

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

# OMI-DUV to NIR

## VERSATILE WAVEFRONT SENSOR

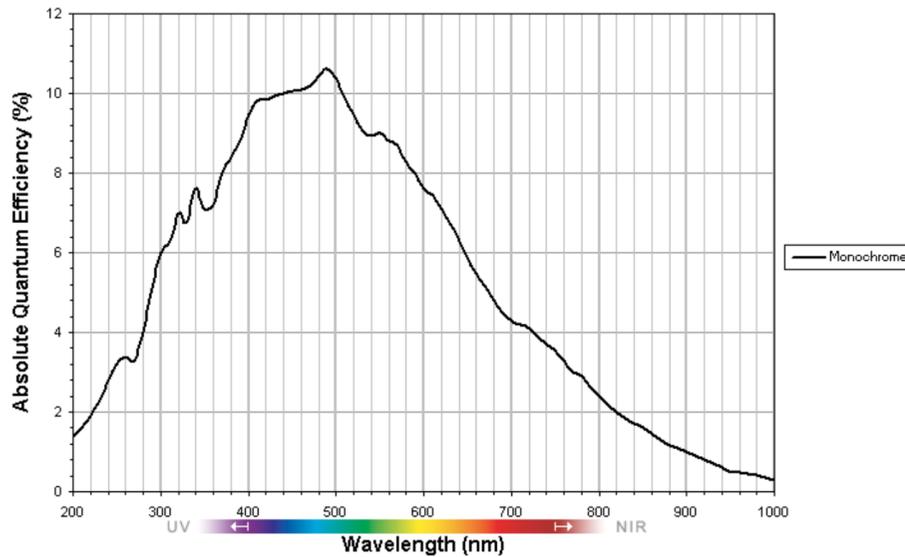
- Accurate metrology in single pass
- Optical elements, lasers and laser diodes
- Test any focal length and diameter (with accessories)
- Large dynamic range
- For R&D and production
- Optimized for UV->NIR wavelength ranges
- High sampling



More than 25 years' experience in accurate metrology

TECHNICAL SPECIFICATIONS	
<b>HARDWARE</b>	
<b>Test</b>	Optical elements, lasers and laser diodes
<b>Power of laser diode that can be tested</b>	Few mW. Higher powers require a power reduction system (available)
<b>No of spots (see cameras below)</b>	70x70 (DUV-VIS-NIR) for a pupil size of 14mm
<b>Diameter and focal length of standard lenslet arrays</b>	<ul style="list-style-type: none"> <li>• <math>\phi=0.2\text{mm}, f=22\text{mm}</math> – for UV-Vis region from 193-750nm</li> <li>• <math>\phi=0.2\text{mm}, f=11\text{mm}</math> - for NIR region – from 751-1000nm</li> </ul>
<b>SOFTWARE</b>	
<b>Software (control and analysis)</b>	Sensoft for 64bit Win7, Win 8.1, Win 10
<b>RMS repeatability of Zernike coefficients</b>	<2nm rms ( $\lambda/800$ @ 1550nm)
<b>RMS repeatability of modal wavefront measurements</b>	< $\lambda/100$
<b>Accuracy and dynamic range</b>	$\lambda/20$ - $\lambda/100$ (calibration dependent), $\pm 50 \lambda$
<b>CAMERA</b>	
<b>Detector, wavelength range and cooling</b>	CCD (DUV-VIS-NIR). Uncooled.
<b>Resolution, pixel size, chip size</b>	2048 x 2048 pixels, each of 7.4 $\mu\text{m}$ . 15.15 x 15.15 mm <sup>2</sup>
<b>Connection, A/D convertor bits</b>	Gigabit Ethernet, 12-bits or 14-bits
<b>Acquisition speed</b>	7.5Hz (CCD)
<b>Triggering</b>	Yes
<b>Exposure time (max)</b>	1sec
<b>ACCESSORIES</b>	
<b>Light sources, beam expanders and compressors</b>	High quality LD with lens at test wavelength, beam expanders/compressors

OMI DUV-VIS-NIR (from 193nm-1100nm)



Quantum efficiency curve of CCD

Other details

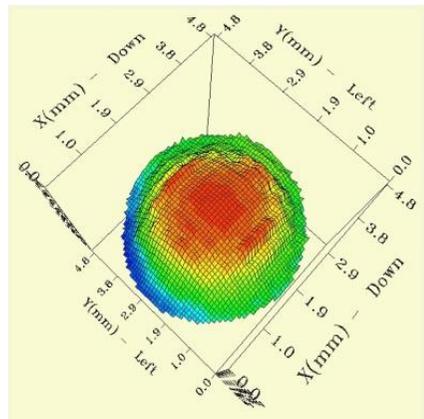
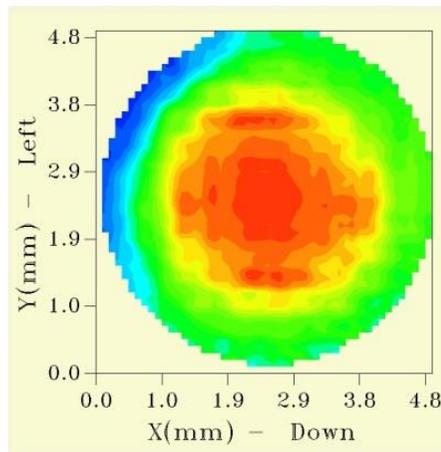
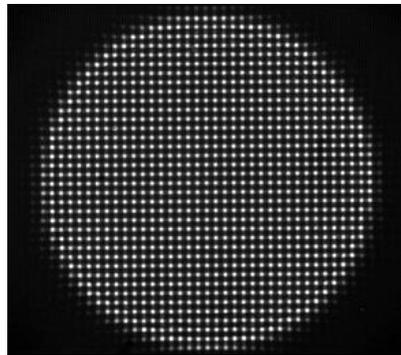
- Resolution: 2048 x 2048 pixels
- Pixel size: 7.4  $\mu\text{m}$  x 7.4  $\mu\text{m}$
- Chip size: 15.15 mm x 15.15mm
- Image rate: 7.5Hz (full resolution)
- Interline transfer sensor. Saturation:  $\geq 40,000e^-$
- Max. exp. time: 1 sec
- Connection: Gigabit Ethernet



OMI-DUV-VIS (left) with motorized calibration unit

Other details

- Resolution: 70x70 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

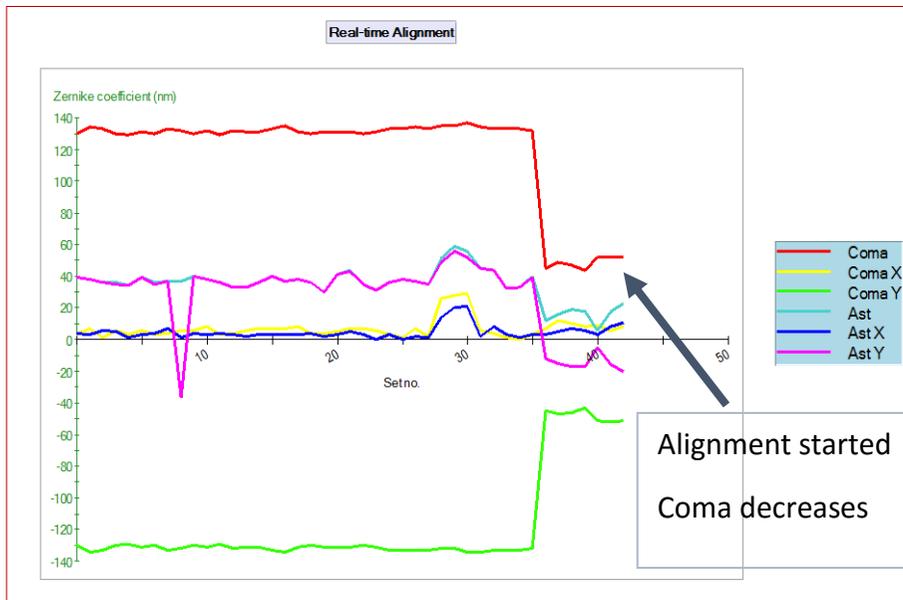
### Sensoft: The modular software package

- 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:

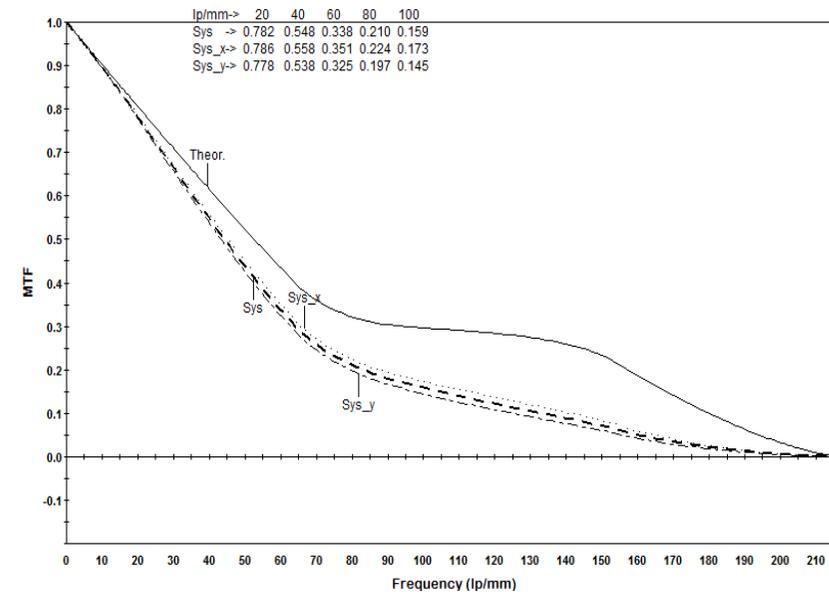
- OMI – with its own PC - can easily be adapted to the production line
- It can work in a closed-loop with the PC of the manufacturing machine
- A software module defines the IP communication protocol and transfers the results between the PCs in the Local Area Network

## ON-LINE ALIGNMENT IN A FAST LOOP



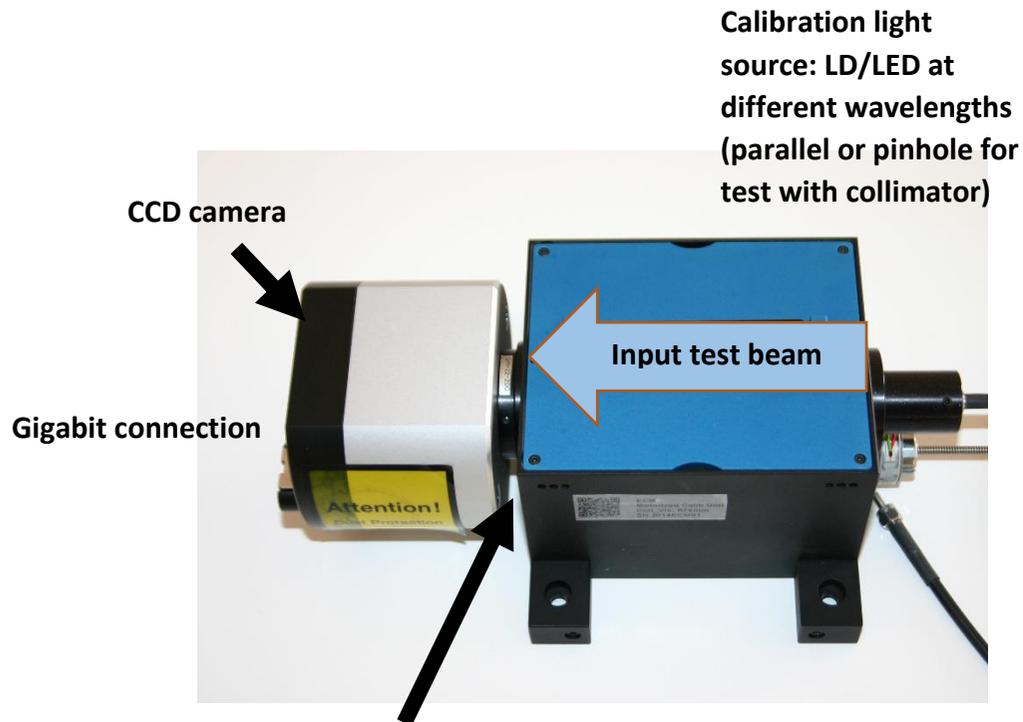
- The alignment of complex optical systems becomes easy by monitoring coma and astigmatism in a continuous loop
- The individual (x, y) components of coma and astigmatism, as well as the total coefficients are displayed
- The optimization can be done for one component at a time, as the software can display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

## MTF MEASUREMENTS



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

## OMI on OPTINO with DUV-VIS CAMERA



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 (750-1000nm)
- Max. Resolution 70x70 spots for a pupil size of 14mm

### PHYSICAL

#### Camera:

CCD, Gigabit Ethernet, 12-14bits (193-1000nm)

#### Dimensions

105 (L) x 90 (W) x 71 (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 waterfont 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