

# SpotOptics

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## OMI-SWIR



### FAST & ACCURATE WAVEFRONT SENSOR

- Acquisition speed up to 300 Hz, analysis speed up to 200Hz
- Optimized for SWIR wavelength range with InGaAs camera
- Accurate metrology in single pass (OMI) and double pass (Optino)
- Optical elements, lasers and laser diodes
- Test any focal length and diameter (with accessories)
- Large dynamic range
- Medium (35x35) and high sampling (60x60) options
- Adaptable for production

**More than 25 years' experience in accurate metrology**

## TECHNICAL SPECIFICATIONS

Hardware	
<b>Test</b>	Optical elements, lasers and laser diodes
<b>Power of laser diode that can be tested</b>	Few mW. Higher powers require reduction system (available)
<b>No of spots (see cameras below)</b>	35x35 (standard camera), 60x60 (large format camera)
<b>Diameter and focal length of standard lenslets</b>	( $\phi=0.2\text{mm}, f=11\text{mm}$ ), ( $\phi=0.15\text{mm}, f=7\text{mm}$ )
Software	
<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), $\pm 50 \lambda$
Camera (see next page for details)	
<b>Detector, wavelength range and cooling</b>	InGaAs. 0.90 $\mu$ -1.7 $\mu$ , Uncooled or Peltier cooled version
<b>Connection, bits</b>	Gigabit Ethernet, 12-bits or 14-bits
<b>Acquisition speed</b>	From 100Hz up to 340Hz at full resolution. Speeds up to 1700Hz available with custom cameras
<b>Triggering</b>	Yes
<b>Exposure time range</b>	5ums-100msec (uncooled), 5ums-1s (cooled)
Accessories	
<b>Light sources, beam expanders and compressors</b>	High quality LD at test wavelength, beam expanders/compressors

## OMI models: cooled and uncooled. High acquisition and computational speed

### Standard resolution

#### OMI-SWIR-340

Resolution : 35x35 spots

Chip size: 9.6x7.68 mm<sup>2</sup>

No. of pixels: 320x256. Pixel size: 30 μ

High acquisition speed: up to 344fps

High computation speed: up to 200Hz

InGaAs detector for high accuracy

Wavelength range: 0.9-1.7 (μ)

Gigabit Ethernet connection

### High resolution

#### OMI-SWIR-100-HR

Resolution : 60x60 spots

Chip size: 15.9x12.7 mm<sup>2</sup>

No. of pixels: 636x508. Pixel size: 25 μ

High acquisition speed: up to 100fps

High computation speed: up to 100Hz

InGaAs detector for high accuracy

Wavelength range: 0.9-1.7 (μ)

Gigabit Ethernet connection

## OMI models details (standard resolution models)

<b>Model of wavefront sensor</b>	OMI-SWIR-HS-340	OMI-SWIR-HS-340-C (cooled)
<b>Highlights</b>	High-speed, Uncooled, 344fps	High-speed, Cooled, 344fps
<b>Form</b>	Rectangular	Rectangular
<b>Pixels</b>	320x256	320x256
<b>Peltier cooling</b>	No.	Temperature stabilized TEC1
<b>Output(bits)</b>	14	14
<b>Operating temp (°C)</b>	Minimum +10	5° C
<b>Power requirement (V DC)</b>	10.8-30 or via PoE	10.8-30 or via PoE
<b>Power consumption (W)</b>	10.8 (@ 12V DC)-12.5W (@ PoE)	10.8 (@ 12V DC)-12.5W (@ PoE)
<b>Weight (Camera+OMI) (g)</b>	340+50=390	810+50=860
<b>Dimension (L,W,H in mm)</b>	78x55x55	90x80x80
<b>Acquisition speed (fps)</b>	344	344
<b>Analysis speed for Zernike coefficients in loop mode( Hz)</b>	~200	~200



## OMI models details (high resolution models)

<b>Model of wavefront sensor</b>	OMI-SWIR-100-HR	OMI-SWIR-100-HR-C
<b>Highlights</b>	High resolution, Uncooled, 100fps	High resolution, Cooled, 100fps
<b>Pixels</b>	636x508	636x508
<b>Peltier cooling</b>	No. Temperature stabilized TEC1	Yes. TEC2
<b>Output(bits)</b>	14	14
<b>Operating temp (°C)</b>	Minimum +10	-20 to +55 (case)
<b>Power requirement (V DC)</b>	10.8-30 or via PoE	or via PoE
<b>Power consumption (W)</b>	10.8W(@12VDC)-12.95W(PoE)	19W(@12VDC)-22W(PoE)
<b>Weight (Camera+OMI) (g)</b>	370+50=420	810+50=860
<b>Dimension (L,W,H in mm)</b>	78x55x55	90x80x80
<b>Acquisition speed (fps)</b>	100	100
<b>Analysis speed for Zernike coefficients in loop mode( Hz)</b>	~50	~50



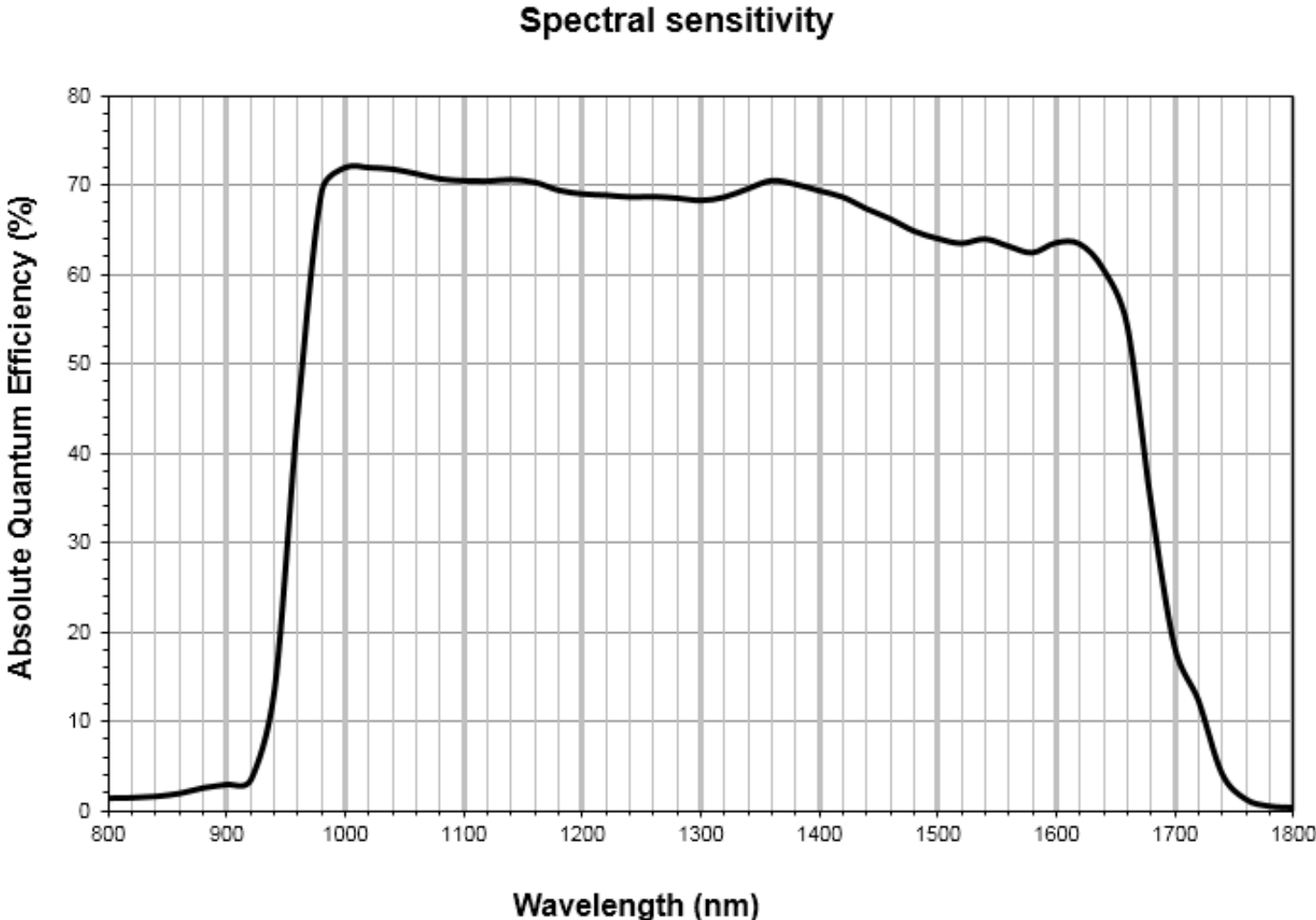


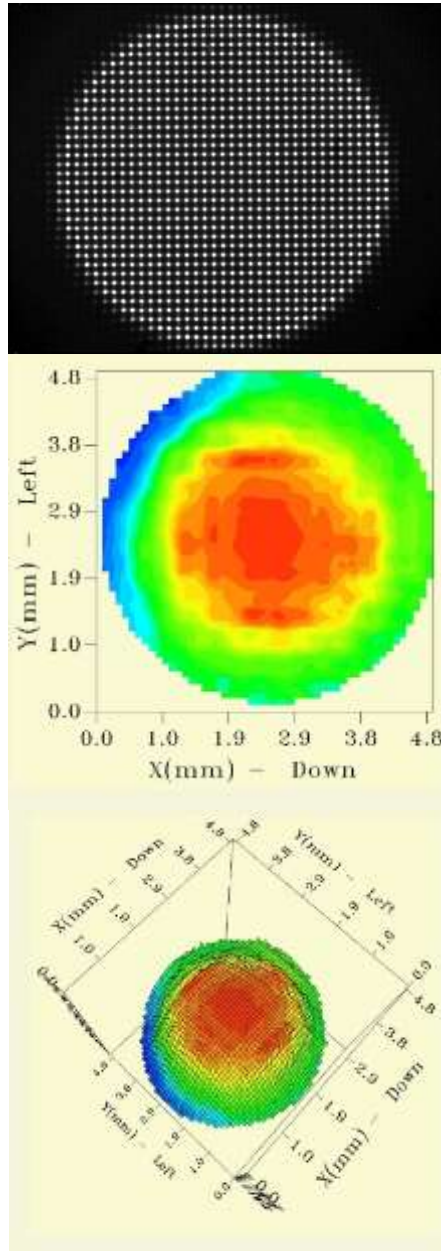
**OMI-SWIR-HS-340 Uncooled and OMI-SWIR-100-HR**



**OMI-SWIR-HS-340 Cooled and OMI-SWIR-100-HR-C**

Quantum efficiency curve of InGaAs sensor





## SENSOFT: THE SOFTWARE

### Sensoft: The modular software package

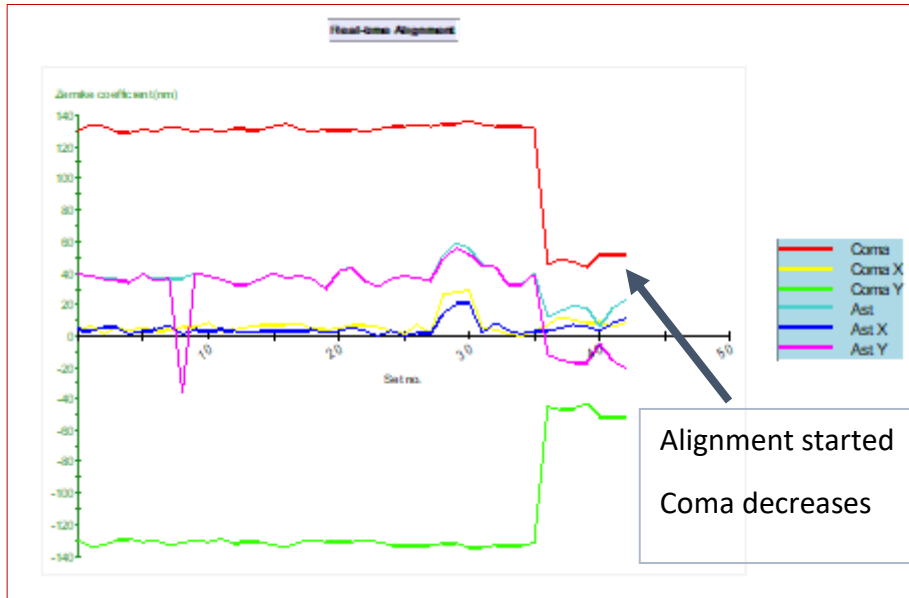
- Fully controls the hardware of OMI
- Performs the Shack-Hartmann (SH) analysis
- Computes Zernike coefficients, diagnostics (alignment and correct focal plane), wavefront, MTF, spot diagram
- Has a Loop mode for on-line adjustment of optical systems

### OMI in your production line:

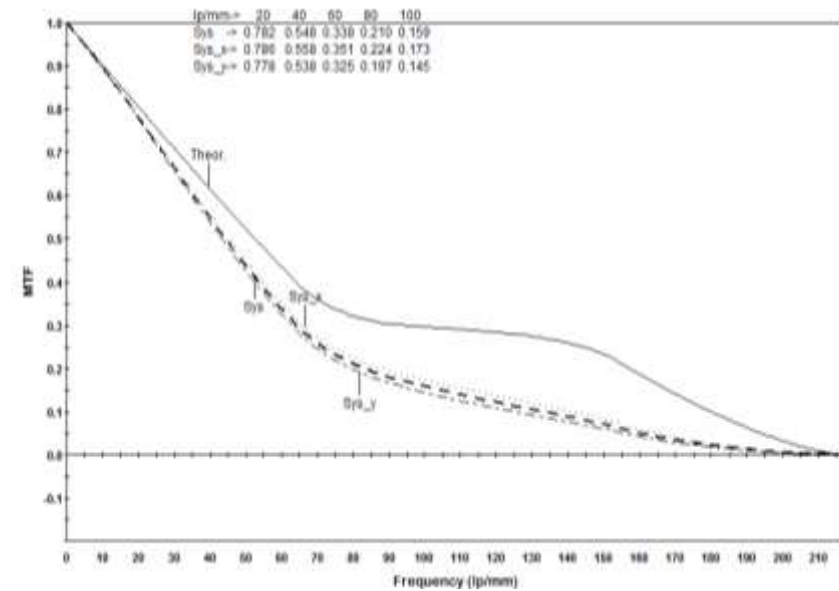
- OMI – with its own PC - can easily be adapted to the production line
- It can work in a closed-loop with the PC of the manufacturing machine
- A software module defines the IP communication protocol and transfers the results between the PCs in the Local Area Network



## ON-LINE ALIGNMENT IN A FAST LOOP



## MTF MEASUREMENTS



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- 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 CAMERA

900-1700nm InGaAs  
standard camera  
(SWIR)



OMI with large format  
InGaAs camera.  
Max. resolution: 60x60

Calibration light source  
(parallel or pinhole): LD at  
different SWIR wavelengths  
available

Gigabit connection



OMI  
( $f_l=11\text{mm}$ ,  $\phi=0.2\text{mm}$ )  
Max. Resolution  
35x35 spots

Input test beam

- $\phi=7\text{mm}$  (standard resolution)
- $\phi=12\text{mm}$  (standard resolution)
- Larger beam sizes with beam compressor (up to 40mm)

## PHYSICAL

### Dimensions

~89 (L) x 90 (W) x 71(H) mm (with standard camera)

~90 (L) x 80 (W) x 80(H) mm (with large format camera)

**Weight** ~400g-1500g

**Cameras** InGaAs, Gigabit Ethernet connection, 12-14bit

## KEY FEATURES

### Measurement technique

Shack-Hartmann wavefront sensor

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

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

### Versatile

Test any optical element and lasers in single pass

### Accessories

Full set of accessories available (e.g. light sources)

## SOFTWARE

- Easy alignment of lens group via software: the software gives graphical indication of the misalignment of the optical system, using coma and astigmatism.
- Stabilization of lasers: the software gives graphical indication of focusing of the laser beam