

# EPIC TECHNOLOGY MEETING ON MICROELECTRONICS & PHOTONICS – TWO SIDES OF ONE COIN



## NTS Optel

**“Together bridging your Technology challenges through Optics”**

Leon Hol

Managing Director





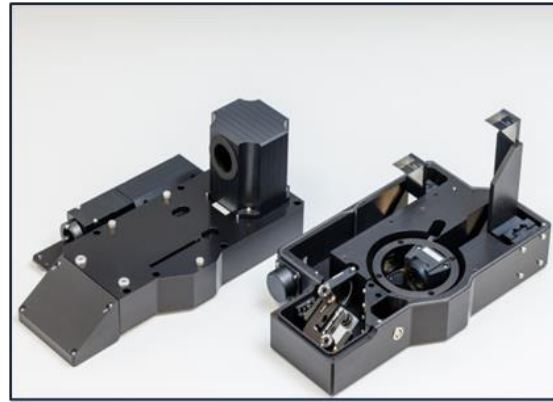
## ABOUT NTS OPTEL

- We are a 1<sup>st</sup> tier solutions provider specialized in Custom Opto-Mechanics
- Specialized in both one-off projects and repeat production
- ISO 9001-13485 certified
- Market focus:
  - Semicon
  - Life-Science
  - Industrial/Food
- Based in Nijmegen NL

# OUR PRODUCT SCOPE (DESIGN AND PRODUCTION)

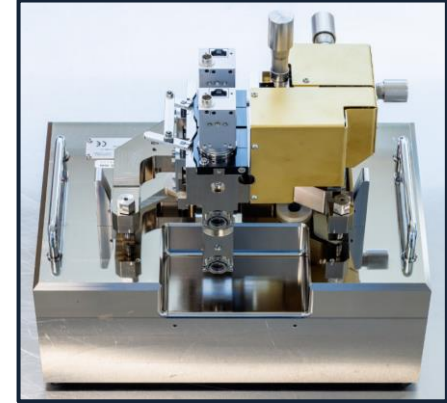
## OEM Modules:

- Wafer Level Sensing
- Fluorescence Microscopy
- Custom cameras
- Laser Beam Delivery



## OEM Optical Tooling:

- Manufacturing
- Qualification
- Service
- Others



## (OEM) Turn-Key Systems:

- Eye Surgery Illumination System
- Micro Holes Metrology
- Others



## Micro-Optics Inspection:

- DOE Optical Inspection
- MLA Optical Inspection
- Others





# OUR APPLICATION AREAS (DESIGN AND PRODUCTION)

## Illumination:

- Custom illumination
- Machine vision illumination
- Fiber illumination
- General illumination

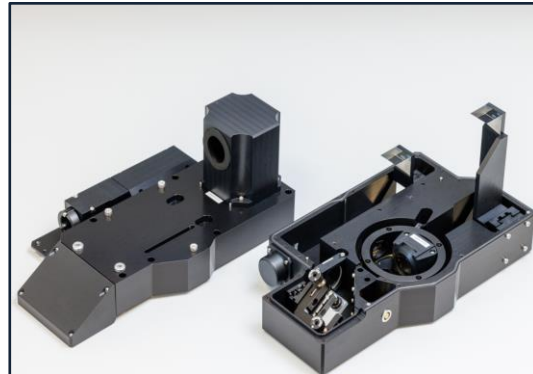


## Sensing:

- Custom spectral sensors
- Custom position sensors
- Wafer level sensors

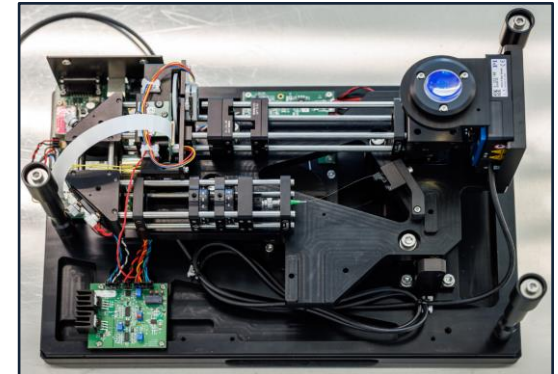
## Imaging:

- Custom imaging optics
- Custom cameras
- Microscopy systems
- Fluorescence systems
- Machine vision



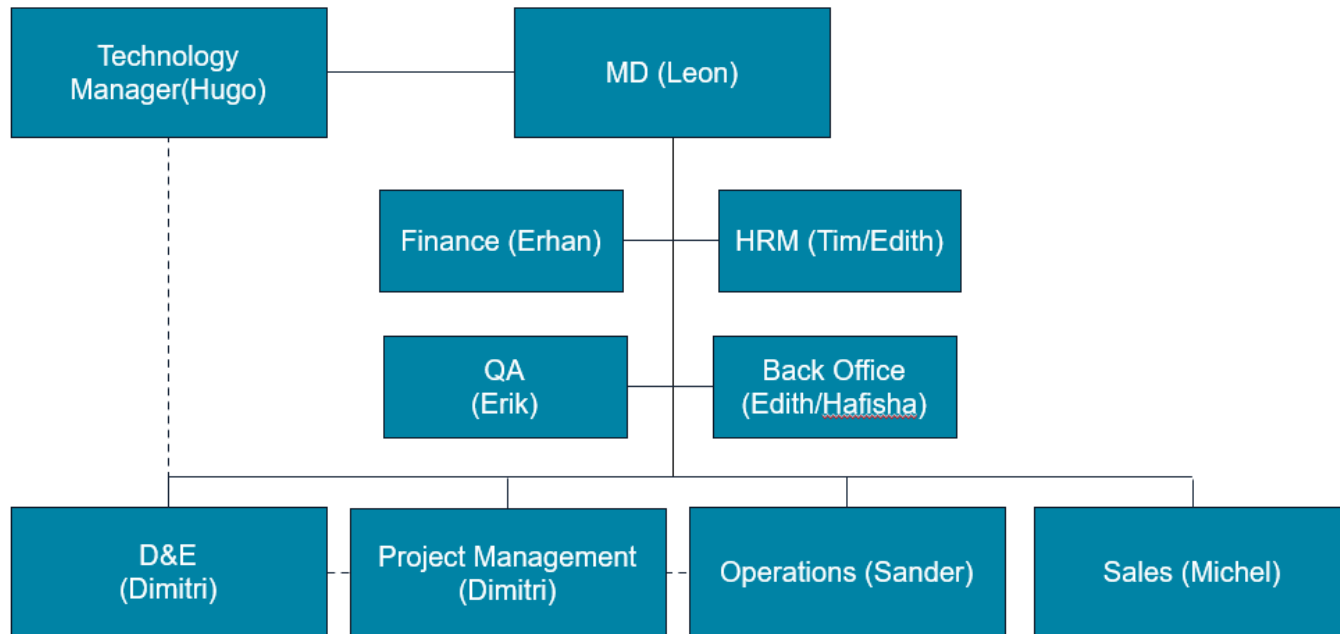
## Laser beam delivery:

- Scanning
- Focusing
- Beam shaping
- Beam steering





# OUR TEAM AND KEY FIGURES



## Some figures

Our staff: 43 FTE (2023)

- Operations: 24 FTE
  - Finance: 2
  - Purchase: 3
  - PE: 3
  - Assembly/cleaning: 15
  - Warehousing 1
  - QA 0,5
- Engineering: 16 FTE (MSc-PhD)
  - Optics: 11
  - M-Dev/E-Dev/SW: 5 (NX)
- Project Management: 3 (incl. NPI)

Cleanroom (ISO 5-6-7, 300m<sup>2</sup>) incl. own wet cleaning facility (grade 4)

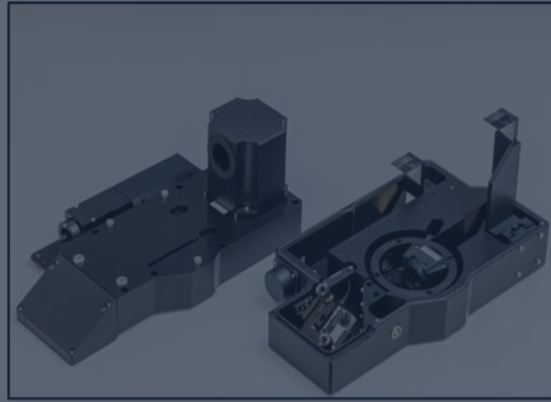
Greyroom (ISO 8, 400m<sup>2</sup>)

MRP principles for serial builds

# WHAT CAN WE DO FOR YOU?

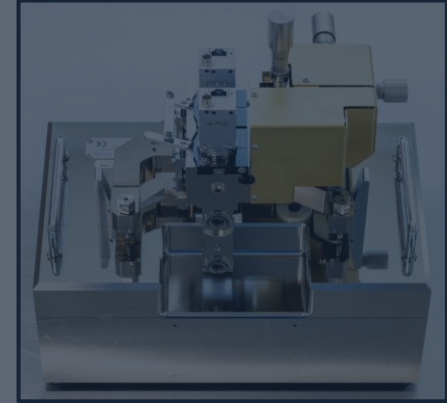
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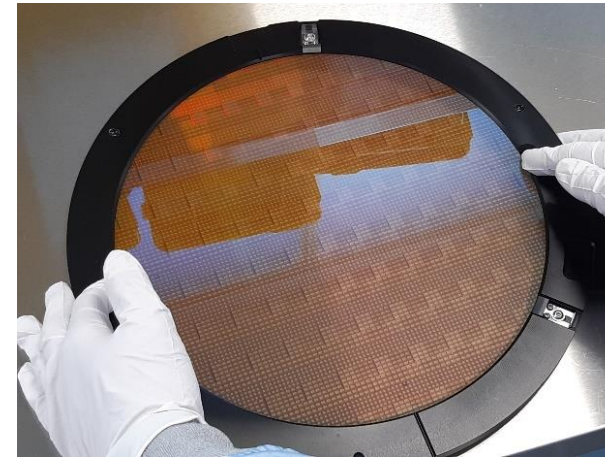


# MICRO-OPTICS INSPECTION

## PROJECT: MICRO METROLOGY TEST STATION



Operational test station



300 mm wafer in removeable holder

**Customer Request:** Design and build micrometrology test station

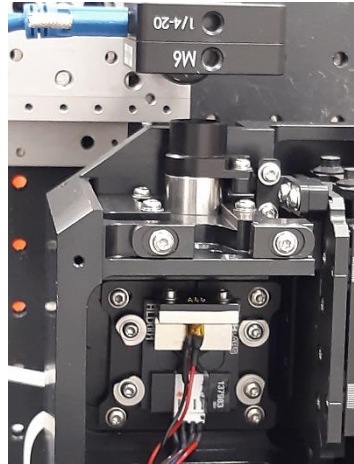
**Main Function(s):** Inspection of wafer-level optics on:

- Pattern tolerance (size-width)
- Throughput
- Detection of hotspots

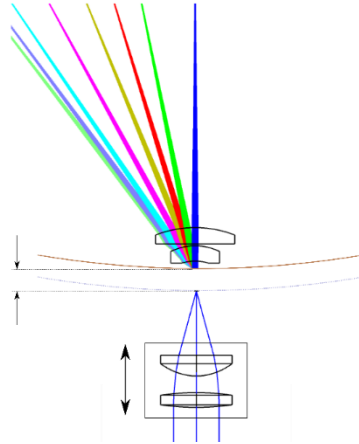
Via DDL of customer image analysis (eg distortion)

# MICRO-OPTICS INSPECTION

## PROJECT: MICRO METROLOGY TEST STATION



VCSEL relay optics

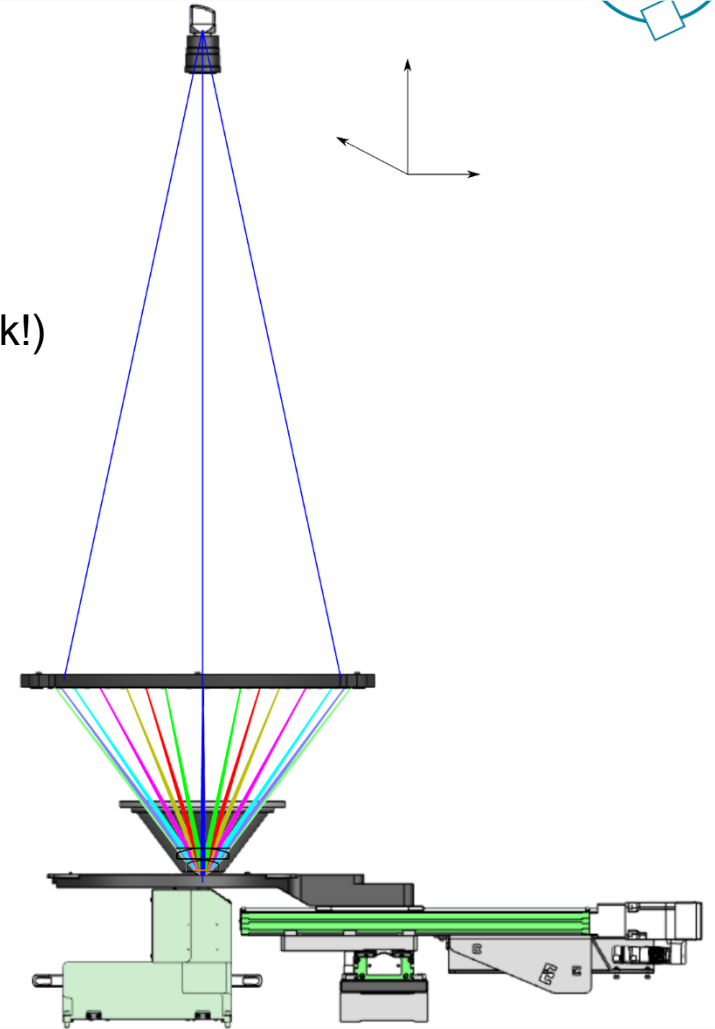


### Key performance specifications

- 115° field of view (circular)
- 0.02°/pixel resolution
- 300 mm diameter wafers (210 μm thick!)
- Sub 10 μm XYZ positioning accuracy
- VCSEL based illumination:
  - λ 940 nm
  - Pulsed operation
  - Safety shutter
  - Adjustable focus position (20 nm stepsize)
- Throughput ~1 element/s

### Challenges

- <6 month start-to-finish
- Controlling wafer vibration
- Synchronization between pulsed VCSEL and camera
- Customer DLL software integration



Test station interior



# PROJECTOR INSPECTION

## PROJECT: PROJECTOR TEST STATION



Operational test station



16 projectors in removeable holder

Customer Request: Design and build projector test station

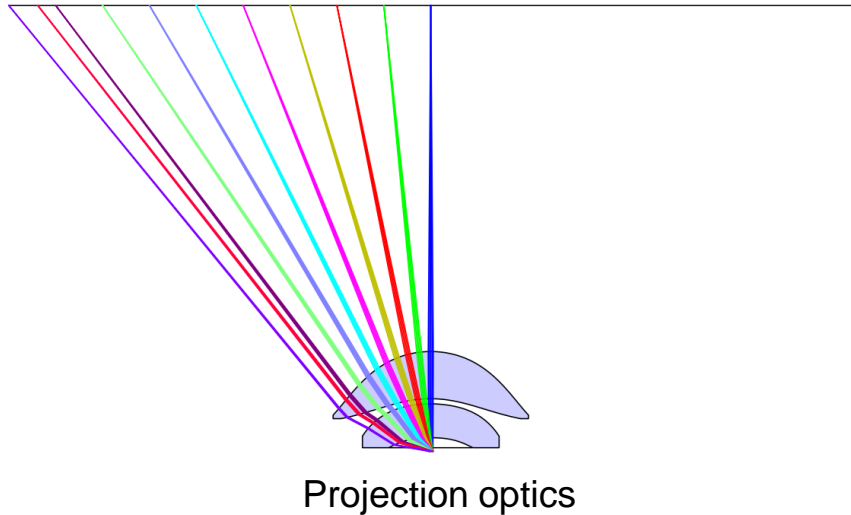
Main Function(s): Inspection of microscale projector modules:

- Pattern tolerance (size-width)
- Throughput
- Detection of hotspots
- Power measurement

Via DDL of customer image analysis (eg distortion)

# PROJECTOR INSPECTION

## PROJECT: PROJECTOR TEST STATION

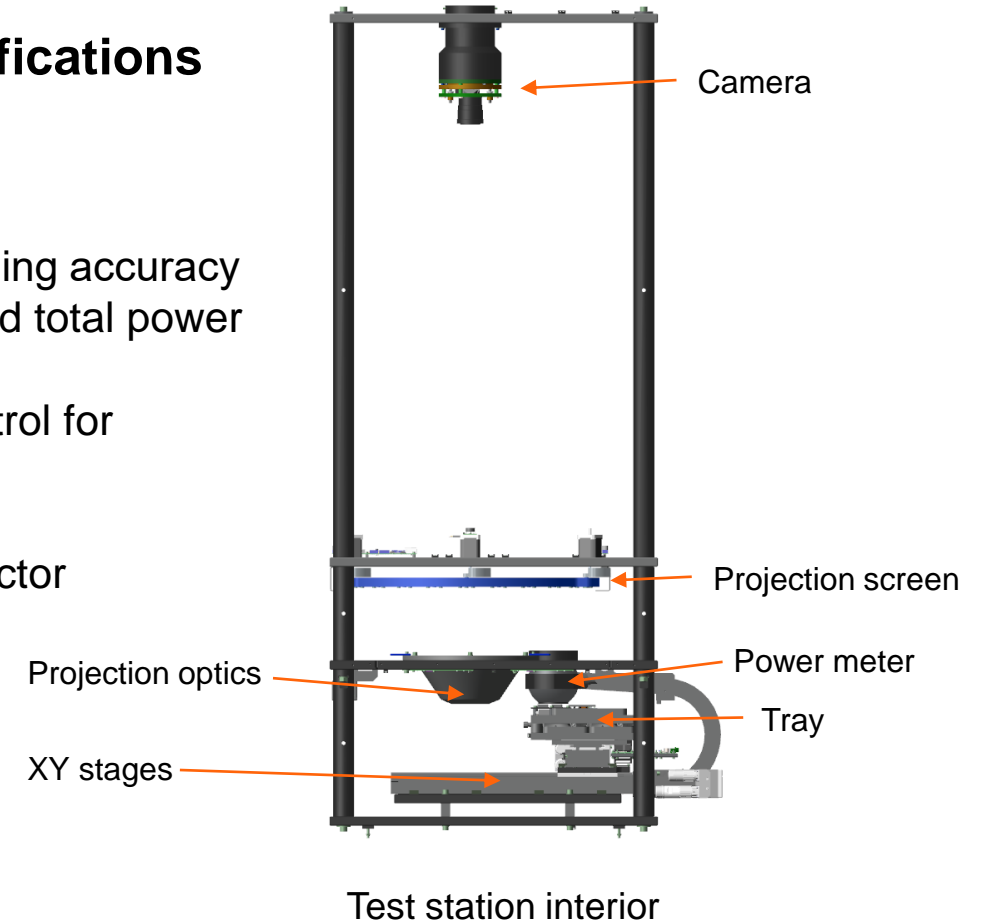


### Challenges

- Reliable and durable interfacing between projectors and tray
- Large field of view
- Customer DLL software integration
- Integration of customer driver electronics

### Key performance specifications

- 160° field of view (circular)
- 0.036°/pixel resolution
- 16 projectors per tray
- Approx. 20 μm XY positioning accuracy
- Radiant intensity profile and total power output measured
- Separate temperature control for each projector
- Read out EEPROM data
- Throughput ~10 sec./projector





# SUMMARIZED: WHAT CAN WE DO FOR YOU?

- Partnering in Custom Opto-Mechanics development
  - Micro-Optics Inspection
  - OEM Modules Systems
  - OEM Optical Tooling
- Partnering in Custom Opto-Mechanics production (from 1 until high volume series)
- Optics Competence Partner (e.g.: pressure cooking sessions)
- Extension of your own Development department → flexibility, time to market!



# WHAT CAN YOU DO FOR US?

- Pull us/industry in for brainstorm sessions
- Pull us/industry in at an early stage of development. Make use of the knowledge outside your own company → Early Involvement
- Together we can achieve more





## WHY NTS OPTEL

### Eyes on your success:

- What is important for you?
- Understand the actual customer need (of actual customer requirement) behind the question

### Jointly create great (optical) solutions:

- Pragmatic & Pro-active approach towards your demands
- Creativity, resulting in innovative customized solutions
- Adaptive to your desired way of working, ranging from intense team collaboration to an autonomous operation
- High quality in design and assembly ensuring continuity and solution stability

# Thank you

Accelerating the future

