

SpotOptics

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	
Test	Optical elements, lasers and laser diodes
Power of laser diode that can be tested	Few mW. Higher powers require reduction system (available)
No of spots (see cameras below)	35x35 (standard camera), 60x60 (large format camera)
Diameter and focal length of standard lenslets	($\phi=0.2\text{mm}, f=11\text{mm}$), ($\phi=0.15\text{mm}, f=7\text{mm}$)
Software	
Software (control and analysis)	Sensoft for 64bit Win7, Win 8.1, 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), $\pm 50 \lambda$
Camera (see next page for details)	
Detector, wavelength range and cooling	InGaAs. 0.90μ - 1.7μ , Uncooled or Peltier cooled version
Connection, bits	Gigabit Ethernet, 12-bits or 14-bits
Acquisition speed	From 100Hz up to 340Hz at full resolution. Speeds up to 1700Hz available with custom cameras
Triggering	Yes
Exposure time range	5ums-100msec (uncooled), 5ums-1s (cooled)
Accessories	
Light sources, beam expanders and compressors	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 mm²

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 mm²

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)

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

OMI models details (high resolution models)

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



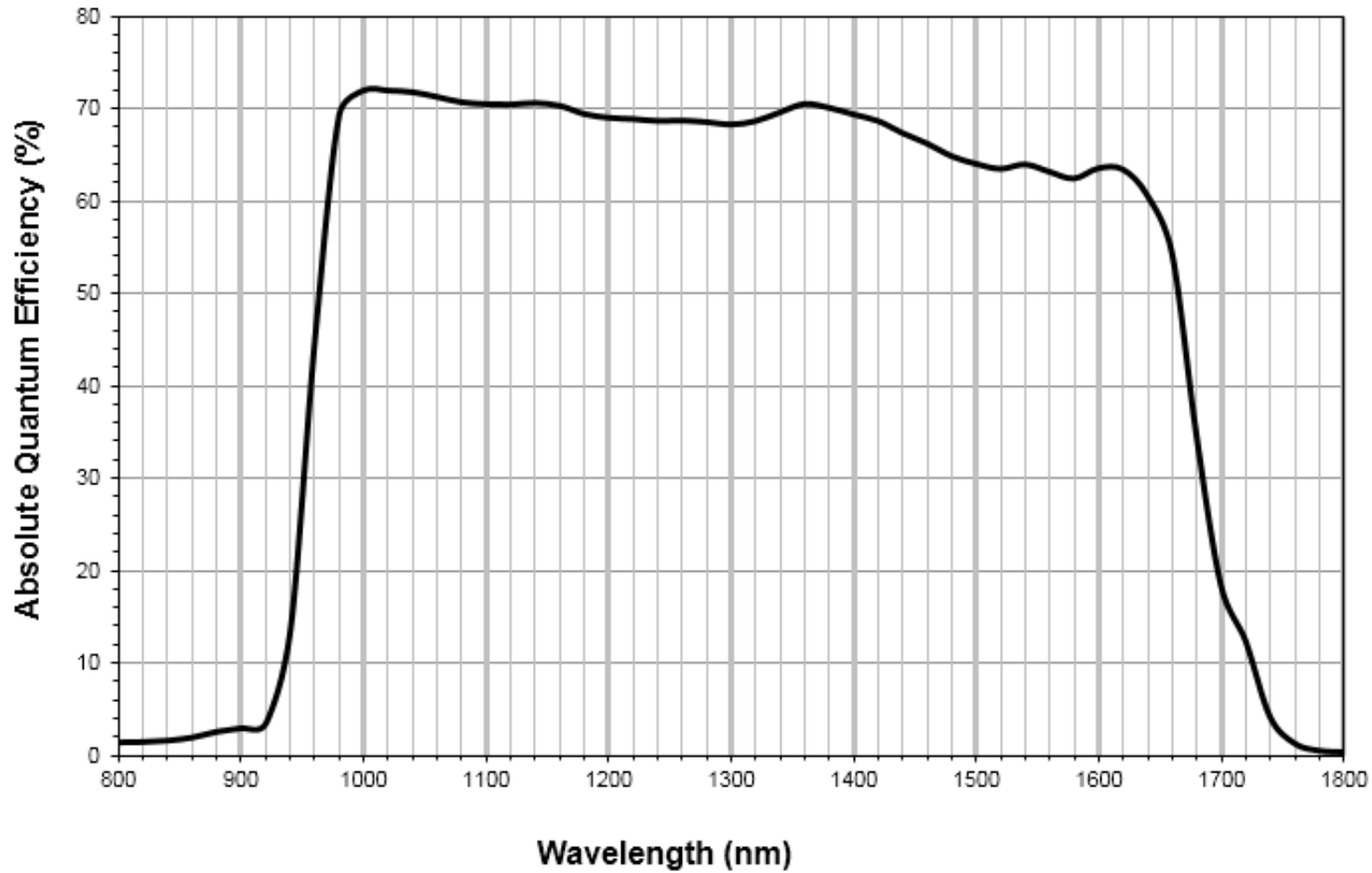
OMI-SWIR-HS-340 Uncooled and OMI-SWIR-100-HR

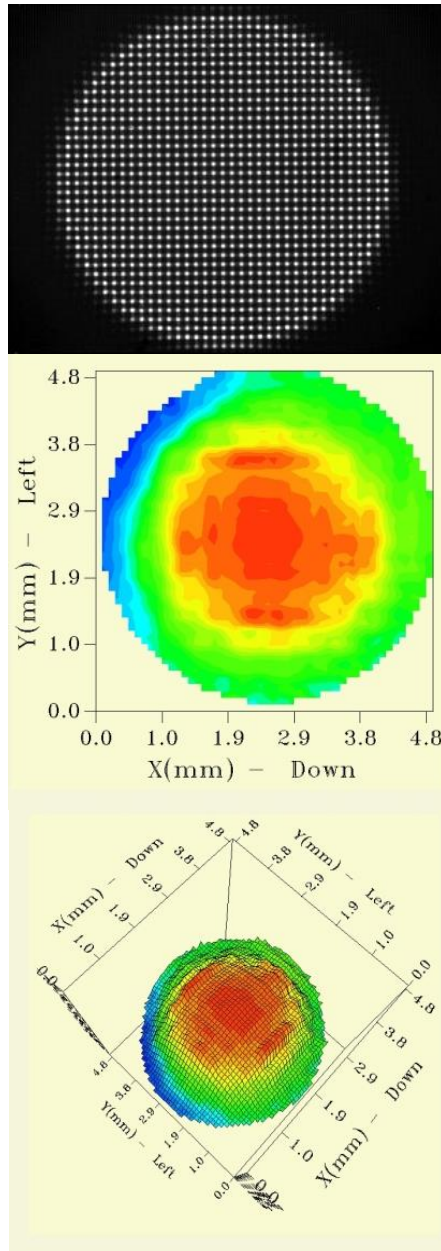


OMI-SWIR-HS-340 Cooled and OMI-SWIR-100-HR-C

Quantum efficiency curve of InGaAs sensor

Spectral sensitivity





SENSOFT: THE SOFTWARE

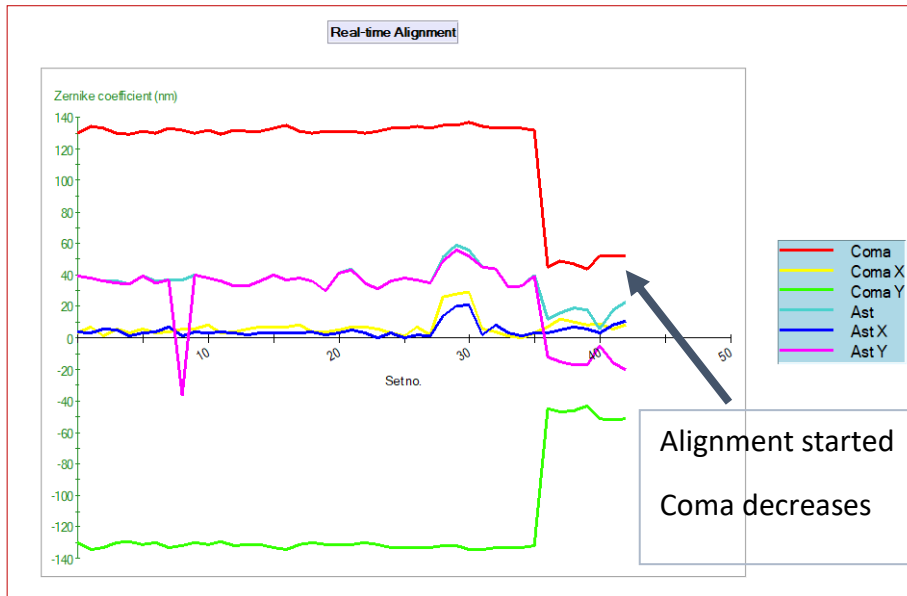
Sensoft: The modular software package

- 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:

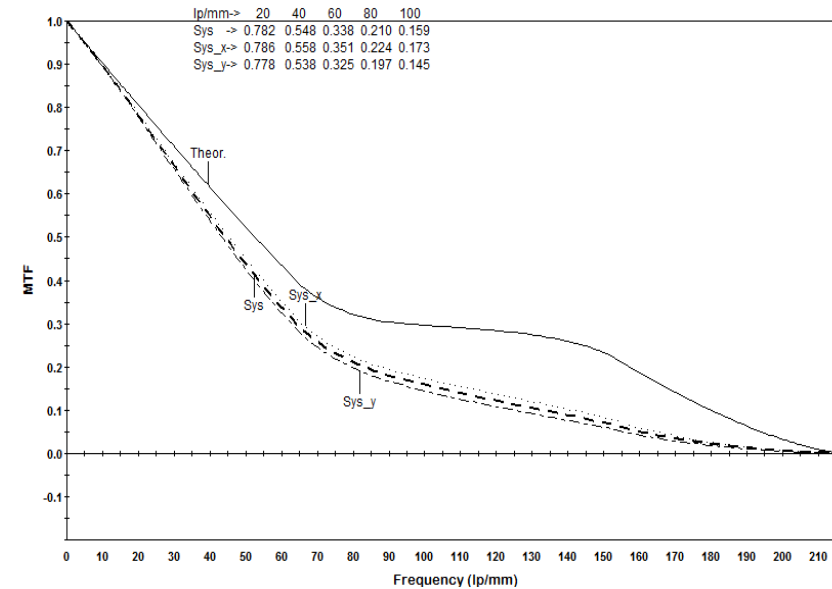
- OMI – with its own PC - can easily be adapted to the production line
- It can work in a closed-loop with the PC of the manufacturing machine
- A software module defines the IP communication protocol and transfers the results between the PCs in the Local Area Network

ON-LINE ALIGNMENT IN A FAST LOOP



- 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 CAMERA

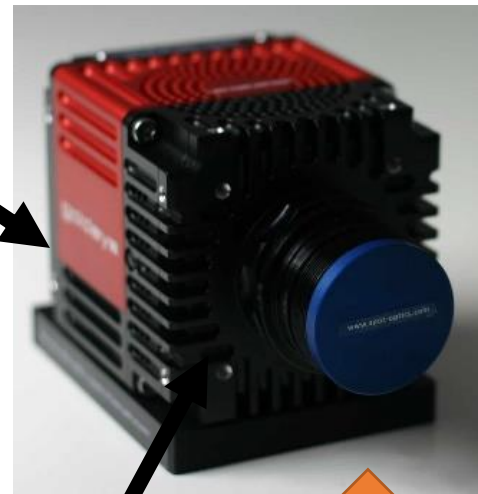
900-1700nm InGaAs
standard camera
(SWIR)



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