



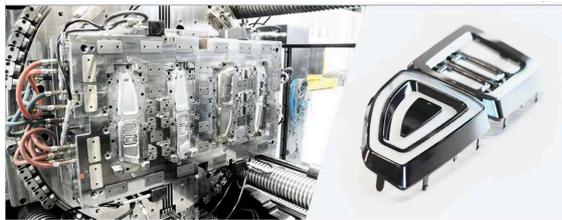
How ingenuity and expertise led to the development of our multi-pixel LED.

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Editorial

Innovation Everywhere In Our World: Toolmakers



At DVN we tend to focus primarily on innovations in light sources, semiconductors, and optical technique. But there's constant innovation in every part of the vehicle lighting value chain, all of it worthy and important, and it was high time to dig into another key area for innovation: plastic mould design and construction, especially for optical lenses.

So I went visiting our toolmaker DVN members in Portugal, MD Group and Vangest-Moliporex, to see their latest products and innovations. Technology in their field is evolving fast, especially for new lit front and rear fascias, and mould makers are a key element for these new features.

Tooling is a crucial part of the lamp design process. Each and every unique vehicle lamp requires 12 to 20 weeks' worth of milling, drilling, and polishing, and many, many Euros (... Dollars, Yen, Won, Yuan...). Tooling represents between five and 10 per cent of the complete revenue of the lighting ecosystem.

Product design, including simulation, is useless without the ability to build the tool and produce the components. I met with people who develop and realize what engineers have designed.

Tooling localization next to the final plant location is also essential to reduce schedule development. Tool shipment takes one to two months from one continent to another one, and is always at risk from pandemic, geopolitical instability, and all the other things that can disrupt supply chains. It's all quite fascinating, and we're happy to bring you this information.

Sincerely yours,

Paul-Henri Matha
DVN Chief Operating Officer and Lighting General Editor

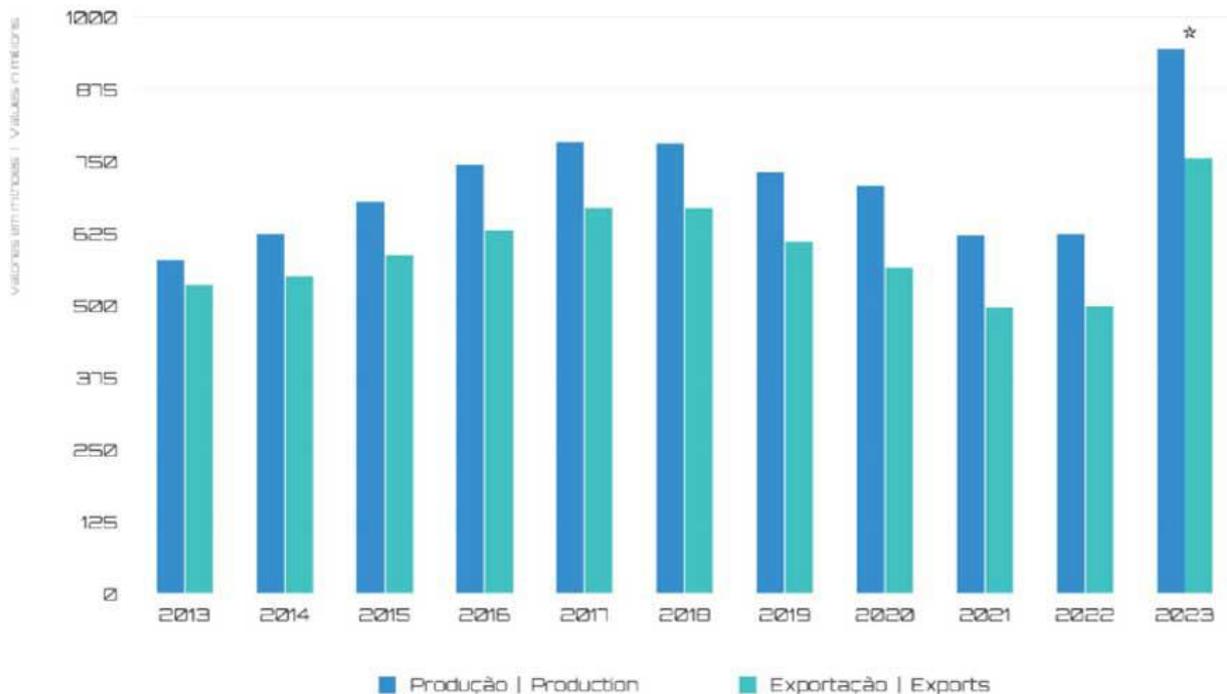
In Depth Lighting Technology

Toolmakers in Portugal: Doing Great Things



By Paul-Henri Matha, DVN COO and Lighting General Editor

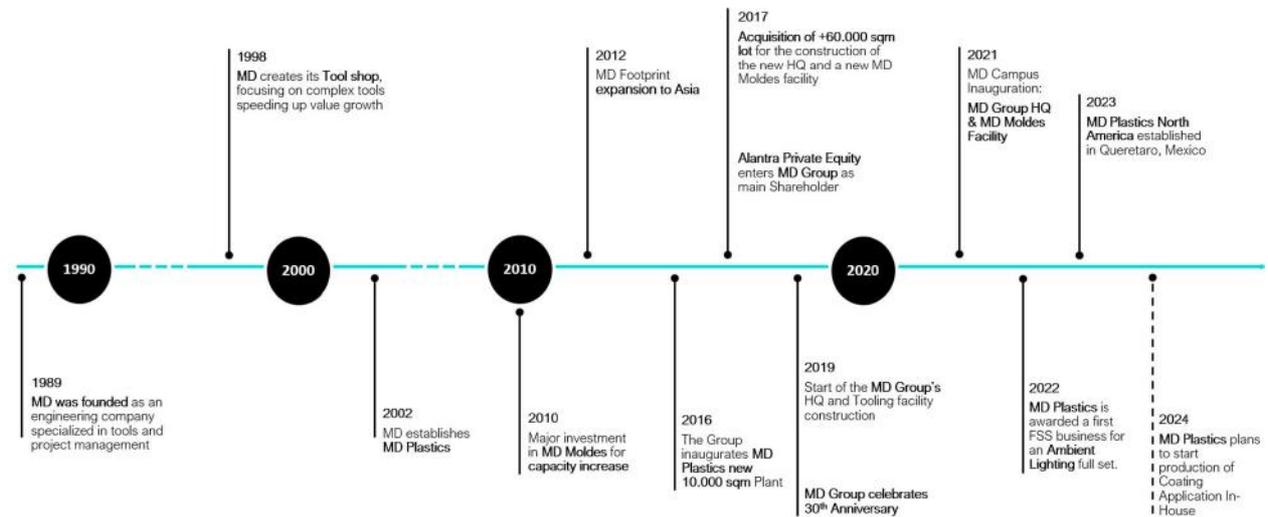
Portugal is the Nº 3 country in Europe for toolmaking, after Germany and Italy. Worldwide, Portugal is Nº 8. Key figures from Portugal's toolmaker ecosystem (as of 2023) include 9,972 employees; 472 toolmakers; €947m revenue, and the industry is devoted 73 per cent to automotive. Main customer-countries are Spain (22 per cent), Germany (17 per cent), and France (14 per cent).



Extract from CemafoI, Portuguese association for the mould industry, report 2024

MD Group

I started by visiting with MD Group, who are mainly dedicated to lighting technology. Their company was established in 1989, and evolved from an engineering company to a toolmaker specialized in complex tool design including for lighting, and in-house production for optical components.



MD Group has three business units: **MD Engineering** in Portugal; **MD Moldes**, with 192 employees in Portugal, China, and Mexico; and **MD Plastics**, with 245 employees, 35 injection machines, and 2 white rooms—specializing in thick-lens production (> 30mm) in Portugal and Mexico. Revenue in 2023 was €55m, of which €31m for tools and €24m for injection.

Lighting makes up 90 per cent of MD's tooling activity—light guides, outer lenses, and optical lenses. 25 engineers are dedicated to tool design, and MD Moldes can produce 230 tools per year.

And 60 per cent of MD Plastic's activity goes toward injection-moulding light guides and optical lenses. The remainder is largely for VW's plant in Portugal (notably, the T-roc exterior and interior trim).

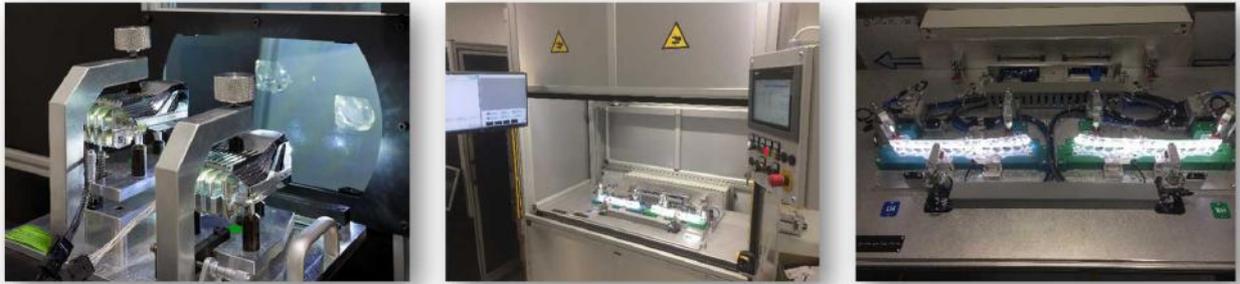
Revenue is growing fast, and the company expect 2027 revenues to exceed €100m, driven in large part by their Mexico injection plant expansion with partner Vistamex.

Over the years, MD Group has become a major partner for most of all lamp set makers for tooling and injection, and their work appears on the products of a long list of the world's automakers and suppliers.



MD Group have developed expertise in toolmaking and injection moulding, with specialities in

- Multilayer up to 6K lens tool
- Automatic laser sprue cutting
- Heat and cool system (Variotherm)
- Automatic assembly line
- End of line testing including photometry control, camera cutoff sharpness measurement, color control
- Surface finishing with radius < 5 nm with nanotech machine for microstructure



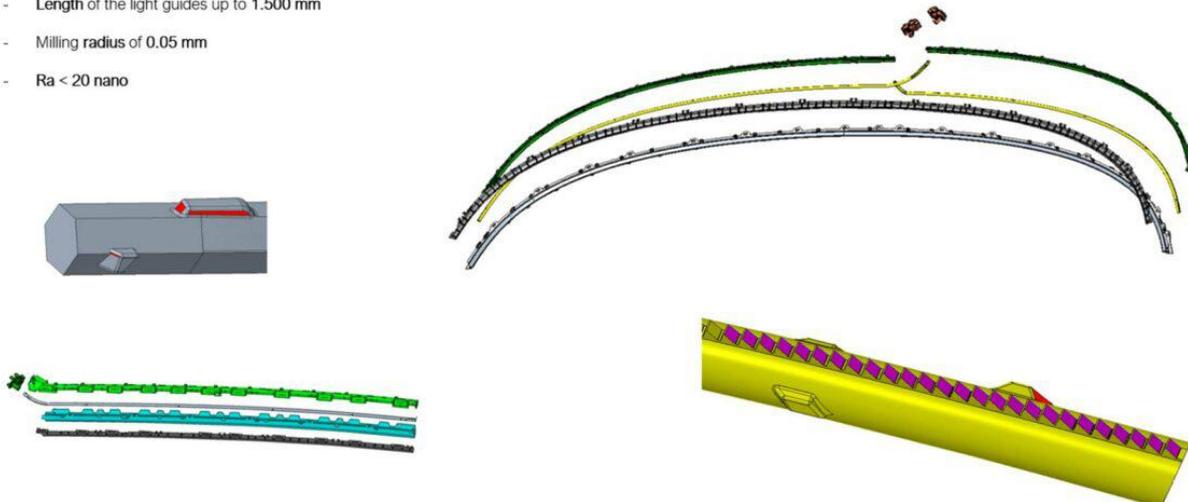
Nanotech:

- Thermal Stability +/- 0.5°C
- Absence of Vibrations below 4Hz frequency
- Surface Finishing of Ra <5nm
- Surface Shape down to Radius of 0.01 mm
- Confocal microscope combined with integrated white light interferometer
- 2D e 3D Surface Analysis and Measurement Evaluation

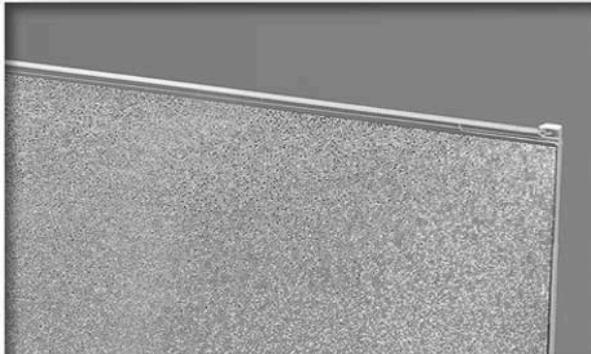
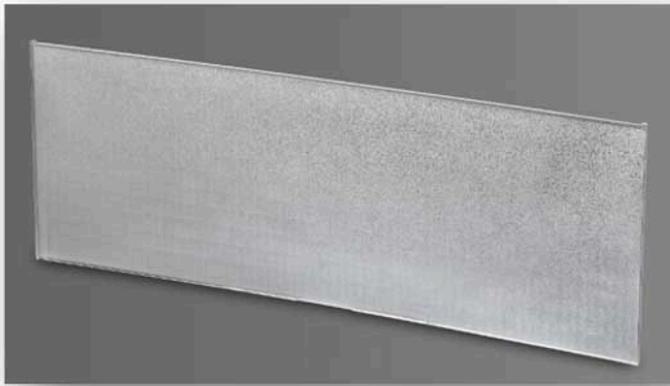


Here are some sample parts—light guides, optical lenses, and display backlights— injected by MD Plastics, with tools designed and built by MD Moldes:

- Length of the light guides up to 1.500 mm
- Milling radius of 0.05 mm
- Ra < 20 nano



Display Backlight



- Cross-Car BMW iX
- PC Injection in 900T with Heat & Cool
- 100% Automatic Inspection
- High Precision Sprue Milling CNC
- 100% Automatic Dimensional Control



Vangest

Next, I visited Vangest—a company founded in 1986 and composed of five operations: DISTRIM CADFLOW (software); GRANDDESIGN (product design); MOLIPOREX (moulds); DT2 (fixtures), and HTP (injection).



Integrated Services

MOULD MAKING SOLUTIONS

DFM Study and feasibility analysis

Mould Design & Engineering

Mould Manufacturing:

- 2K/3K
- Micro moulds
- Metal Insert
- Reel-to-reel
- In-mold assembly
- Automatic unscrew cores
- "Heat & Cool" (RICH)
- Back-injection
- Gas assisted



In 2022, the company had €43m revenue, and 320 employees. Tooling activity represents 55 per cent of the revenue. They made 130 tools last year, of which 70 per cent for automotive, and 15 per cent for lighting.

Moliporex can produce 3K tools, including compression technology, heat and cool (rich technology), in-mold assembly, and back-injection, with pressures up to 30 tons.

SMALL MOULDS
Up to 1 TON



MEDIUM MOULDS
Up to 5 TON



LARGE MOULDS
Up to 30 TON





Try-out can be done in-house, with injection machines from 35 tons to 2,300 tons with 3K; rotary tables; heat and cool systems.

Simoldes

To round out my fact-finding tour, I went north to visit Simoldes, the largest Portuguese toolmaker. Company was created in 1959 and is still family owned.



They churn out around 600 moulds per year with 1,000 employees and tool revenues around €133m.



Simoldes' resources and expertise include Roctool, Mucell, 3K, compression, in-mould films, textile wraps, and lighting tools (though this is a smaller part of their business).

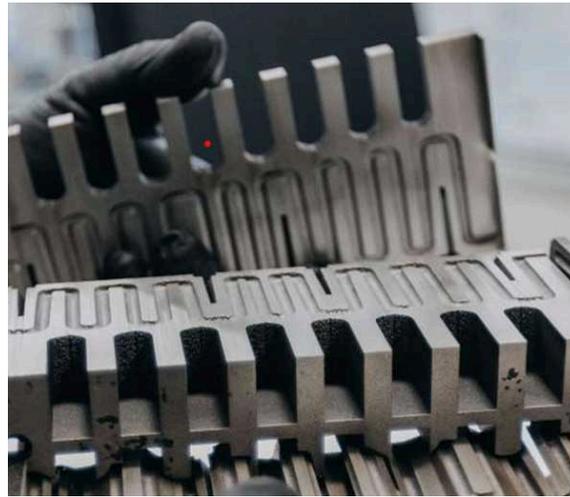


TOOL EXAMPLE WITH COMPRESSION

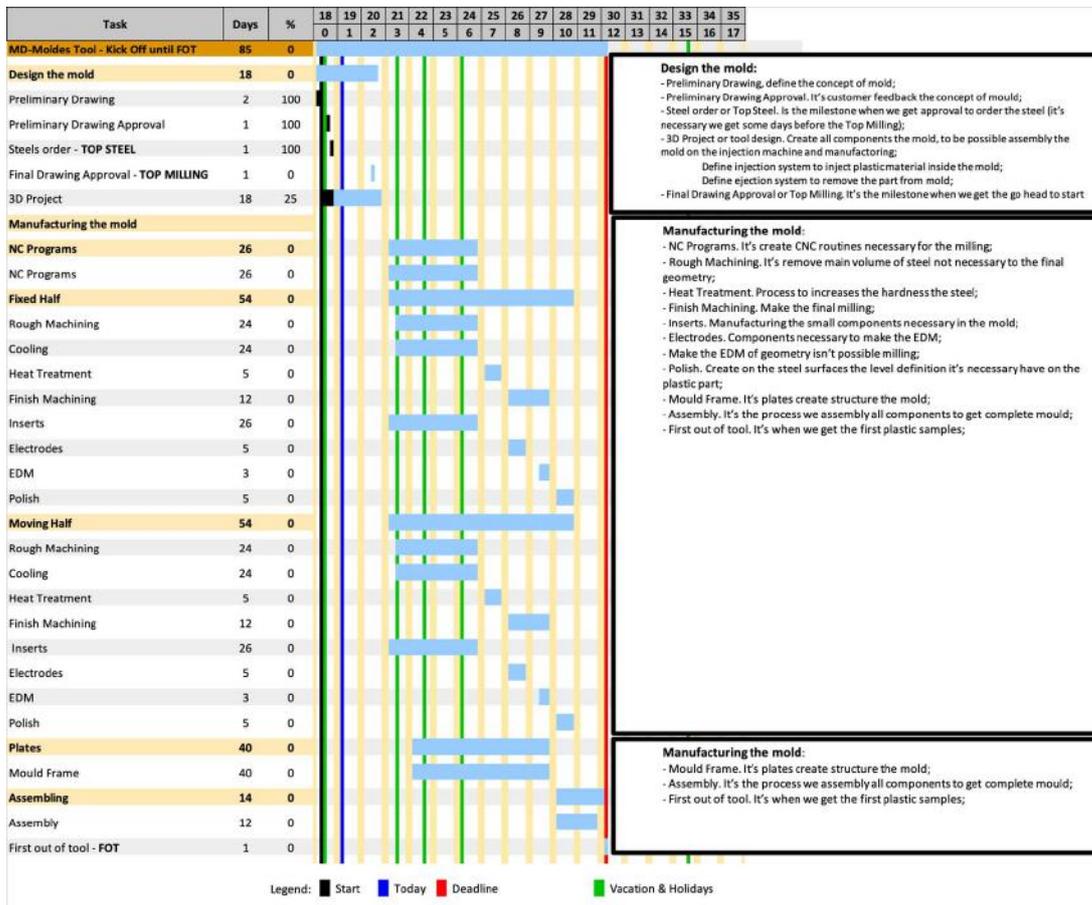


TOOL EXAMPLE WITH ROCTOOL

Simoldes has also developed patented technology with additive manufacturing process to obtain cooling channels that cannot be made by conventional drilling process.



To wrap up this look at how toolmakers serve their vital role, here is a sample tool schedule from MD Moldes, from mold design to first off-tool plastic component (12 weeks; 85 days) in this example. For 2K outer lens and other complex tools, the duration may be longer—18, 20, 22 weeks—depending on size, number of sliders and cavities, and other suchlike:



Lighting News

Nichia Launch Aachen Auto Innovation Center

LIGHTING NEWS



Nichia have launched the Nichia Automotive Innovation Center in Aachen, Germany. The new facility is intended to power the company's ongoing automotive innovation and bring enhanced support to customers and their rapidly evolving requirements.

The new facility's mission is to develop advanced and sustainable lighting solutions to bolster road safety, visual comfort, energy efficiency, and vehicles' aesthetic appeal. In close partnership with industry leaders, together with the R&D team at Nichia's headquarters in Japan, the NAIC will accelerate the development and commercialization of innovations to advance the quality of light.

To support the next generation of vehicle lighting solutions, NAIC contains a wide array of laboratory tools for testing, modelling, monitoring, analysis, rapid prototyping, and more. Dr. Ulf Meiners, Managing Director of the NAIC, says collaboration is key: "By working closely with business partners and academia, we will bring groundbreaking solutions to the market faster and more efficiently than ever before. As a result, the centre can rapidly accelerate the pace of innovation".

Nichia say the NAIC, led by an expert team of technicians and business leaders, reflects their vision for tomorrow's vehicle lighting.



NICHIA AUTOMOTIVE INNOVATION CENTER

Lumileds to Sell Lamps & Accessories Biz to First Brands Group

LIGHTING NEWS



Lumileds and First Brands Group, an auto parts maker serving the worldwide aftermarket, have entered an agreement for First Brands to acquire the Lamps and Accessories business of Lumileds for \$238m. Under First Brands, the Lamps and Accessories business will continue to expand offerings and position their products and leading brands in the automotive accessories sector.

Lumileds CEO Steve Barlow says, "The automotive OEM lighting go-to-market synergies and conditions that made the union of Lumileds and Philips automotive lighting business so compelling nearly a decade ago have changed as transportation manufacturers have adopted LEDs as their standard light source and traditional automotive light sources have transitioned to primarily an automotive aftermarket business. Our Lamps and Accessories and our LED businesses are industry leaders in their respective markets and will be free to focus on the ongoing growth of their unique brands, channels, and customers".

The sale is expected to close in the second quarter of calendar year 2024.

The acquisition includes Lumileds automotive lamp factories in China, Germany, and Poland. Lumileds will keep other factories and sites in Germany and China, as well as facilities in the Netherlands, the United States, Malaysia, and Singapore.

Changan Show Pics of CS75+

LIGHTING NEWS



Changan have released official images of their new CS75 Plus SUV, set to hit the market in the second half of the year.

Externally, its design is refreshed. There's a borderless grille design with a dot-matrix arranged in a vee shape sequence echoing the central Changan V emblem. The front lighting package has a full-width light band uppermost, with three more bands below that on each side.

At the rear, a full-width light comprises multiple vertical strips.

The current/outgoing CS75 Plus is priced between C¥117,900 and C¥154,900 (\$16,625 - \$21,850).



Nio's Onvo L60 Coupé SUV

LIGHTING NEWS



Nio have launched their mass-market Onvo brand, positioned below the Nio brand and focusing on young families. Onvo is short for 'On Voyage'; the Chinese name is Ledao (乐道), which means 'road to happiness'. Deliveries will start in September, and presales opened at C¥219,900 (\$30,500).

Front lamps are split into two parts, with slim modules (height around 15mm), while the rear lamps are ultra-slim light lines wrapping from the quarter panel into the deck lid.



Driver Assistance News

Renault, WeRide in AV Pact

DRIVER ASSISTANCE NEWS



The Renault Group are working with AD specialists WeRide, on an autonomous bus slated for a first demonstration in real conditions starting 26 May at the Roland-Garros 2024 tennis tournament.

Renault say they are working with WeRide for 'large-scale commercial deployment of vehicles with an L^4 level of autonomy'.

Renault Group say the L^4 AV is designed for public-transport usage, and that more flexible, autonomous miniBuses will be able to operate 24/7 in complete safety as a zero-emission alternative or an efficient complement to existing solutions (train, tram, bus) in terms of costs and CO₂ emissions per passenger. Renault think of robotisation and automation costs could be offset by the absence of on-board operators (i.e., human drivers), and that a 'simple remote supervision system will be required to operate a fleet of vehicles'.

Gilles Le Borgne, Renault's CTO, says "(...) thanks to our experiments and our partners, the best in their fields, we will be in a position, well before the end of this decade, to propose a highly relevant range of autonomous, low-carbon minibuses to meet the growing needs of the regions".

Renault also said the trials will lead Renault Group to offer a robotised electric minibus platform based on the New Renault Master, able to integrate automation solutions from specialist partners such as EasyMile, Milla, and WeRide.

Roland-Garros 2024 tennis tournament trials mean that from 11am to 7pm, from 26 May to 9 June 2024, the experimental service will take passengers from the P2 car park (located on the outskirts of the Bois-de-Boulogne) to the Roland-Garros stadium. And, at the end of the matches, to leave Roland-Garros to the Place de la Porte d'Auteuil or back to the P2 car park.

General News

Display Week 2024 San Jose, CA. Technology and Trends

GENERAL NEWS



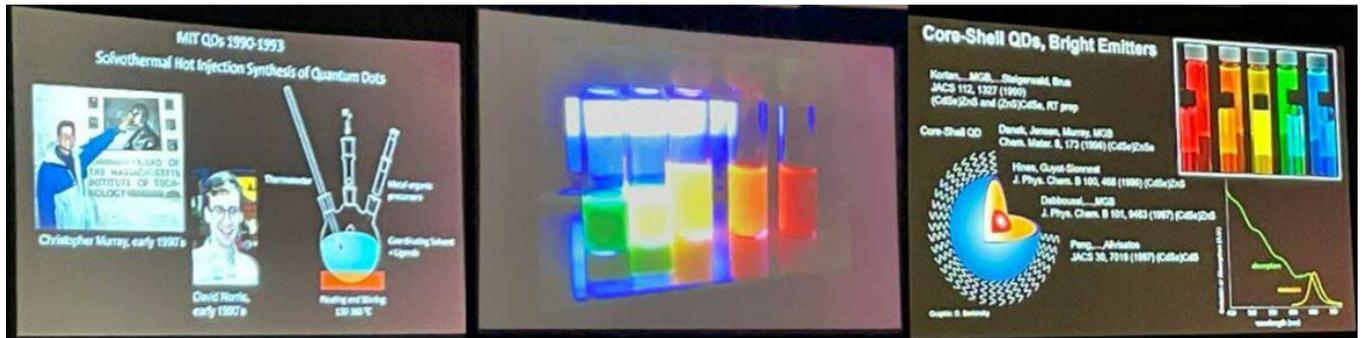
The largest Display Conference 2024 took place last week in San Jose, California and I was amongst the 1000's of industry experts and guests that attended the event. The event consisted of 3 key notes from industry experts as well as lectures and demonstrations from suppliers. There were over 130 suppliers, Tier1, 2, 3's as well as test houses that were at the event promoting and show casing new technology, advancements in technology, new test protocols, methods as well as equipment.

The imaging and display industry is constantly evolving, which means the displays available for consumer, automobile, as well as medical industry is evolving at a rapid pace. The display week technical presentations continued to identify innovations and technology advancements that are pushing the forefronts of change. This year's special topics and tracks provide technical and professional insights into the future of imaging technologies for enhanced near-term and future capabilities. The key focus for innovations for this year's display week was on :

- Ultra-high bandwidth transmission and processing (new for 2024)
- Sensors integration and functional displays
- Artificial intelligence (AI) including machine learning (ML) for imaging
- Digital signage (indoor and outdoor information displays)
- Sessions in imaging technology for Automotive applications
- Tracks and sessions advancing XR Technology, Optics, OLEDs, Quantum Dots, MicroLEDs, Healthcare and Biotech Imaging, and more.

The overall program included on-site demos providing opportunities for direct interaction with many of the leaders and explorers in the imaging field. There was also a focus on [Women in Tech](#) and a [CEO Forum](#) and this year's event was sponsored by BOE, TCL CSOT, TIANMA, 3M, Meta and RADIANT.

This years' hot topics were:



- Quantum dot materials
- AR/VR display systems
- Emerging biomedical applications
- Display data transmission and processing
- Machine learning in display

The development and innovations as well as the advancements in MicroLED's played a significant part of the event. Exploring the possibilities of the future market and innovations linked to Micro LED's in the industry for consumer, medical as well as automobile showed a significant growth in the area of the advancements in Micro LED application, not only for displays but other areas of OEM's. One supplier (name cannot be mentioned due to NDA with an OEM) had taken this to the next level, showcasing the significant advancement of application of Micro LED in automobile lighting applications.



The innovation and significant advancement in Micro LED has opened up a world of possibilities in the display industry. This combined with the technical advancements of films, coatings and chemical compositions are making the impossible a reality today, opening up the world to an entire new dimensions of possibilities.



Some of the key highlights for the automotive industry were the full pillar to pillar displays, filters and sharp cut off for the display that had seamless transition between sections and screens, as well as a unique collapsible screen that would extend to a passenger display when an occupant was present and just a Driver Display (DD), Center Information Display (CID), when the occupant was not present in the vehicle.



Projections on to the windscreens, 3D displays as well as the evolution of film based technology are being used in conjunction with Micro LED's to open up new possibilities not only in the display space but also in the exterior and interior lighting applications.



We are excited to announce that there will be a full in-depth report that will be published shortly in the upcoming DVN newsletter.

Shamika Wickramasinghe