Tue, 18 April 2023
Weekly Newsletter

DVN
Lighting & ADAS

NEWSLETTER #799

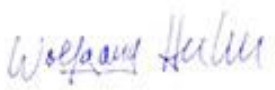
Editorial

Small Company, Big Plans

In our ongoing series about small enterprises, we have most recently visited a small-but-growing international company founded 2014. They're TQ Technology, a spinoff of the Taiwanese Chimei group, and they make materials, semiconductors, and optics. Today TQ comprises just 35 people, but they've got big plans. At TQ we discovered an innovative spirit and great expertise in optical solutions—a sturdy foundation for their next steps onward and upward. Today we bring you our exclusive DVN interview with them. It's always exciting and enlightening to learn about a capable, pioneering company whose name doesn't spring instantly to mind, and we're pleased to be able to share that with you.

DVN found a small company on the move, with an innovative spirit and a great Know How in optical solutions, shortly before their next big step.

Also this week we bring you news about the latest evolutions and experiments in messaging grilleboards; we'll tell you about an alarming new thing vehicle lighting makers will have to think about; have a glance at Hella's Q1 performance, and lay eyes on some catchy new lightstyles on the latest cars.



Wolfgang Huhn
DVN Senior Advisor

In Depth Lighting Technology

DVN Overview + Interview: TQ Technology

Gerald Uhlenberg · Wolfgang Huhn · Jürgen Müller at historic Görzwerk entrance

TQ Technology are up and at it; they've bought 7,500 m^2 of land for an R&D and production facility to be opened by the end of this year.
It's in Tainan's Shalun Green Energy Science City, home of the official Taiwan Autonomous Vehicle Laboratory. It's a perfect environment and network for green automotive R&D with a high potential to become a market leader in automotive projection and laser technology.

There are three owners of TQT, one of whom is Managing Director Gerald Uhlenberg, a former manager and projection and laser scientist from Osram Specialty Lighting in Berlin. Besides Tainan, TQ have a sales office in San Francisco and an optical concepts and project management office in Berlin. We met with Gerald and the company's Managing Director for Germany Jürgen Müller, who has an Osram history as well.

The German office is located in the old Görzwerk factory, in the south of Berlin. Optician Carl Paul Görz was famous for his social-mindedness; he was the first industrialist offering his employees paid holidays (in 1897!). The factory was built near the end of the 19^{th} century for the manufacture of photo cameras, optical lenses, and cinema projectors. More than a hundred years later, it now houses dozens of startup companies. TQ Technology use the location to apply their skill; talent, and long-term expertise is the development of digital projection systems.

Current projects at TQ in Berlin include first concepts for light engines; modules; projection systems, and laser-based products for automotive and non-automotive applications. Product development takes place in Tainan; for now, production is partly outsourced until the new plant is ready.

We had a grand interview with TQ's Managing Director, Dr. Gerald Uhlenberg, and Managing Director for Germany, Dr. Jürgen Müller. They're both physicists, and both worked for over 15 years at Osram Specialty Lighting in Berlin, developing DLP and laser optical solutions for the automotive and non-automotive market. As a result, they have a good network branching both into the industry and into the scientific world.

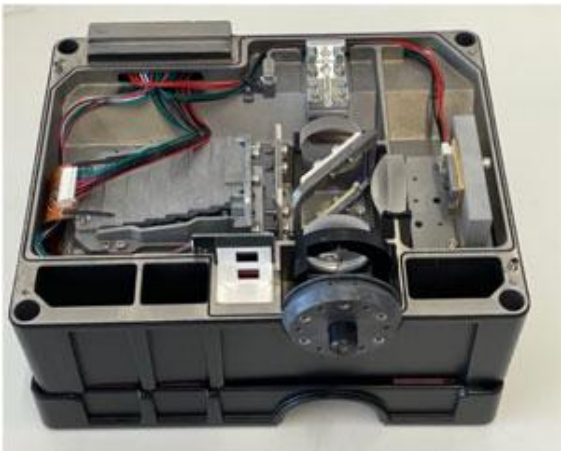
DVN: Tell us about TQ Technology, will you please?

GU: TQ Technology was founded 2014 as a spinoff of the several-billion-dollar revenue Chimei group.
Chimei have a wide portfolio; best known are the material products like plastics, sustainable materials, synthetic rubber, and specialty chemicals. Chimei also have a semiconductor branch, as well as optical products and other industrial goods. Out of this multi-industry group TQ Technology was founded. We have three owners: Alex Wang; Scott Soong, and me, Gerald.

Cybersecurity and Smart Technology Building in Tainan

TQ is located on the third floor of the Cybersecurity and Smart Technology Building in Tainan —a fantastic high-tech environment on the campus of the ITRI (Industrial Technology Research Institute) of Taiwan. TQ have bought land close by and started building a production site which will be opened end of 2023.

DVN: What are some of TQ's achievements so far?



Phaser

GU and JM: From the product side, one highlight is the world's first white light source powered by a blue laser for medical technology applications, called the Phaser. It's a 450-nm laser based phosphor-converted white light source realised in R&D cooperation with Osram.

This product pioneered the technology for the later automotive laser-based high-beam front lighting.

RGB laser stage light

Another world first non-automotive product is an RGB laser-based moving-head stage light with 50-watt optical power—that is really powerful! We devised it in 2020 for Claypaky, which was at the time Osram's entertainment lighting operation. We also have an automotive world-first product in preparation, but it is not on the market yet.

DVN: What's on TQ's horizon?

GU and JM: TQ is preparing DLP projectors for automotive interior and exterior applications for leading makers. Also, laser engines for HUDs; holography, and design are becoming an important point.

DVN: What hinders the fast introduction of projectors into the market?

GU and JM: This is a good point. The integration of projectors into the car's electronic architecture is much more difficult than we expected. Especially the ECUs at the location of the projectors (doors/side mirrors) are a bottleneck. Some have limited current; no CAN or LIN bus; of course, no video interface; drivers which are just able to source the actual LEDs in the doors with no reserves…no provisions. This is the reality we have to deal with. The integration of projectors with high functionality into the car is a real pioneering work. Standards are missing, too.

SHORT-DISTANCE DYNAMIC LIGHT CARPET PROJECTOR FOR CAR ROOF MOUNT: 30-50 LM, VERY COMPACT.

TQ PROJECTORS: ULTRA-SHORT-THROW PROJECTION LENS · HEADLINER PROJECTOR · INTERIOR DASHBOARD PROJECTOR

Lighting News

TU Darmstadt: New Speaker on Automotive Optical Technologies

LIGHTING NEWS

Dr.-Ing. Michael Hamm, graduate of TU Darmstadt, former head of headlight development at AUDI, DVN Senior advisor

This summer semester, the conference “Optical technologies in the automotive sector” at the TU Darmstadt will be moderated by a leading expert in this field.
Dr.-Ing. Hamm, graduate of TU Darmstadt, former head of headlight development at AUDI, and now DVN Senior advisor, will introduce students to the secrets of optical technologies in the automotive sector.

Thanks to his extensive experience in research and industry, Dr.-Ing. Hamm brings an in-depth understanding of the latest trends and developments in this field. The conference focus on the theoretical foundations, and will also deal with many practical topics. Innovative technologies such as LED lighting, laser light and adaptive headlights will be examined more closely.

In order to put what has been learned directly into practice, the lecture is complemented by extensive practical laboratory work with application-oriented experiments. Attending this conference will give students valuable insight into the world of automotive optical technologies and help them deepen their knowledge in this field. We look forward to Dr. Ing. Hamm shares his knowledge and experience with the students and makes the conference an unforgettable experience.

Termin	Thema
17.04.2023	Einführung & Regelungen in der KFZ-Lichttechnik
24.04.2023	Lichtquellen
08.05.2023	Optische Technologien
15.05.2023	Methoden der Psychophysik
22.05.2023	Blendung im Straßenverkehr
05.06.2023	Sehleistung und Helligkeitswahrnehmung & Objektdetektion im nächtlichen Straßenverkehr
12.06.2023	Adaptive Heckleuchten
19.06.2023	Industrievorlesung
26.06.2023	Adaptive Driving Beam
03.07.2023	Lichttechnik für automatisiertes Fahren
10.07.2023	Praxisorientierte Grundlagen und Forschungsergebnisse aus der KFZ-Lichttechnik

LECTURE ANNOUNCEMENT 2023

Light Bars to Communicate to the World

LIGHTING NEWS

In the self-driving car era, external digital displays will give visual cues to pedestrians and other cars. The Sony-Honda Afeela EV concept has a digital band between the headlamps; it changes colour and displays text messages and images. Such visual cues will be crucial in communicating with other cars and pedestrians. Automakers are developing the idea in concept cars, and Sony Honda Mobility CEO Yasuhide Mizuno says the Afeela embodies "an interactive relationship, where people feel the sensation of intelligent mobility and where mobility can detect and understand the people and society by utilizing sensing and AI technologies".

The present Afeela prototype has 45 cameras and sensors distributed throughout its exterior and interior. It will include L^2 driver-assistance features for urban driving, with L^3 autonomous driving on the development roadmap.

Škoda's LED Grilleboard: Will It Help Pedestrian Safety?

LIGHTING NEWS

Škoda are experimenting in the UK with a matrix-lit grilleboard on the Enyaq, which flashes green arrows to signal a pedestrian it is safe to cross; a red 'no' cross when it's not, or an orange triangle when the car is about to start moving. These symbols were chosen because they are 'widely recognisable', Škoda say.

The trial comes as changes to the UK's Highway Code stipulate that drivers should no longer signal pedestrians (as by flashing their headlights or waving their hand) that they can safely cross a road—on grounds that such signals can be misunderstood by other road users; and while the signalling driver might have stopped to give way to the pedestrian, nearby or approaching drivers might not do so. This, though, raises the question of whether a go-ahead signal based on sensors and calculations is any more (or less?) dependable than one based on eyes and thoughts…!

The driver won't have control over the grilleboard display; it works automatically when the car approaches a pedestrian crossing, to inform those waiting to cross that the car has registered their presence and is giving way. An equipped car approaching a crossing and unable to stop for whatever reason can visually warn pedestrians not to cross.

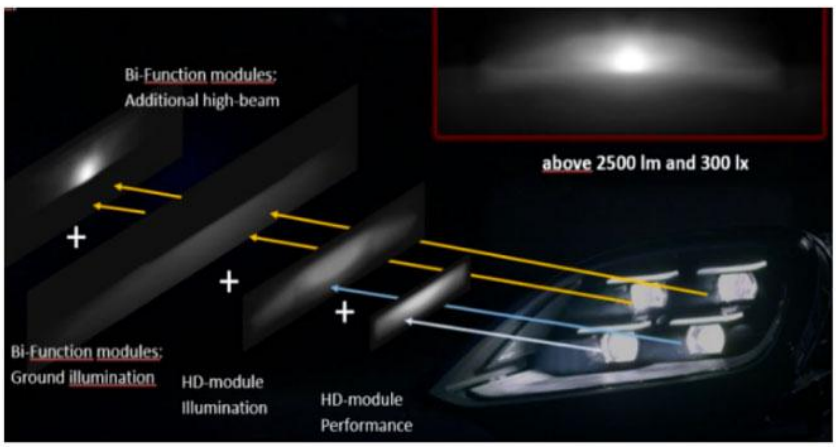
The grilleboard try-out is part of a wider trial within the Urban Mobility initiative of the European Institute of Innovation and Technology.

New Porsche Cayenne Out Today; Final Tease was Headlamps

LIGHTING NEWS

The new 2024 Porsche Cayenne is unveiled today at the Shanghai International Auto Show. So there'll be lots of photos very soon, but take a look at the final, teaser Porsche 'leaked' to the world just a few days ago: it's the front lights!

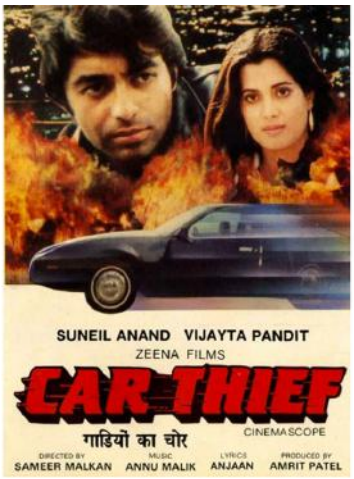
Porsche use bifunction modules combining ground illumination and additional high beam. The functionalities are obtained with the segmented ground illumination, with the brightness of the centre and side areas able to be continuously adjusted.
Overall light performance is very high with more than 2,500 lm and 187,500 cd.



The µLED system is based on 256 × 64 px, so 16,384 LEDs with a pixel pitch of 50 × 50 µm, and an integrated driver, with benefits to the end user: Low, town, country, highway, fog, and rain-optimised beam patterns with swivelling light, static cornering light, and other-side-of-the-road travel mode.
A performant set of high beam functions, glare-free high beam, adaptive highway high beam with a dynamic safety zone, glare-reduction of road signs, Driver information with lane light, construction zone light, marking light, Welcome/farewell animations.

Now They're Stealing Cars Via Headlamps!

LIGHTING NEWS



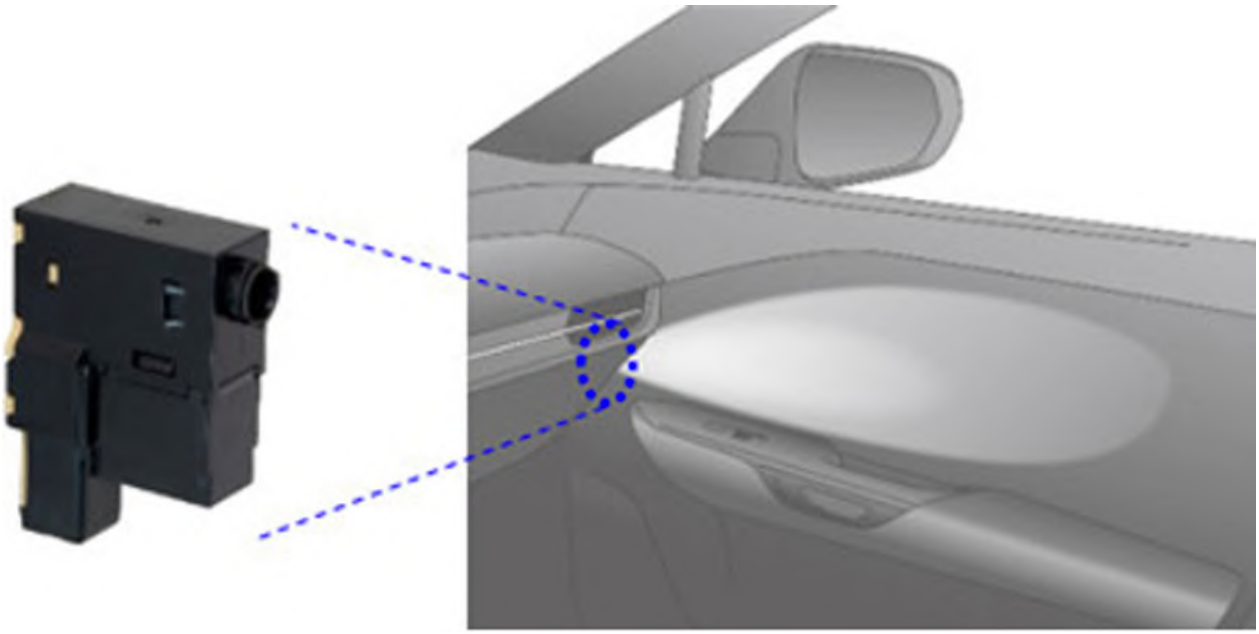
Oh, terrific: car thieves are hacking in via the headlamps. Their hook-up, specifically; headlamps are a relatively 'soft' and accessible target for thieves looking to access the vehicle's CANbus. The attack is called a "CAN injection", and involves using a hold-in-the-hand tool to issue bogus commands to the vehicle's ECUs.

The tool, available on the dark web, is used to impersonate the vehicle’s key fob. A vehicle is vulnerable essentially no matter who made it, or where; thieves yank bumper fascias and trim pieces off, then access the CANbus via the headlamp wiring. Once that's done, they operate the tool: press a button and the vehicle's ECU unlocks the doors and disarms the alarm. Press another and the car starts and off you go, as if you're the owner with key in pocket.

A high expert in automotive CAN systems has put up a detailed, technical **explanation** of the problem and potential solutions. Certainly worth a read; this revelation of the headlamps as car-theft access point might well warrant discussion and thought on how to harden the target; sooner than later, somebody's going to ask for it.

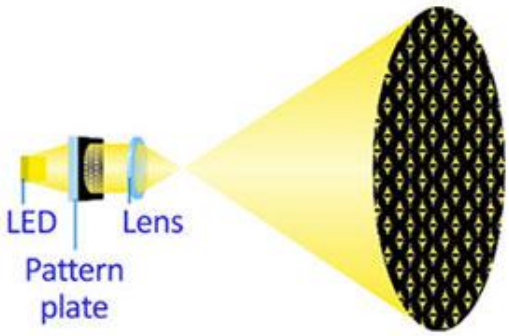
Toyoda Gosei's New LED Shadow Interior Lighting

LIGHTING NEWS



LED Shadow Illumination

Toyoda Gosei have developed an LED lamp unit that projects patterns in vehicle interiors using shadow. It will first be used on the new Lexus RZ battery electric vehicle.
A plate with decorative patterns is built into the LED lamp unit, projecting an attractive ornamental design on the door interior to present a fresh impression at night, as if the vehicle interior had been given a makeover. Toyoda Gosei's optical technology prevents passenger shadows by projecting light diagonally from the front, while at the same time the pattern is vividly projected even at large distances from the light source.



Pattern Projector

The new system can provide a variety of light colours and patterns, and they're customisable to cater for diverse interior materials.

ZKW Are a Patent Machine!

LIGHTING NEWS

ZKW are a top patent applicant in Lower Austria; 61 of the 224 applications in 2022 from Lower Austria to the European Patent Office came from the ZKW Group.

Among ZKW's many innovations is a display with controllable foils to display pictograms as well as being used for large-area lighting. The newly developed and patent-pending display with an upstream controllable element can provide individual illuminated dots or a homogeneously-illuminated surface. If the element is switched transparent, a pictogram behind it can be precisely displayed. When diffused, individual light elements are no longer visible, resulting in a uniformly luminous surface. This is realised by a foil with integrated liquid crystal elements. These can be switched electrically, and in this way adapt the function of the display to individual needs. This development thus easily turns the combination rear light into a warning signal in an emergency.

Another innovation is an unusually efficient lighting element for front and rear lights, which gives front or rear lights the appearance of a sparkling crystal, whether unlit or lit. It has numerous facets, which look randomly distributed, and this jewel-like appearance helps to efficiently realise light distributions which meet legally prescribed values. But in fact the facets are specially calculated and each is specifically aligned; it's not random at all. The light is thus directed exactly where it is needed and used extremely efficiently. The 'crystal' optics can be made out of conventional plastics, so esoteric materials and processes aren't required and production cost is reasonable.

ZKW Group CEO Dr. Wilhelm Steger says "The cornerstones for high-tech products are intensive research as well as constant further development. In this way, we give our customers more design freedom while exploiting all the technical possibilities".

Hella Start 2023 on Strong Up-Note

LIGHTING NEWS

Hella have announced data on their sales development in the first quarter of fiscal year 2023 (1 January to 31 March 2023). Consolidated sales increased by 14.4 per cent to around €2bn.

CEO Michel Favre says the company are off to a strong start: "We were able to carry over the growth momentum of the previous year into the fiscal year 2023, even though the Chinese market developed modestly, as expected. Overall, the successful start to the new year therefore once again underlines the excellent positioning we have along key strategic growth areas such as electrification and energy management as well as safe and automated driving."

Due to overall high production volumes, the Lighting business group's sales improved by 19.4 per cent to €955m.

Driver Assistance News

Innoviz Win OE Lidar Order

DRIVER ASSISTANCE NEWS

Innoviz have received a several-hundred-unit purchase order from a commercial vehicle maker for InnovizTwo lidars as part of advanced discussions for a new series-production award. The order will be delivered to the customer throughout 2023

On strength of improved InnovizTwo manufacturing yields and output, the company can deliver higher volumes at a faster pace. Innoviz currently have four series production awards with Volkswagen, BMW, and others.

General News

Auto Shanghai: Global Auto Enterprises

GENERAL NEWS

Auto Shanghai 2023 has attracted the active participation of over 1,000 exhibitors. attracting main-stream international and domestic auto makers to display with high-level standard. From April 18 to April 19, auto-maker and auto parts exhibitors will hold 143 press conferences.

BMW, Audi, Mercedes-Benz, Volkswagen, Porsche, Ford, SGM (Buick, Chevrolet, Cadillac), Lincoln, Volvo, Jaguar Land Rover Peugeot, Citroen, Toyota, Lexus, Honda, Nissan, Mazda, Subaru, Hyundai, Genesis, KIA, Polestar will participate at Auto Shanghai.

Domestic six main automobile groups FAW, Dongfeng Motor, SAIC Group, Changan Automobile, BAIC Motor and GAC Group will exhibit all the lineups with their group image. Geely, LYNK&CO, Haval, Poer, Tank, WEY, BYD, Chery, Exeed, Jetour, Icar, JAC, JMC will participate the show in the full force.

Among the new energy brands, NIO, XPENG, Li Auto, Neta, Dongfeng VOYAH, ARCFOX, Leap Motor, HiPhi, AVATR, ZEEKR, IM, RISING, HYCAN, ORA, AITO, Yuanhang, DAYUN, LIVAN, DEEPAL, MHERO, SKYWORTH will actively take part in the Auto Shanghai 2023.

More than half of the World Top 100 Tier-1 auto parts suppliers including Bosch, Denso, ZF, Aisin, Mobis, FORVIA, Continental, Valeo, BorgWarner, Aptiv, Webasto, Schaeffler, Hitachi, Autoliv, Brose, Plastic Omnium, Marelli, Gestamp, Eaton, Antolin, Visteon, Nexteer, Mubea, Toyoda Gosei, Toyota Boshoku, NSK, NTN, Garrett, Novelis, SKF, Johnson Electric participate in the show, displaying latest key automotive technologies and development;

Famous domestic auto parts manufacturers such as HUAWEI Digital Power, DESAY SV, BAOSTEEL, FAST, DYNAUDIO, CRRC, Wuling Motors, Lingyun Industries, C&U Group, SAGW, Mingxin, ADAYO, VIE, WLY, BTL, APG, NBHX, TIANCHENG Controls, CAIP, INOVANCE will offer a comprehensive display of the newest technology and products of the automobile industry.

Q1 2023 New Energy Vehicle Sales in China: BYD and Tesla

GENERAL NEWS

New Energy Vehicle includes pure Battery Electric Vehicles (BEV), Plug-in Hybrid Electric Vehicles (PHEV) and Fuel Cell Electric Vehicles (FCEV). PHEV does have a combustion engine that is used to charge the battery in order to extend range, but it does not power the axle.

No.	Group	2023 YTD Sales	YoY	Market %
1	BYD	508,706	80.0%	38.8%
2	Tesla	137,429	26.9%	10.5%
3	GAC (Aion)	80,308	79.0%	6.1%
4	SGM - Wuling	77,701	-26.2%	5.9%
5	Chang'an	60,674	98.0%	4.6%
6	Geely	59,597	33.2%	4.5%
7	Li Auto	52,584	65.8%	4.0%
8	NIO	31,041	20.5%	2.4%
9	VW*	30,787	-5.1%	2.0%
10	NETA	22,449	-25.5%	1.7%

65.9%

80.5%

BYD dominated PHEV with 62% share in 2022, and leads the BEV market with 17% share. Even in PHEV, BYD still dominates.
BYD and Tesla have half of the China market in New Energy Vehicle