

The image features a stylized logo on the left consisting of a white circle above two vertical bars, resembling a lowercase 'i'. To the right of this logo, the word 'MAGNA' is written in a large, bold, white, sans-serif font. The background is a dark, abstract composition of red and blue light trails and wireframe structures.

**MAGNA**

Forward. For all.

Magna Lighting Czech

April 2024

The title 'Global organization' is centered in a large, white, sans-serif font. The background is a dark, abstract composition of blue wireframe grids and vibrant red light trails that create a sense of dynamic movement and global connectivity.

**\$37.8B** in sales

**351** manufacturing  
assembling facilities

**174,000+** entrepreneurial employees



**#1** north america  
market position

**#4** global  
market position

**By  
the  
numbers.**

# Product Systems



BODY & CHASSIS



EXTERIORS



ROOF SYSTEMS



POWERTRAIN



ELECTRONICS



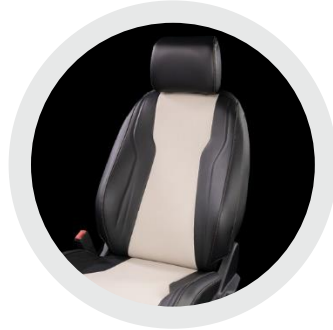
MECHATRONICS



MIRRORS



LIGHTING



SEATING



COMPLETE VEHICLES

# Global Presence – Lighting



**\$1B** (2022 Sales)

**12** manufacturing assembly

**7** engineering dev/sales

**5,334** employees

## North America

**6** manufacturing Assembly

**2** engineering dev/sales

**3,199** employees

## South America

**1** manufacturing assembly

**1** engineering dev/sales

**529** employees

## Europe

**4** manufacturing assembly

**2** engineering dev/sales

**1,434** employees

## Asia

**1** manufacturing assembly

**2** engineering dev/sales

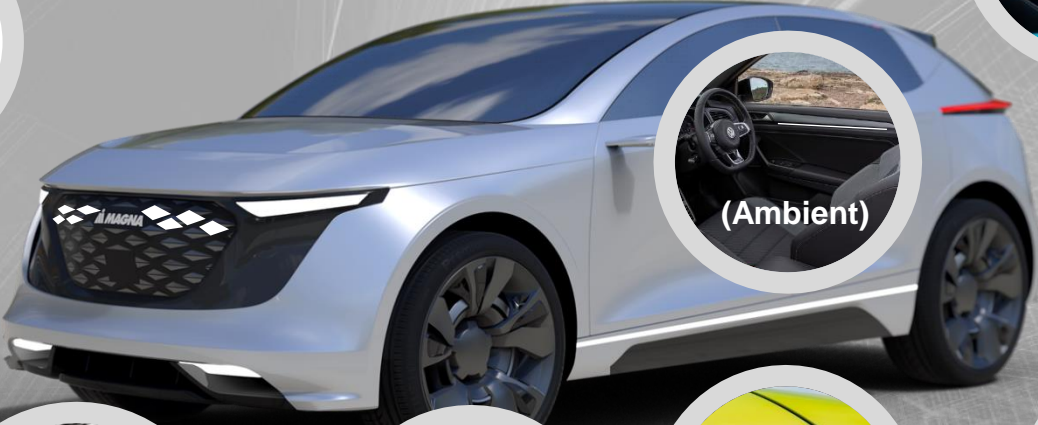
**172** employees

# Magna Lighting - Full System Supplier



SOP 2022

Lit Grill



CHMSL



(Ambient)



Rear Lamps



DRLs



Headlamps



Small Lightings



Bumper Lights



## ABOUT

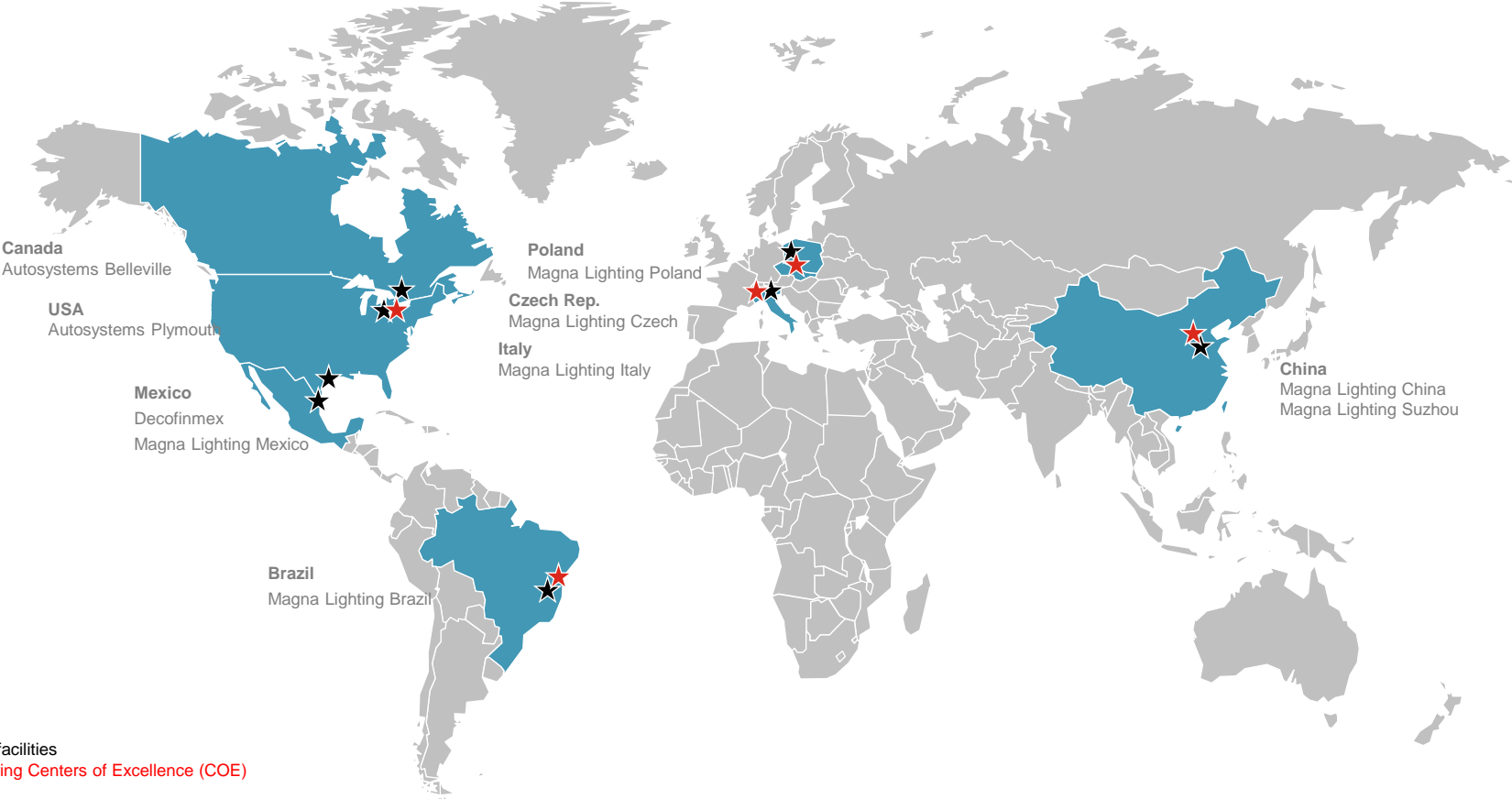
### Products

- Headlamps
- Fog lights
- Daytime Running
- Position
- Turn Indicator
- Tail/Rear Combination
- Rear Turn Indicator
- Dome Lamps
- Reflex Reflectors

### Customers



# Global Footprint in Strategic Regions





The background of the slide is a dark, abstract composition. It features a central area with vibrant red, glowing lines that radiate outwards, creating a sense of energy and movement. On either side of this central area, there are blue wireframe structures that resemble architectural or technical drawings, composed of thin, intersecting lines that form a grid-like pattern. The overall effect is a high-tech, futuristic aesthetic.

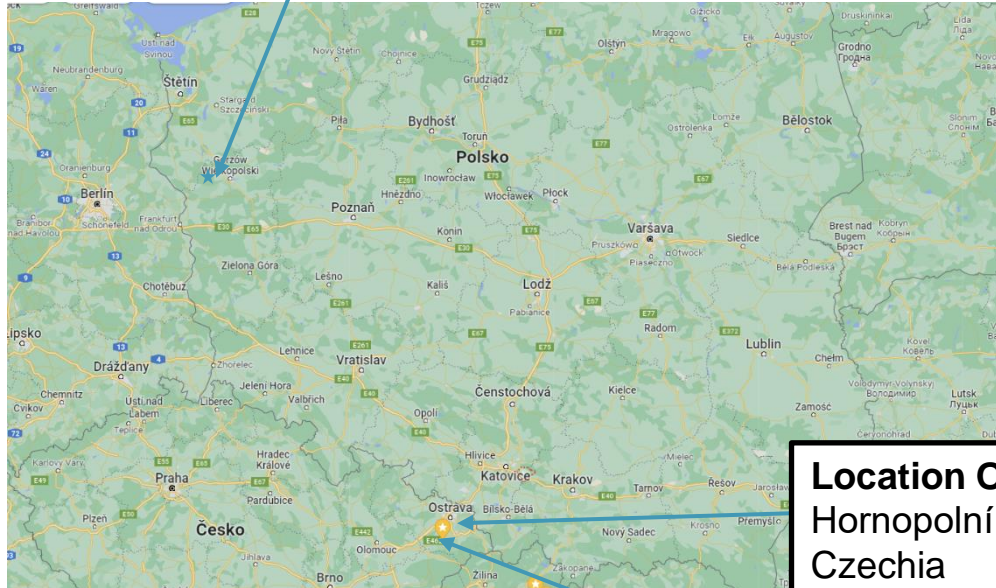
# Ostrava COE

# Ostrava MLC Office and Test Lab



## Magna Manufacturing location

Aleja Milenijna 5 66-470 Kostrzyn nad Odra, Poland

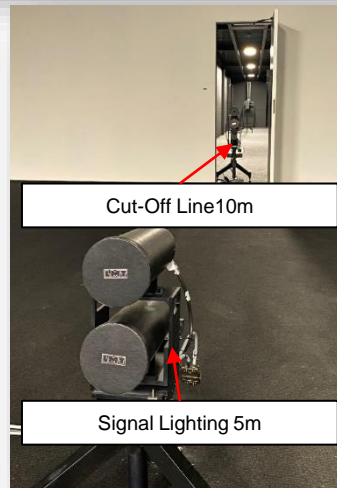
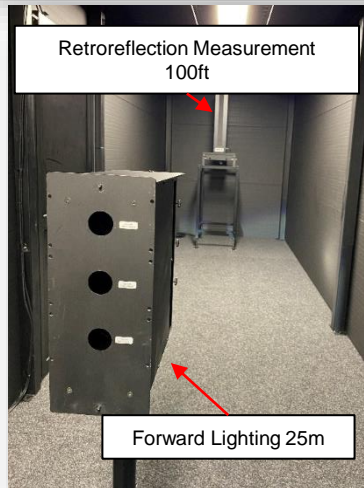


**Location Of MLC CoE Engineering Offices**  
Hornopolská 3308, 702 00 Moravská Ostrava,  
Czechia

**Location of MLC Test Lab**  
Průmyslová 379, 742 51 Mošnov, Czechia



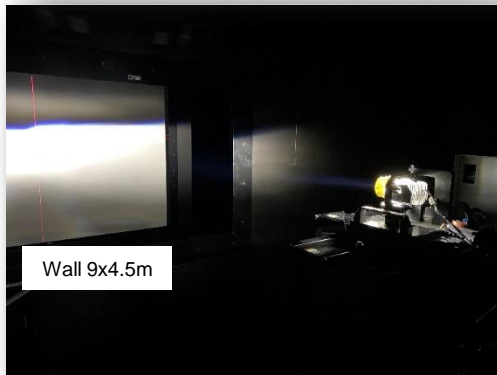
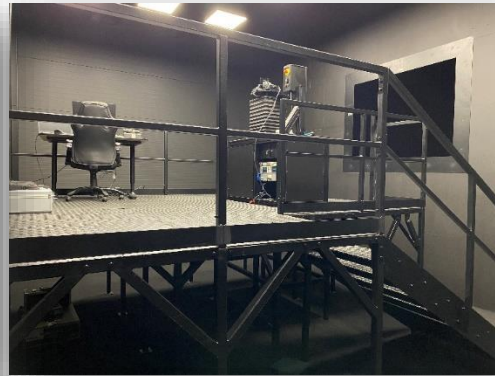
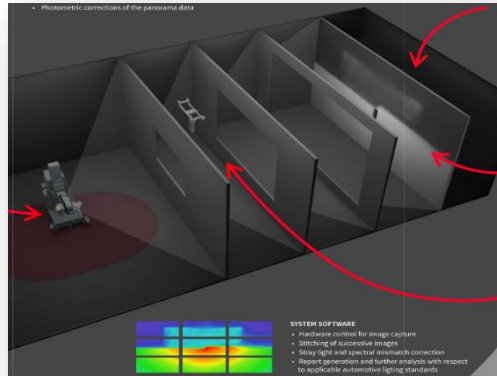
# Gonio Photometer Room



## Solution from LMT:

- LMT-Goniometer GO-H 1860
  - Max. test object dimensions: 1800mm Øwidth
  - Max. test object weight: 80 kg
  - Angular accuracy 0.01°
  - Table mounted electrical multiplexer, 7 selectable channels, software controlled
- Photometric Measurement 5m for **Signal Lighting**
  - Photometer Head SP 30 S0T-GO AMR (0.001 - 16x10<sup>5</sup> cd)
  - Colorimeter Head I CHS 30
- Photometric Measurement 10m for **Cut-Off Line**
  - Photometer Head SP 10 F0T-GO AMR (0.001 - 16x10<sup>5</sup> cd)
  - Colorimeter Head I CHS 30
- Photometric Measurement 25m for **Forward Lighting**
  - **3x** Photometer Head SP 30 S0T-GO AMR (0.1 – 16x10<sup>7</sup>cd)
  - Angular separation is 0.2°, scanning at 0.01° resolution is enabled, freely selectable ISO scanning angular resolution
  - ISO Mapping speed H +/- 30° - V +/- 15° no PWM **8:48 min**
  - ISO Mapping speed H +/-30° - V +/- 15° PWM **16:04 min**
- Retroreflection Measurement LMT RETRO 1000 100ft for Reflex
  - Projector
  - 2x Photometer Head 12' and 1°30' (ECE/SAE) and 20' (ECE)

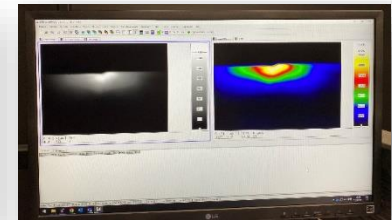
# Imaging Photometer Room



- Imaging Photometer Room is a solution for the indirect light measurement, the whole room is a test device. Available height of the room enabled replacement of standard goniometer with less costly rotary table.
- A measured object positioned on a measuring table illuminates a reflective wall (10 m distance) with Lambertian characteristics. The projected luminance distribution is measured by using the LMK luminance camera.

## Solution from TechnoTeam:

- Dark Room
  - 3x baffle to block stray light
  - Platform to achieve asymmetrical FOV in vertical direction (V +8°/-15°) and symmetrical FOV in horizontal direction (H +/- 17°)
- Camera Box
  - Color-luminance measuring camera LMK 6-12 color (12 megapixels)
  - Laser system (H line, -0.57° line, V line)
- LID-Table
  - Measuring Table with lifting and H-axis rotation
  - LID Merging 1D add-on (max H +/- 90°0)



# Integrating Sphere

- Integrating Sphere UL 1000 for Luminous Flux Testing
- Fine Tuning Room is dedicated for fine tuning and pre-heating of measured items.
- Integrating sphere is located here to be close for light source lumen output verification.



# 3D Scanner & 3D Optical Profilometer

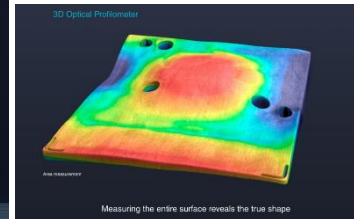


## 3D Scanner Keyence VL 700 C

- Place-and-Click 360° 3D scanning
- Analyze and compare any shape
- Fully automatic CAD conversion

## 3D Optical Profilometer Keyence VLR 6000 C

- High-precision 3D measurement of an entire surface (capture full surface data with 0.1 µm resolution)
- Rotational scanning on a wide variety of materials
- Stable measurement of profiles, dimensions, roughness, and GD&T



A horizontal banner with a dark background. It features a central burst of bright red light rays emanating from the left. On either side of the red burst are blue wireframe structures that resemble 3D CAD models of mechanical parts, rendered in a perspective view.

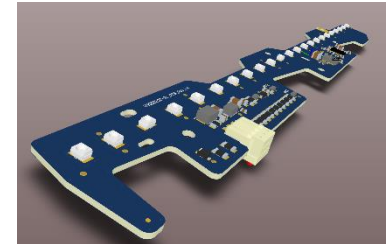
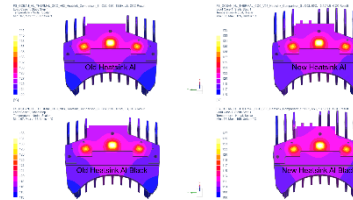
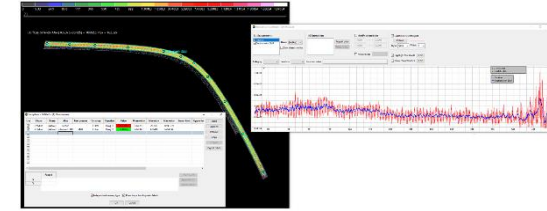
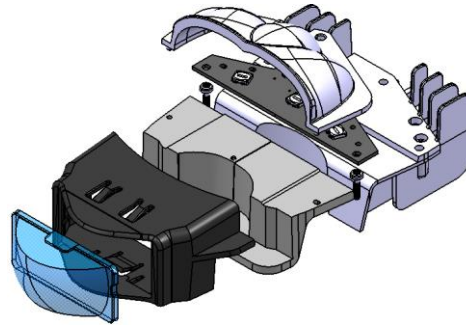
# Product development



# Ostrava Design Capabilities

Complete Lighting development from Styling intent to Serial production  
Experience with Headlamp and Rear lamp

- Product Management
- Product Design – Catia V5
- Optical development
- Electronic HW & SW Development
- CAE Simulation
- ASPICE integration Team
- Process Planning
- Prototype Shop



# ED&D: Optical Team



Ostrava Team:  
1 Manager  
11 Optical Engineers  
1 Optical Software Engineer

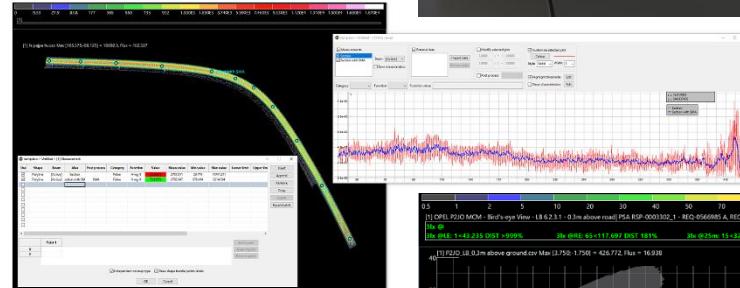
## Optical Design

- Signal Lighting: Reflectors, Collimators, Light Blades, Light Pipes,...
- Front Lighting: Free-Form Reflectors, Modules, Micro optics, Lenses,...



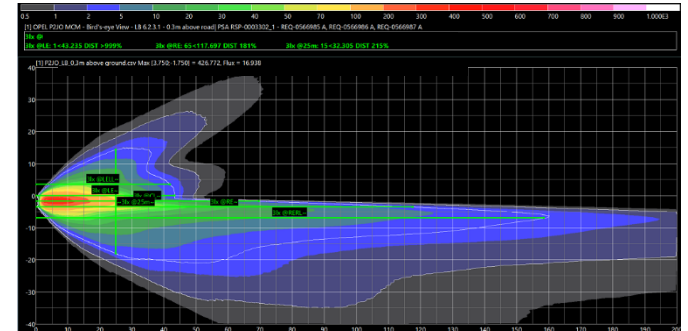
## Optical Simulation:

- Luminous intensity, luminance, illuminance
- Colorimetric calculations
- Physics based rendering
- Homogeneity evaluation
- Glare and light leakage analysis
- Light projection / night drive (static & dynamic)



## Analysis:

- In house software development – BeamStudio
- Evaluation according customer requirements



# Ostrava CAE simulation

Ostrava Team:

- 1 Global CAE Lead
- 1 Manager
- 4 CAE Engineers

## FEM

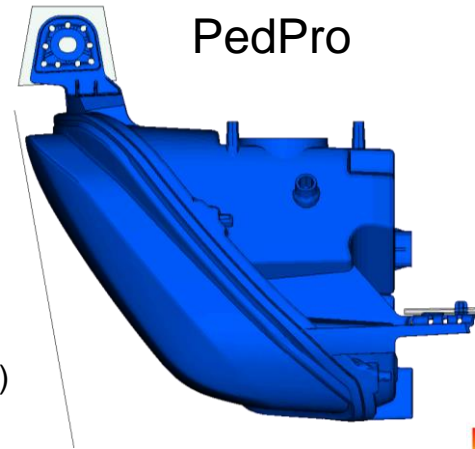
- Pedpro simulation
- Modal (Eigenvalues, eigenshapes)
- Harmonic (Frequency response, displacement, stress)
- Random (PSD,  $3\sigma$  displacement,  $3\sigma$  stress)
- Fatigue (Fatigue from random simulation)
- Non Linear (Assembly, clips)
- PedPro (Head, leg Impact)

## CFD

- Thermal
- Luminous flux derating analysis
- Condensation (Based on temperature change)
- Sun Load (Including refraction in condenser lens)

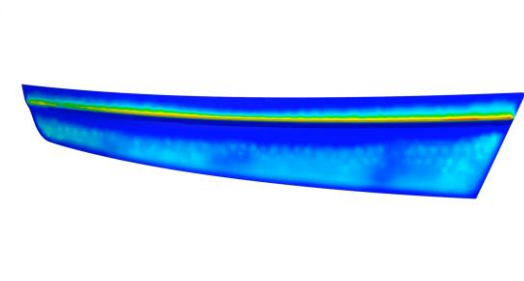
## Analysis:

- Cut-Off Line (Thermal expansion)

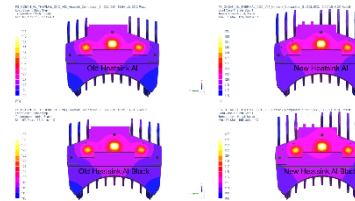


PedPro

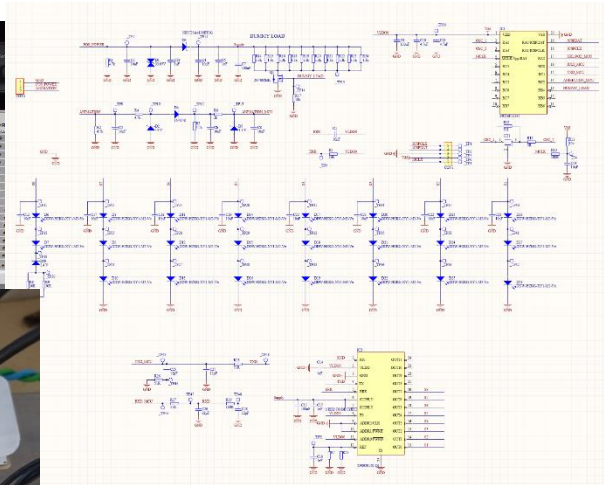
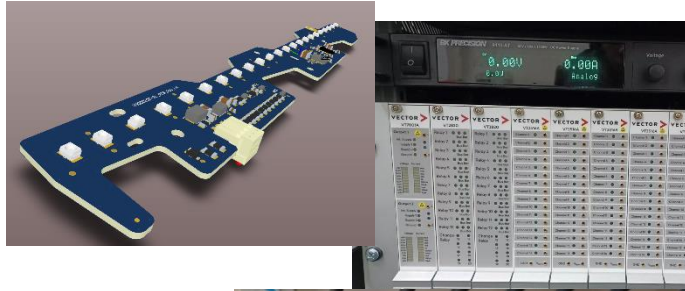
Condensation



Thermal

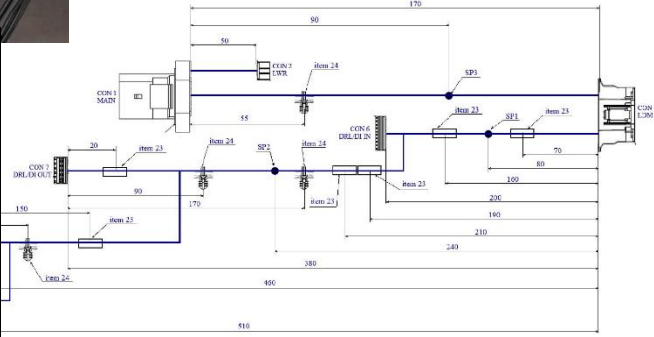
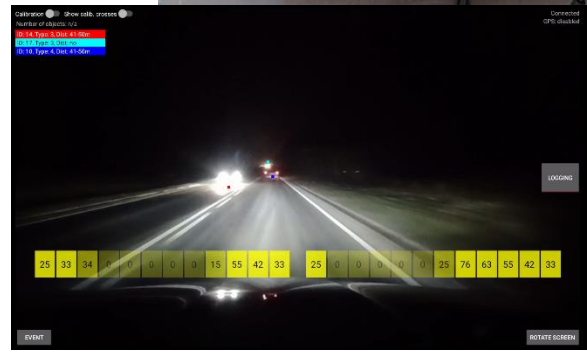
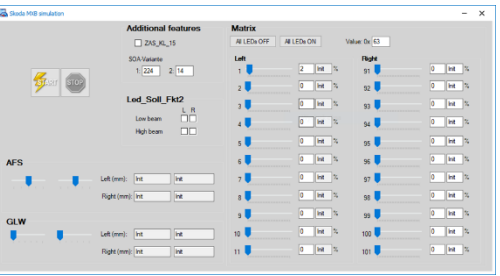


# ED&D: Electronics and SW



Ostrava Team:  
 1 Manager  
 6 System Engineers  
 5 HW Engineers  
 7 SW Engineers

- Electronic HW & SW Development
  - From concept to serial production
  - Schematic, PCB Layout - Design in Altium Designer
  - SPICE simulation
  - In-house SW development – ASPICE compliant
  - Automatic System Testing
  - PCB prototyping – electronics testing

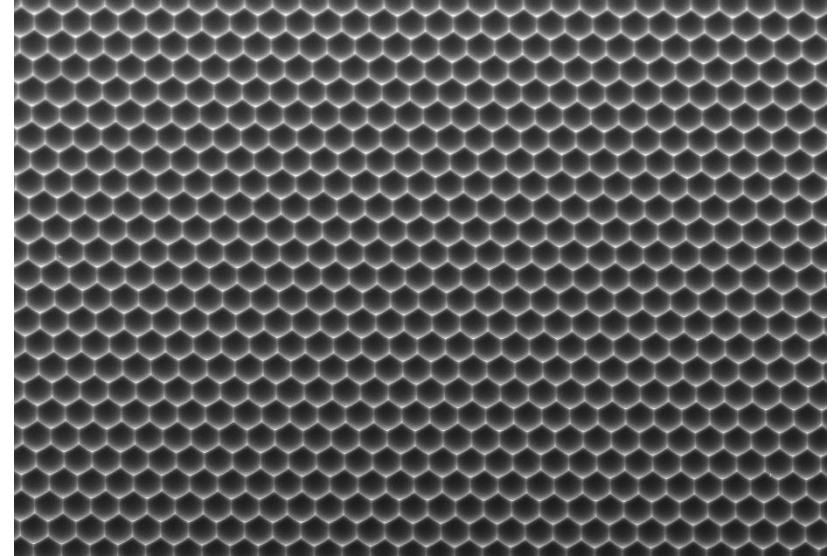
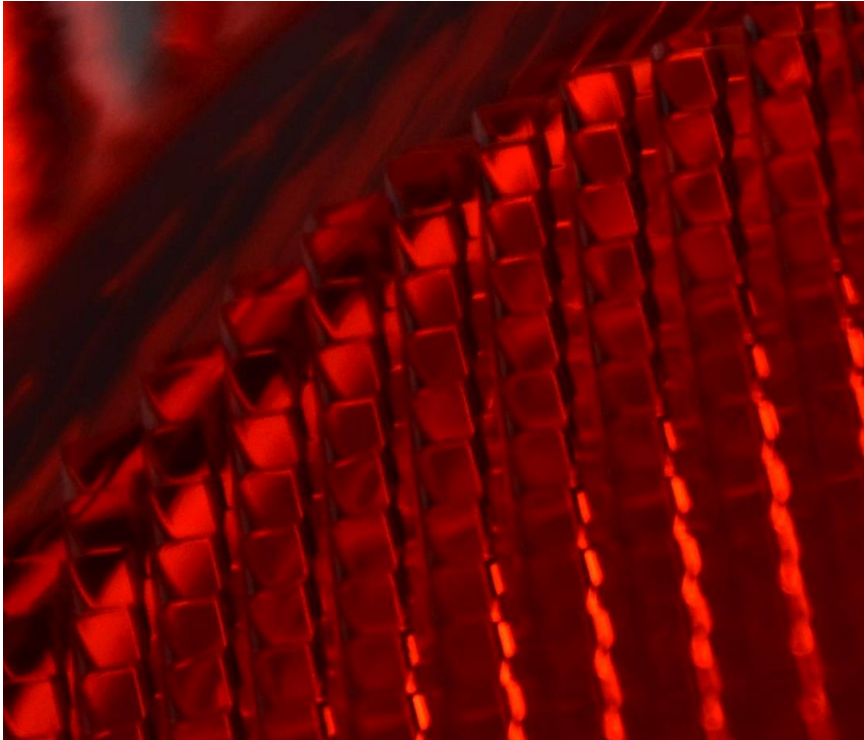


A horizontal banner with a dark background. It features a central burst of bright red light rays radiating outwards. On either side of the red burst are blue wireframe structures that resemble 3D architectural models or data visualizations.

We look for cooperations

# Cooperations

- We look for proved producers of precise plastic optical elements, both in serial and prototype volumes.



The image features a dynamic background of red and blue light trails. The red trails are the most prominent, radiating from the center and creating a sense of motion. In the bottom right corner, there is a blue wireframe grid that appears to be a 3D architectural or technical drawing. The overall aesthetic is modern and high-tech.

**MAGNA**

Forward. For all.