

**SpotOptics s.r.l. – leaders in accurate metrology**

## OMI-UV to NIR

### **VERSATILE WAVEFRONT SENSOR**

- **Accurate metrology in single pass**
- **Optical elements, lasers and laser diodes**
- **Test any focal length and diameter (with accessories)**
- **Large dynamic range**
- **For R&D and production**
- **Optimized for UV->NIR wavelength ranges (300-1100nm)**
- **High sampling**



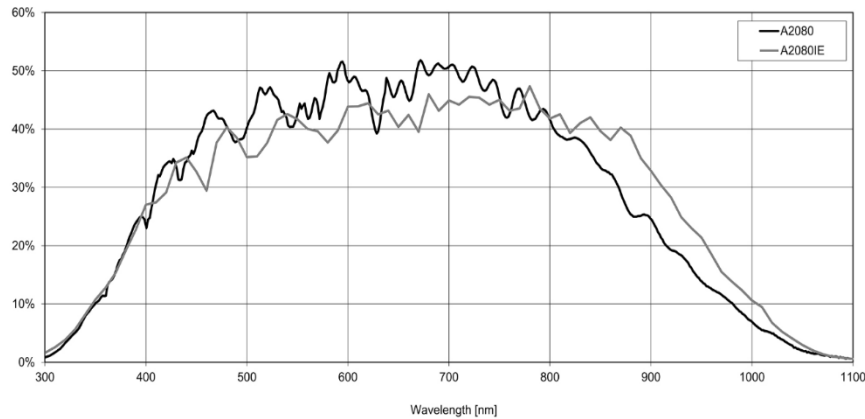
More than 25 years' experience in accurate metrology

## TECHNICAL SPECIFICATIONS (GENERAL)

HARDWARE	
Test	Optical elements, lasers and laser diodes
Power of laser diode that can be tested	Few mW. Higher powers require a power reduction system (available)
No of spots (see cameras below)	50x50 (UV-VIS-NIR) for a pupil of $\phi=10\text{mm}$ . 75x75 spots for a pupil of 15mm
Diameter and focal length of standard lenslet arrays	<ul style="list-style-type: none"> <li><math>\phi=0.2\text{mm}</math>, <math>f=22\text{mm}</math>– for UV-Vis region from 300-750nm</li> <li><math>\phi=0.2\text{mm}</math>, <math>f=11\text{mm}</math> - for NIR region – from 750-1100nm</li> </ul>
SOFTWARE	
Software (control and analysis)	Sensoft for 64bit Win 8.1, Win 10, Win 11
RMS repeatability of Zernike coefficients	$<2\text{nm rms } (\lambda/800 @ 1050\text{nm})$
RMS repeatability of modal wavefront measurements	$< \lambda/100$
Accuracy and dynamic range	$\lambda/20$ - $\lambda/100$ (calibration dependent), $\pm 50 \lambda$
CAMERAS	
Detector, wavelength range and cooling	CMOS (UV-VIS-NIR). Uncooled. See QE curves below
Camera 1: Resolution, pixel size, chip size	1024 x 1024 pixels, $10.6 \mu\text{m}$ , $10.9 \times 10.9 \text{ mm}^2$
Camera 2: Resolution, pixel size, chip size	2048 x 2048 pixels, $8\mu\text{m}$ , $16 \times 16 \text{ mm}^2$
Connection, A/D convertor bits	Gigabit Ethernet, 12-bits
Camera 1: Acquisition speed	75Hz
Camera 2: Acquisition speed	15Hz
Triggering	Yes
Exposure time (max)	$\sim 800\text{msec}$
ACCESSORIES	
Light sources, beam expanders and compressors	High quality LD with lens at test wavelength, beam expanders/compressors

## OMI UV-VIS-NIR (from 300nm-1100nm)

### Quantum Efficiency Image Sensor



### Quantum efficiency curve of CMOS

#### Other details

- Resolution: 1024 x 1024 pixels
- Pixel size: 10.6  $\mu\text{m}$  x 10.6  $\mu\text{m}$
- Chip size: 10.9 mm x 10.9 mm
- Image rate: 75Hz (full resolution)
- Saturation:  $\geq 900,000e^-$  SNR: 200
- Max. exp. Time:  $\sim 800$  ms
- Connection: Gigabit Ethernet

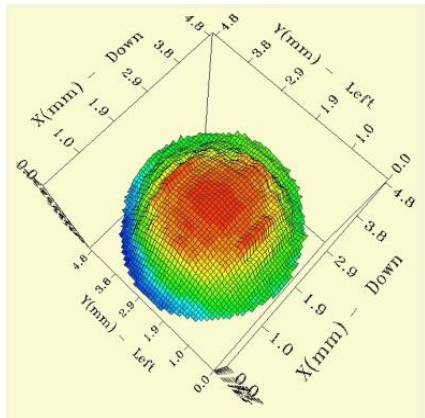
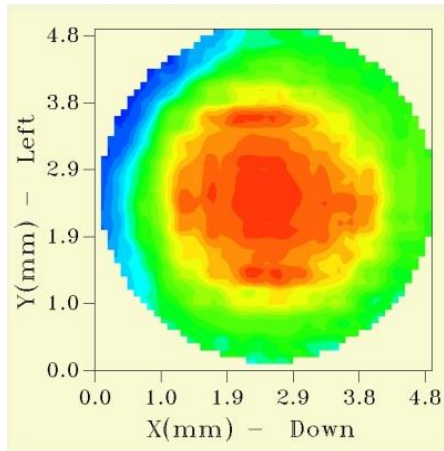
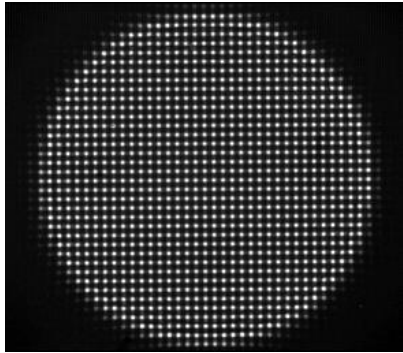


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### OMI UV-VIS-NIR

#### Other details

- Resolution: 50x50 spots (max)
- Lenslet pitch and focal length (UV and VIS): 0.2mm, 22mm
- Lenslet pitch and focal length (NIR): 0.2mm, 11mm
- Calibration unit for parallel light: Static or motorized high-quality collimator with LD/LED at test wavelength
- Motor step: 2.5 $\mu\text{m}$



## SENSOFT: THE SOFTWARE

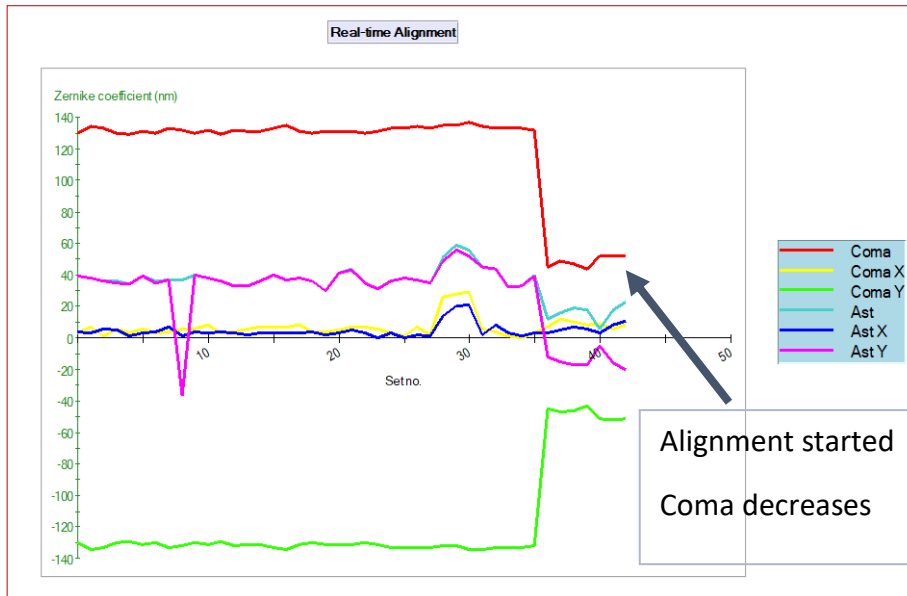
### Sensoft: The modular software package

- Fully controls the hardware of OMI
- Performs the Shack-Hartmann (SH) analysis
- Computes Zernike coefficients, diagnostics (alignment and correct focal plane), zonal and modal wavefront, MTF, spot diagram
- Has a Loop mode for on-line adjustment of optical systems

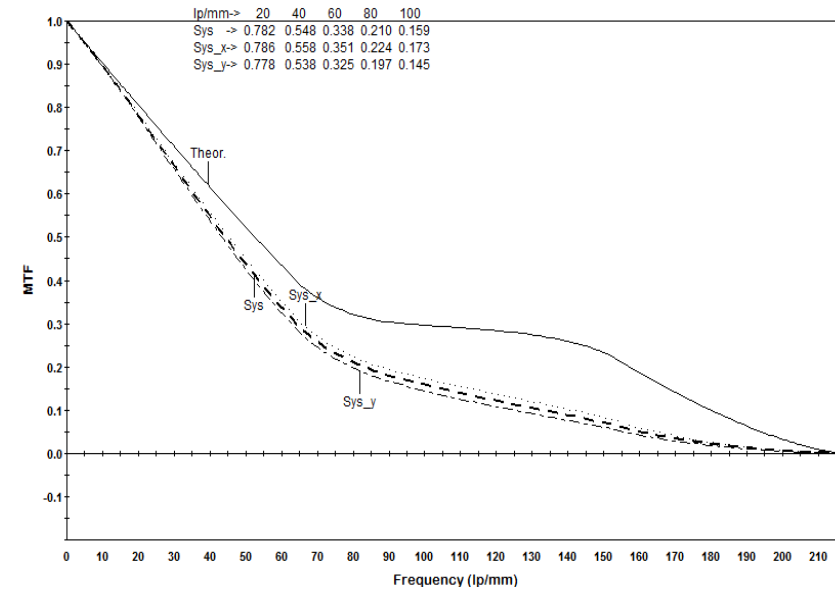
### OMI in your production line:

- OMI – with its own PC - can easily be adapted to the production line
- It can work in a closed-loop with the PC of the manufacturing machine
- A software module defines the IP communication protocol and transfers the results between the PCs in the Local Area Network

## ON-LINE ALIGNMENT IN A FAST LOOP



## MTF MEASUREMENTS

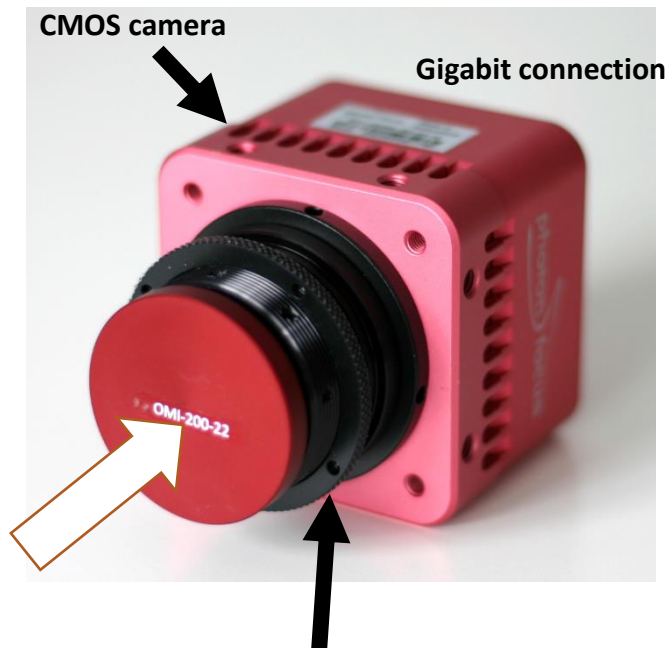


- The alignment of complex optical systems becomes easy by monitoring coma and astigmatism in a continuous loop
- The individual (x, y) components of coma and astigmatism, as well as the total coefficients are displayed
- The optimization can be done for one component at a time, as the software can display one component of interest

MTF after subtracting the contributions of tilt and defocus present in the data.

## OMI with UV-VIS CAMERA

Calibration light source: LD/LED at different wavelengths (parallel or pinhole for test with collimator)



Input test beam

### OMI

- $f_l=22\text{mm}$ ,  $\phi=0.2\text{mm}$  for UV-Vis (300-750nm)
- $f_l=11\text{mm}$ ,  $\phi=0.2\text{mm}$  for NIR (750-1100nm)
- Max. Resolution 50x50 spots

## PHYSICAL

### Camera:

CMOS, Gigabit Ethernet, 12-bits (300-1100nm)

### Dimensions

120 (L) x 60 (W) x 60 (H) mm

Weight: ~500gm

## KEY FEATURES

### Measurement technique

Shack-Hartmann wavefront sensor

### Test in parallel light or at the lens focus in single pass

Parallel light (with a calibration unit)

At the focus of the lens (with pinhole calibration unit)

Light sources with different wavelength available

### Calibration units available

High-quality parallel light source (motorized or manual)

Pinhole calibration unit

### Accessories

Light sources and beam expanders/compressors. Collimators

## SOFTWARE

- Full waterfront analysis: Zernikes, zonal and modal WF, Spot diagram, MTF, EE, PSF,  $M^2$
- Easy alignment of lens group via software: graphical indication for correction using coma and astigmatism
- Stabilization of lasers: graphical indication of focusing of laser beam