



Editorial

COVID-19 Is Behind Us?

In Europe and America, plants are opening with limited shifts and other safety precautions in place. Taking note of the experience in China and South Korea where commerce and industry already have resumed, automakers will gradually increase volumes as the supply chain ramps up. Meanwhile, R&D teams kept on working and I hope you have done a great job at home.

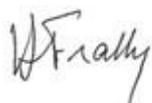
Now is an apt time to step back and talk about what business will look like when operations resume. Surely some companies won't emerge intact from this crisis, and in those that do, harsh priorities in investments and projects will come. Lighting technologies might not be near the top of the list. So I wish you, firstly, good health for you and your family; and secondly the best of success in convincing your company to continue your wonderful lighting research projects.

For our part, we at DVN are continuing to work hard. Last week we released a new report on the vehicle lighting industry in North America, which shows the innovation opportunities and the constraints of that region's lighting environment with regulatory circumstances that keep the latest technology out of reach of American motorists.

To thank the DVN team working at home since the start of the pandemic, I present [a video](#) showing how and where we are spending our time these days.

And don't miss the news on Marelli-AL's Pace Award with an interview of CEO Sylvain Dubois.

Sincerely yours



DVN President

In Depth Lighting Technology

DVN Team At Work

DVN is the automotive lighting and driver assistance industry's journal of record, dedicated to keeping the community informed and communicating about the latest progress and developments. Week after week, in Newsletters and Reports, the DVN team work hard to send you all the latest information concerning vehicle lighting and interiors. [Have you met our team?](#) You should! Here we are:

Hector Fratty, France



Hector Fratty's entire career has been in vehicle lighting. Formerly Valeo Lighting's director of R&D; now President of VISION congress and member of ISAL Symposium Founder & CEO of Driving Vision News since 2008.

Salomon Berner, France



Graduated from Polytechnic School and aeronautical engineer
CEO of small- and medium-sized industrial and service companies
Financial and Sales Director at Driving Vision News.

Daniel Stern, Canada



Member of the SAE Lighting Systems Group.
Member of the US transportation Research Board Visibility Committee. One of the five
greatest lighting experts in North America
DVN Chief Editor and Report author

Jean-Paul Ravier, France



Graduated aerospace engineering science at ISAE-Supaero
Advanced Technology director at Valeo Lighting
Former director of ELS chair, for advanced training and research in lighting,
Author of several DVN Reports

Carsten Befelein, Germany



Passionate expert for interior and exterior lighting
Engineer at the lighting and electronic departments of BMW.
Founder of engineering office CB-Lichtdesign to develop creative lighting solutions.
Engineer at Toyota Boshoku Europe in the Advanced Development Department, then at
Techniplas - Weidplas, producer of highly engineered plastic components.
Author of several reports on interior lighting

Jean-Paul Charret, France



Graduating Electronics from Grenoble University,
Manager Vascular imaging department at GE Medical systems,
R&D director at Valeo Sylvania in US
R&D director of Valeo Lighting Systems
Author of several DVN Reports

Ralf Schäfer, Germany



Ph.D in physics from the University of Münster
Head of Xenon Development at Philips Automotive Lighting
Global Headlighting Development director of Philips Automotive Lighting
Vice President for OEM marketing of Philips Automotive Lighting.
Author of reports on lighting and electronics

Leo Metzemaekers, Nederlands



Graduated of Delft Technical University in the Netherlands
29 years at Royal Philips.
19 years in the automotive Lighting and Optical Storage
10 years in the Consumer Electronics business.
International assignments in Development, Marketing & Sales and Strategy

Rainer Neumann, Germany



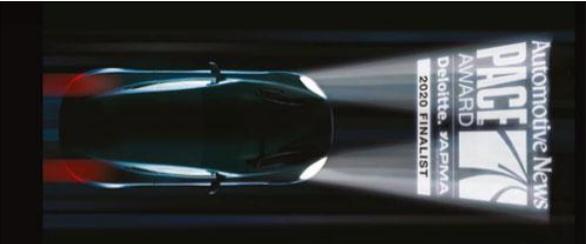
Dr. in Physics, studied in Frankfurt/Main
Engineer at Bosch then Magneti Marelli.
Director of Business Development of Varroc L.S. as VP Global Technology
Chairman of GTB Front Lighting Working Group
Member of Scientific Committee in VISION, ISAL, ISOL, and IFAL.
Awarded the Personality of the year in Automotive Lighting by DVN in 2014
Inventor of more than 100 patents

Other colleagues

Carine Abouaf, France
Eiichi Ono, Japan Takashi Sato, Japan
B. Y. Chung, Korea
Noam Ouaknine, France
Robert Miller, US
Catherine Erder, Israel
Kim and Huixin, China

Lighting News

Marelli Win Award For Lighting Module



Marelli Automotive Lighting have won a Pace award for their innovation h-Digi lighting module. It's the first of its kind, incorporating a chip containing 1.3 million micro-mirrors that provide glare-free high beam and image projection on the road.



h-Digi[®] improves safety and comfort, can leverage vehicle-to-everything (V2X) communication technology. Future-state image projections could include speed limit warnings, weather and road condition advisories, vehicle-width guidelines, construction alerts and more

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Four questions to Sylvain Dubois, EVP Marelli and AL CEO



DVN: Congratulations! After the Mercedes Maybach, have you had more orders for this technology?

Sylvain Dubois: We were first to market using this technology with Mercedes-Benz. And we are also producing for Audi on the E-Tron. We have also received other orders which are currently under development.

DVN: How do you see road communication to help tomorrow's drivers? Construction guidance lines, warnings, and that kind of thing.

S.D.: Every time we talk about lighting, we talk about a system that is a key contributor to driver safety. This new lighting technology, which allows the driver to receive information projected on the road, in his field of view, is clearly a step forward. I am convinced that this and other high resolution technologies will develop broadly in the coming years.

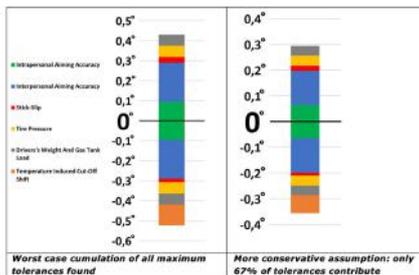
DVN: How do you assess the DMD technology with the thousands μ LEDs?

S.D.: DMD technology is the high end of light digitalization with 1.3 megapixel. It cannot be afforded by the mainstream OEMs. However, we are currently developing a more affordable solution in the range of 30 kilopixels for generalists, so called μ LEDs. We are convinced that our new development will allow the democratisation of this safety feature.

DVN: The vehicle lighting field was going in a wonderful direction toward a bright future before the crisis. How do you see the effect of the crisis on lighting innovations?

S.D.: Before the crisis, megatrends such as electrification, autonomous driving, and car connectivity were pushing carmakers to invest a lot in innovation, sometimes making choices not to spend in other areas like lighting. The COVID crisis, whose magnitude is still difficult to evaluate, is already having some impact on innovation where in some cases, OEMs have decided to delay or stop some programs. So for sure innovation will be affected and a slowdown is expected, not specifically for lighting, but in general.

Real Life Tolerances Degrade Headlight Aim

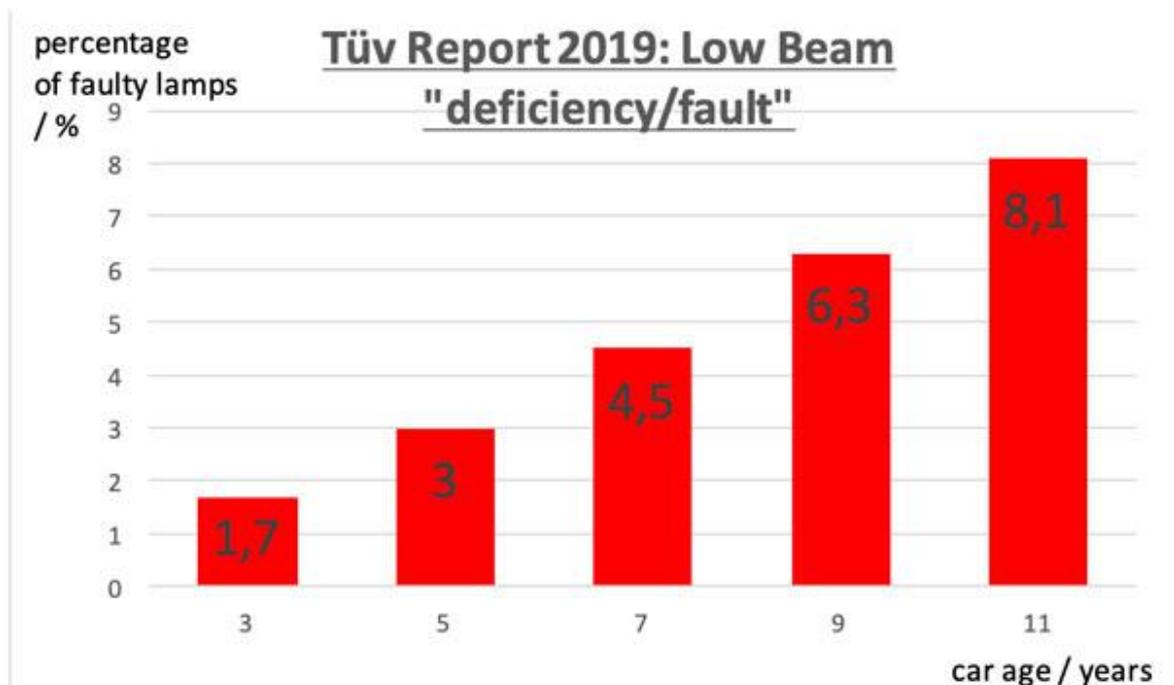


Investigation by Michael Hamm and Christian Hinterwaelder

Good lighting requires a good headlamp, well aimed. This investigation looks at the effect on headlight aim of individual tolerance contributors from car body parameters like load, tire pressure, suspension as well as

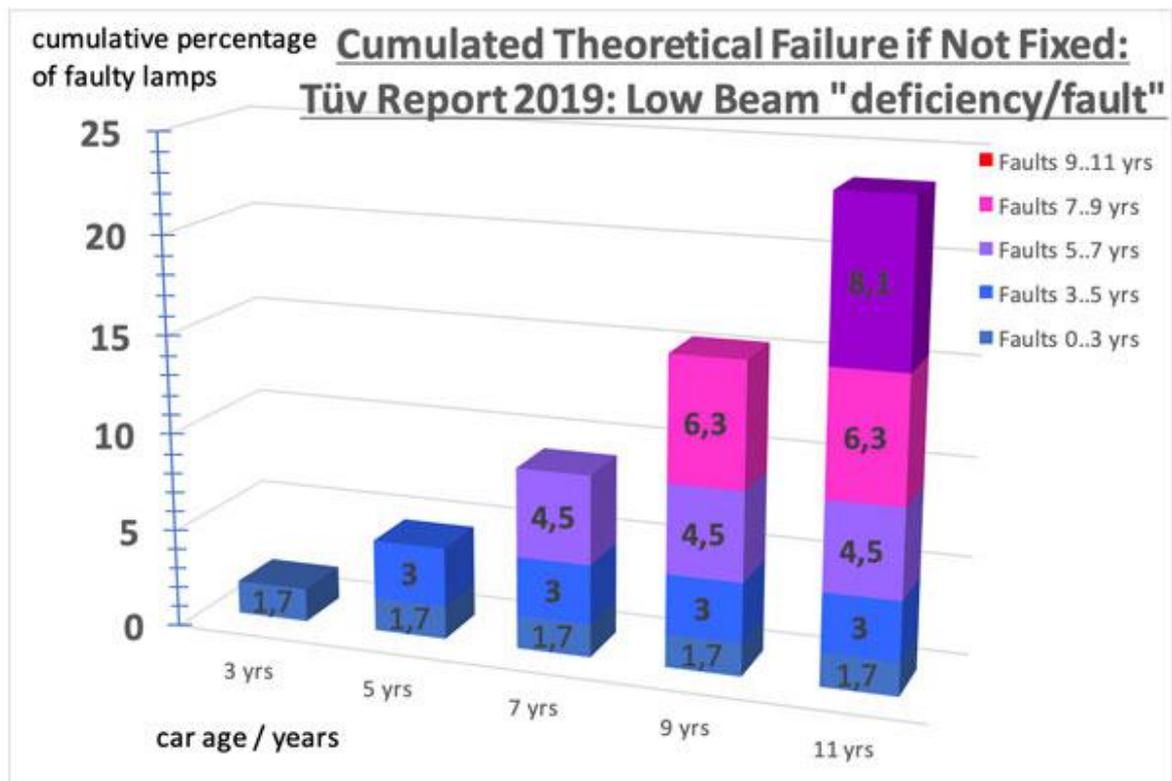
temperature parameters of chassis and plastic parts.

First, the main result from Germany's TÜV. This is the official data of defects that are registered during the bi-annual roadworthiness inspection cars must pass; any defects found must be fixed before the vehicle's registration can be renewed.



Defect Low beam (TUV 2019) after each operation period

After each inspection, each car starts at zero defects. The paper makes a theoretical approach: What happens if there is no zero?



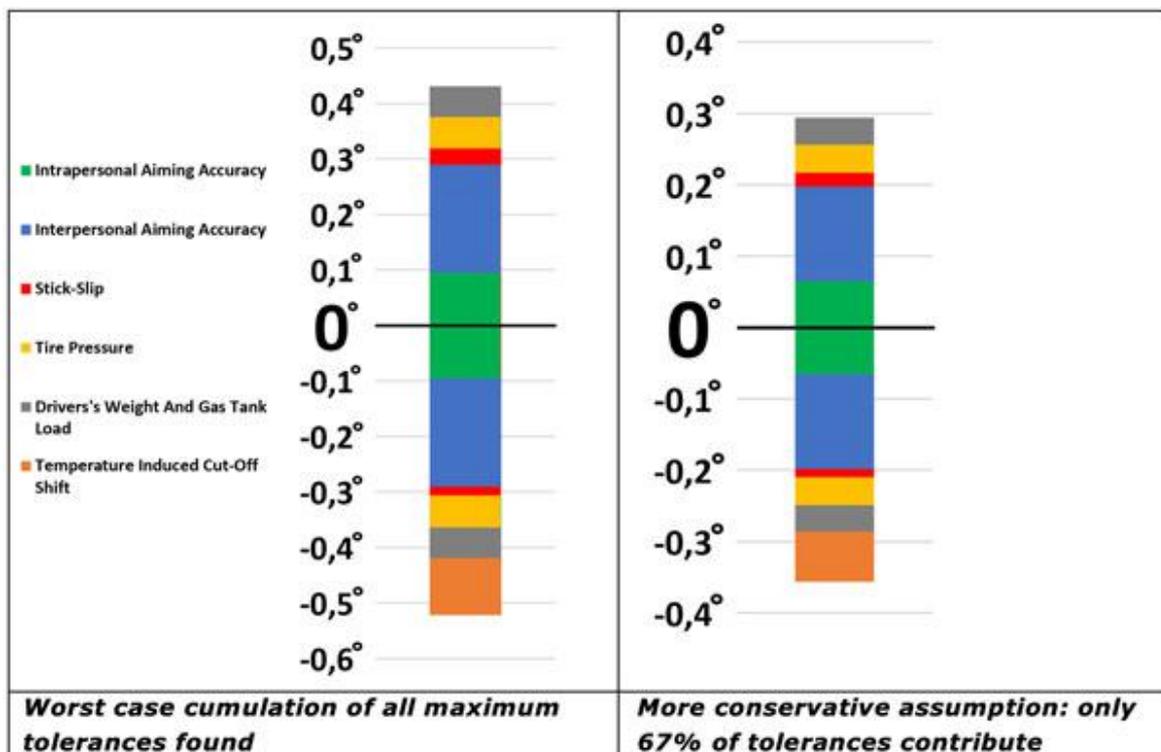
Cumulated share of faulty low beam (TUV 2019)

Low beam faults in cars from 3 to 12 years old are at 23.6%. This is reported as a theoretical maximum.

Repair might also be initiated by the car owner. It might also happen that the faulty low beam is generated by a dead bulb that could easily be replaced, etc.

So in countries without regular inspection, the realistic defect numbers are between the TÜV numbers and the cumulated theoretical maximum.

In a second part, the investigation analyses the tolerances in cutoff position during operation, from many different contributors including inter- and intrapersonal aiming accuracy, stick-slip effect, tire pressure variation, temperature load, driver weight, and fuel tank filling.



The investigation shows in the chart above that the headlight aim in a used car can fluctuate in a conservative cumulative scenario about $\pm 0.3^\circ$. There are tolerances everywhere. There are many contributors to headlamp aim outside the optical and mechanical development targets.

The presented results show the variations in reality, but they are not fully explaining the TÜV Report results shown in the beginning of that paper. It seems very difficult to predict the real aiming variation by tolerances. The TÜV report reveals that aim variation is normal and needs to be controlled.

Additional effects like small accidents, ageing, lifetime related relaxation of the suspension systems and changes in car chassis or body in white relaxation have to be considered in future in order to come closer to a comprehensive picture and changes in car chassis or body in white relaxation have to be considered.

3 questions to Michael Hamm and Christian Hinterwaelder



Dr. Michael Hamm joined Audi in May 2012 as manager of headlamp development.

During his professional work he has contributed to 70 patent families and published more than 35 technical papers, interviews and publications.



Co-author Christian Hinterwaelder joined Audi in 2019 and works in headlamp development. His tasks also cover accident research and headlamp rating.

DVN: Do you have proposals to reduce the consequences of these tolerance contributors?

Christian Hinterwaelder: Biggest contributor is the human eye. Nobody should believe he is able to exactly identify a cutoff.

And some tolerances just apply from plus to minus during operation. Take the gas tank filling: Full tank means higher aiming than empty tank. So the surrounding conditions must be kept in full control and we need better aiming machinery. Especially we need an optical precision better than our human eye accuracy.

DVN : What technology of automatic aiming could solve the tolerance problem?

Michael Hamm: In this case a possible correct answer would be rocket science. No joke — in missiles there are precise 3D positioning devices; we should think on something similar adopted in automotive. A kind of triple gyroscopic determination of the headlamp coordinate system, the car coordinate system, and the street coordinate system. Then we would have perfect aim everytime and everywhere.

DVN: OK, but that would surely take a long time to perfect In the meantime?

M.H.: We must continue in small steps. Improve awareness, improve aiming. We should try to increase automatic levelling to reduce glare and increase ADB systems penetration because they are less influenced by vertical aiming deviations. Wherever possible, decrease tolerances and improve sensor ability. A very big milestone would be any kind of closed loop between the aiming and the resulting light distribution on the street. This is an important task, also for future digital projections on the road.

Drive Light & Sight, Edition 2020



ZKW are working with startups toward a goal of improved safety, increased comfort, and more flexibility for their customers. Selected startups will participate in a kickoff event planned for this September with industry professionals from the ZKW Group. Participants will pitch their ideas and talk with ZKW's experts. The event will take place near Vienna, Austria.

The Partnership *Program Drive Light & Sight Edition 2020* centres around two main focus

areas:

• **Accurate Sensor Data**

ZKW are looking for solutions to increase the confidence level of sensor data at all times, including sensor cleaning, component coating, designs that avoid particle collection; all-weather suitability of sensors; calibration & validation, lidar sensors, and hybrid solutions.

• **Supplemental Lamps**

ZKW are seeking new lighting systems that can be integrated into existing infrastructure such as CHMSLs, turn indicators, DRLs, and taillights, as well as solutions that enrich existing lamps with additional features and whole new lighting systems around the car.

Up to four innovative teams will establish direct contact with ZKW's team of experts and, in addition, share a total of €30,000 in equity-free prize money.

PACE Awards For 13 Suppliers



Innovations in lightweighting, advanced communications and better visibility dominated the 2020 Automotive News PACE Awards, which honoured 13 supplier winners in a ceremony delivered virtually last week.

The 2020 winners and their innovations, concerning Lighting and ADAS are:

Magna Exteriors: composite space frame

This new approach to high-volume production of lighter-weight tailgates and liftgates uses a composite space frame reinforcement. The structure meets

automaker performance standards while delivering a 10% mass reduction versus steel reinforcements. The innovation also gives auto designers greater flexibility for new styling features with more complicated and bolder shapes. First customer: Toyota, for their Supra.

Marelli: H-Digi lighting module

A 1.3-megapixel digital light headlamp with improved illumination and finer resolution, using digital micromirror devices. The mirror matrix is illuminated by innovative high-current LEDs projected onto the street by means of a multilevel lens system. The first application is the Mercedes S-Class Maybach

Mobileye: Road experience management system

By equipping customers' vehicles with Mobileye's EyeQ4 chips and software capable of collecting and uploading up-to-date road data to the cloud, Mobileye are harvesting, aggregating, and localising data to create high-definition digital maps that work anywhere. The sensing systems record information on lane conditions, drivable paths through complex intersections, and static scenes such as road signs, traffic lights and on-road markings to 10-cm accuracy.

The first customer is Volkswagen.

Valeo: XtraVue trailer

This magic see-thru system gives drivers improved rear visibility when pulling a trailer. Valeo's system creates an unobstructed view from the cockpit, as though the trailer isn't there. XtraVue works by combining the real-time video feeds of two cameras, one on the back of the towing vehicle and the other on the back of the trailer. The two images are aligned and light-matched into a single enhanced rear view. The first customer is GMC on their Sierra Heavy Duty pickup truck.

Hyundai Design Chief Steps Aside

Luc Donckerwolke, the Belgian designer who overhauled styling at Hyundai, Kia and Genesis, citing personal reasons, is leaving Hyundai Motor.

Donckerwolke joined the Korean maker from Volkswagen in 2015 to lead design at the Hyundai and Genesis brands. He expanded that portfolio in 2018 to become chief design officer of the entire Hyundai Motor Group, taking over the Kia marque as well.

"It's been an honour and privilege to contribute to the shaping of the future of Hyundai, Kia and Genesis," Donckerwolke said. "Their audacious and progressive attitude has



allowed me to push the boundaries and challenge the status quo."

Hyundai will not name a successor as chief design officer for the entire group. Instead, SangYup Lee will continue in his role as head of design for the Hyundai and Genesis brands, while Karim Habib will remain at the helm of Kia after being poached from Infiniti last year.

Peter Schreyer, the German designer who was hired away from the Volkswagen Group

and catapulted Hyundai design into global prominence, remains at the automaker. He is president of design management, though he has stepped back from daily involvement of studios.

At Genesis, Donckerwolke played a pivotal role in giving the premium Genesis brand an independent identity and helped it achieve a clean break from holdover Hyundai styling.

Driver Assistance News

PACE Award for Marelli 3D Display



Automotive News has given Marelli a 2020 PACEpilot award for the supplier's Glasses-Free 3D Display technology.

With modern vehicle technology becoming more and more complex, driven by the evolution of the cockpit, it is imperative that displays and control systems become simpler and more intuitive. 3D displays can ensure critical alerts catch the attention of the driver without requiring them to look away from the road.

A key enabler in Marelli's winning innovation is auto-stereoscopic 3D screen technology

(AS3D). Marelli developed AS3D in partnership with Alioscopy, a French company known for pioneering glasses-free 3D displays for the digital signage, communications and professional imaging markets. AS3D enables a 3D effect without the use of glasses, allowing the viewer to perceive depth through the naked eye.

Marelli's innovation incorporates an array of magnifying lenses laminated on top of a standard display. The result is extremely thin, occupies minimal space and is up to 50% less expensive than competitive solutions that use multiple displays to achieve a 3D effect.

With 3D technology, parking cameras can present increasingly accurate views to the driver. During navigation, 3D depth perception will take the guesswork out of when and where to turn, by virtually immersing the driver in the surrounding environment.

The benefits of 3D extend beyond the driver. As automated driver assistance system (ADAS) and autonomous driving development progresses, and the trend towards large immersive display integration continues, 3D technology can be used to entertain and inform passengers during transit.

No L3 Autonomy in Audi A8

Audi have abandoned plans to introduce Level 3, eyes-off-the-road autonomous driving technology in their A8 sedan.

The feature, called Traffic Jam Pilot, was to have been activated only in markets where regulations allowed it. Since then, global regulators in Geneva have still not agreed on a



type approval process for even the most rudimentary L³ functionality. At that level a vehicle can be put into autopilot mode under certain circumstances, allowing the driver to take their eyes off the road.

Given the regulatory delays, Audi won't have sufficient time to make the system compliant before the next A8's release date. Audi technical development chief Hans-Joachim

Rothenpieler cited problems getting regulatory approval for the Traffic Jam Pilot, which when operating would automatically transfer liability in the event of an accident from the driver to the manufacturer.

"Currently, there is no legal framework for Level 3 automated driving and it is not possible to homologate such functions anywhere in the world in a series production car," Rothenpieler said.

General News

Higher Profit Prediction For Mercedes



Daimler say they expect the full-year operating profit of their Mercedes-Benz cars and vans division to be above the prior-year level, but warned that the coronavirus pandemic will push the group to an operating loss in the second quarter.

The maker expect group revenue and earnings before interest and taxes (EBIT) to be below 2019 levels but given substantial one-off charges in the year-earlier period, the

cars and vans division is now seen delivering EBIT above last year's.

After closing factories in March to preserve cash and manage costs, Daimler have now "started with a gradual ramp-up" of production, CEO Ola Kaellenius says.

CFO Harald Wilhelm said on April 8 the crisis could help accelerate overhaul efforts to save €1.4bn in labor costs by 2022. The plans include slashing costs to revive margins that were already squeezed before the virus crisis escalated.

Daimler mapped out plans last year to eliminate more than 10,000 jobs worldwide in an effort to cut costs and invest in electrification.

VW's Diess Envis Tesla's Software



Volkswagen Group CEO Herbert Diess is pushing executives at the automaker to come up with solutions to match Tesla's software expertise.

Diess says Tesla's competitive edge in electric cars and software is a threat to VW. In a recent webcast to VW executives, he voiced his concerns. "What worries me the most are Tesla's capabilities in assistance systems," Diess said.

Tesla are the only automaker with a software system that is constantly learning, he said. "500,000 Teslas function as a neural network that continuously collects data and offers the customer a new driving experience every

14 days, with improved features," Diess said. "No other car manufacturer can do that today."

VW have struggled with software problems in its ID3 compact EV, a Tesla Model 3 challenger, according to German press reports.

Diess said that the integration of powerful new software into new models is a much higher hurdle for VW than electrifying its fleet.

Diess praised software updates with which Tesla "increases the range of its cars from 300 miles to 318 miles."

Bosch Forecast: Minus-20 in '20



Bosch expect automotive production to fall by 20% this year, as the coronavirus pandemic slams the brakes on factory production lines and saps demand.

"We are bracing ourselves for a global recession that will also have a considerable impact on our own performance in 2020," Bosch CFO Stefan Asenkerschbaumer said in a statement.

"Given the many imponderables, we feel unable to make a reasonable forecast for the Bosch Group for the year as a whole. It will take a supreme effort to achieve at least a balanced result."

To cut costs, Bosch have postponed investments, reduced working hours for half of their staff in Germany, and imposed salary reductions; managers and executives are taking a 20 percent pay cut in April and May.

"Even if production has been ramped up again in China, and European industry is preparing for a ramp-up of its own, we have to steel ourselves for a severe global recession over 2020 as a whole," the company said.