required for calibrating front radar systems across the market.

In addition to the exact positioning of the reference panel or radar reflector, a level surface for the vehicle is another requirement for correct ADAS calibrations. Otherwise – as with headlight adjustment – detection range deviations will occur and tolerance ranges are only just complied with or not at all. This source of error can be ruled out by using the leveling plates from Hella Gutmann which are mounted on the workshop floor.

Danger Lurks in Post-Crash ADAS Repairs

Advanced automotive safety systems have to be precisely recalibrated after vehicle collisions, or they won't work.

Janet Bigelow is an experienced auto technician at Advanced ADAS Calibration Centers, the first repair facility in the U.S. state of New Jersey specialising in repair and calibration of ADAS on all brands of vehicle. She says post-crash repair work such as welding or painting can damage or dislodge sensitive cameras and radar sensors or throw them out of calibration—and that some drivers, insurers and body shop owners are unaware of the importance of working safely around such components, and checking they're calibrated correctly .

On a daily basis, the technicians at Bigelow's shop see vehicles in which cameras, radars, and other sensors have been thrown off balance by collisions—including minor parking taps. Bigelow says ADAS are improving traffic safety, but "it's important to understand they are incredibly sensitive and must be carefully scrutinised post-collision."

General News

Cree, STM Extend Wafer Supply Agreement

Last January, Cree and STMicroelectronics revealed their long-term pact under which Cree provide their Wolfspeed silicon carbide wafers—USD $250m worth— to STMicroelectronics. The two companies now report expansion and extension of the agreement to more than $500m. The increased wafer supply will enable STM to address the rapidly growing demand for silicon carbide power devices globally, particularly in automotive and industrial applications.

The adoption of silicon carbide-based power solutions is rapidly growing across the automotive market as the industry seeks to accelerate its move from internal combustion engines to electric vehicles, enabling greater system efficiencies that result in electric cars with longer range and faster charging, while reducing cost, lowering weight and conserving space. In the industrial market, silicon carbide modules enable smaller, lighter and more cost-effective inverters, converting energy more efficiently to unlock new clean energy applications.

European Sales Up Yet Again

European new-car sales rose 8.6% in October, driven by robust demand in Germany and France and a rebound in demand for Volkswagen Group brands that were hit by the introduction of new emissions rules last year.
Registrations increased to 1.21 million in the EU and EFTA countries, data from industry association ACEA showed on Tuesday.

- Volkswagen Group registrations jumped 31%, with great rises at Porsche, 65% at Audi, 29% at VW brand, 28% at Seat, 7% at Škoda.
- PSA Group sales fell 5%
- Renault Group sales rose 13%
- Fiat Chrysler Automobiles gained 2.5%
- Ford Motor registrations were flat.
- BMW brand was up 6%
- Mercedes-Benz's volume gained 2%
- Hyundai registrations rose 13%
- Toyota brand gained 9%
- Nissan rose 1%

Europe's October registrations were at their highest level for the month since 2009 but the rise masked a dismal outlook.
The latest monthly figure takes registrations down 0.7% to 13.3 million vehicles since the start of the year, putting 2019 on a path for a full-year decline.

Ansys Bring Physical Sims to Digital Twins

Digital simulation software experts Ansys are working with Microsoft to add Ansys' Twin Builder software to the Microsoft Azure Digital Twins solution, and enable their joint customers to optimise their product operations. Users will be able to predict the performance of objects with great accuracy in order to reduce downtime, optimise maintenance costs and speed up the release of advanced products.

Microsoft Azure Digital Twins is a tool for creating complete models of physical environments, compatible with IoT and Edge devices. Digital Twins users will now be able to use Twin Builder to optimise product production and maintenance.

Industrial companies invest enormous money in the surveillance and maintenance of connected objects—machines, vehicles, etc—to optimise their performance and longevity. A virtual prototype of a physical object in operation, the digital twin is a key tool to help businesses meet these goals. Indeed, the data provided by the digital twin can predict maintenance operations, imagine new business models and accelerate the development of products.

"Industrial companies need comprehensive, actionable field data to optimize the performance of existing products. That's why all ecosystem players need to work together to implement solutions that meet the needs of the market, "said Eric Bantegnie, Vice President and General Manager of Ansys' System Business Unit. "Ansys Twin Builder extends the capabilities of Microsoft Azure Iot Services and allows customers to better analyze the performance of their products with simulation data".