

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

# OMI-DUV-HR 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**
- **High resolution (60x60 spots)**
- **For R&D and production**
- **Optimized for DUV->NIR wavelength ranges (190-1100nm)**

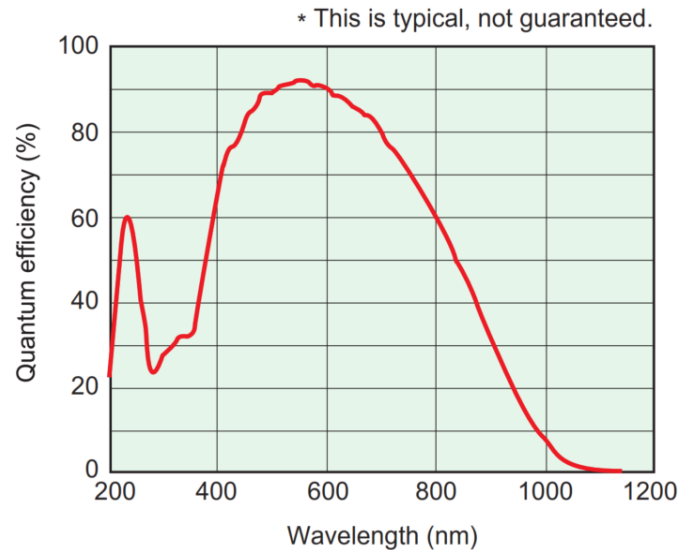


More than 25 years' experience in accurate metrology

TECHNICAL SPECIFICATIONS	
<b>HARDWARE</b>	
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)	60x60 (DUV-VIS-NIR) for a pupil size of 12.5mm
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 190-750nm</li> <li>• <math>\phi=0.2\text{mm}</math>, <math>f=11\text{mm}</math> - for NIR region – from 751-1100nm</li> </ul>
<b>SOFTWARE</b>	
Software (control and analysis)	Sensoft for 64bit Win 10
RMS repeatability of Zernike coefficients	<2nm rms ( $\lambda/800$ @ 1550nm)
RMS repeatability of modal wavefront measurements	< $\lambda/100$
Accuracy and dynamic range	$\lambda/20$ - $\lambda/100$ (calibration dependent), $\pm 50 \lambda$
<b>CAMERA</b>	
Detector, wavelength range and cooling	Back Thinned CCD (DUV-VIS-NIR). High quantum efficiency: Over 60 % at 200 nm, Over 90 % at 650 nm. Cooled (Thermo-electric or water cooling)
Resolution, pixel size, chip size	1024 x 1024 pixels, each of 13.0 $\mu\text{m}$ . 13.3 x 13.3 $\text{mm}^2$
Connection, A/D convertor bits	Firewire IEEE 1394b-2002, 16-bits
Acquisition speed and Frame transfer	3.15 Hz, 4.85Hz in binned mode, full frame transfer (global shutter) CCD
Triggering	Yes
Exposure time (min, max)	400 msec, 7 sec
<b>ACCESSORIES</b>	
Light sources, beam expanders and compressors	High quality LD with lens at test wavelength, beam expanders/compressors

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

## SPECTRAL RESPONSE



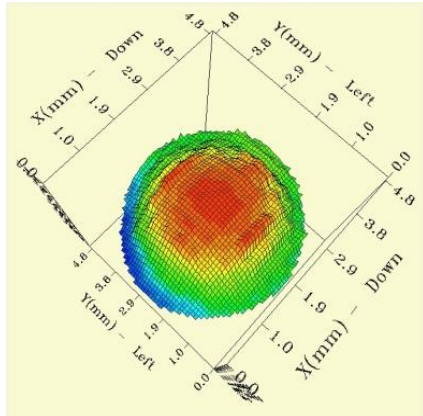
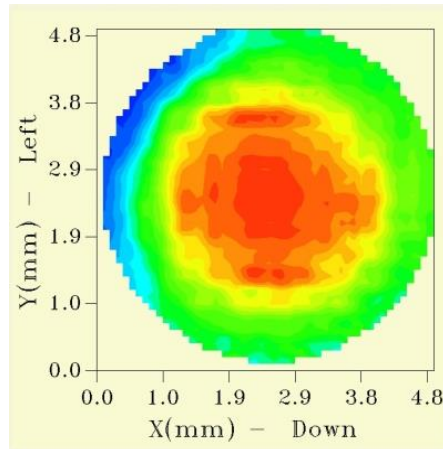
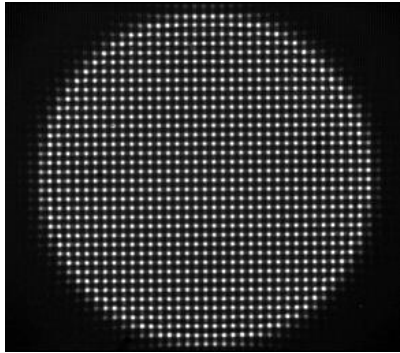
## Quantum efficiency curve of CCD

## Other details

- Resolution: 1024 x 1024 pixels
- Pixel size: 13.0  $\mu\text{m}$  x 13.0  $\mu\text{m}$
- Chip size: 13.3 mm x 13.3mm
- Image rate: 3.15Hz (full resolution)
- Interline transfer sensor. Saturation:  $\geq 80,000\text{e}^-$
- Max. exp. time: 7 sec
- Connection: Firewire IEEE 1394b-2002

## Other details

- Resolution: 60x60 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

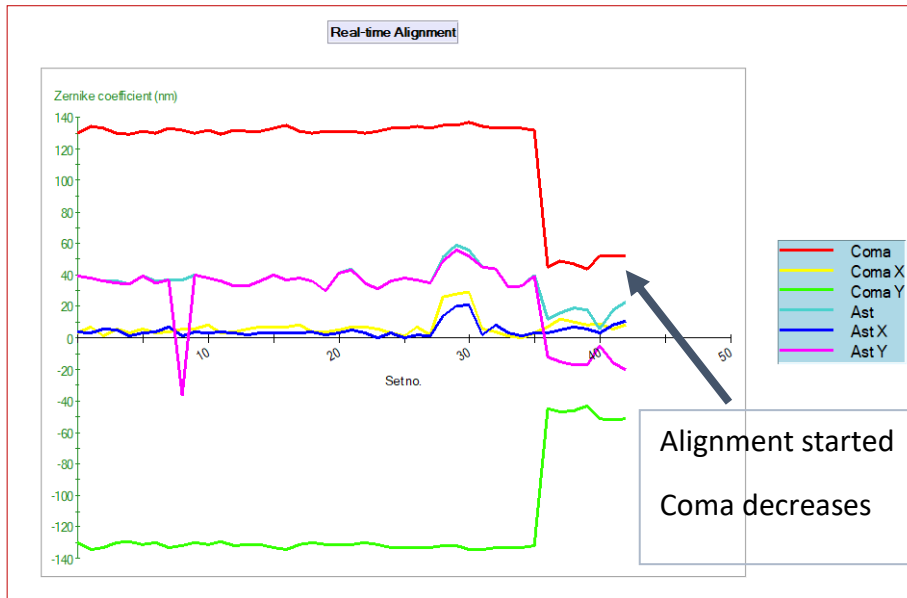
### Sensoft: The modular software package

- 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:

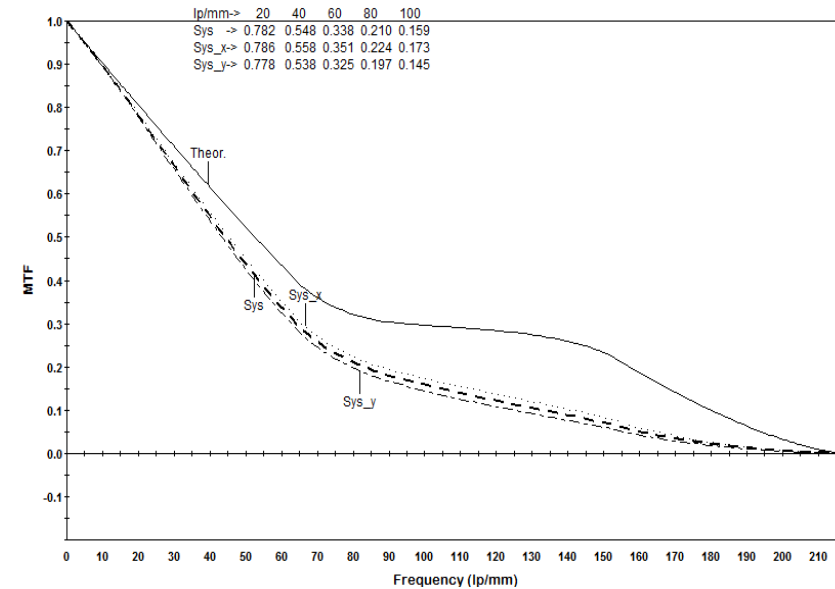
- OMI – with its own PC - can easily be adapted to the production line
- It can work in a closed-loop with the PC of the manufacturing machine
- A software module defines the IP communication protocol and transfers the results between the PCs in the Local Area Network

## 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 with DUV-VIS CAMERA

CCD camera with OMI



### OMI

- **f<sub>l</sub>=22mm,  $\phi$ = 0.2mm for UV-Vis (193-750nm)**
- **f<sub>l</sub>=11mm,  $\phi$ = 0.2mm for NIR (750-1000nm)**
- **Max. Resolution 60x60 spots for a pupil size of 12.5mm**

## PHYSICAL

### Camera

CCD, Firewire, 16bits (200-1000nm), Global shutter

**Chip size:** 1024x1024x13 $\mu$  pixels, 13.3.x13.3 mm<sup>2</sup>

**Cooling:** Yes. Thermo electric or water cooling

**Dimensions:** 110 (L) x 111 (W) x 215 (H) mm

**Weight:** ~3.5 Kg

## 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<sup>2</sup>
- 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