SpotOptics

The software people for optics

OPTINO

VERSATILE WAVEFRONT SENSOR

- Accurate metrology in single and double pass
- Lenses, mirrors and laser beams
- Any focal length and diameter
- Large dynamic range
- Adaptable for production
- Wide wavelength range with different cameras (193nm-10.6μ)
- Different lenslets available according to application

Optino: models

OPTINO

OPTINO-MU

Small Footprint. Max: 45x45 spots
USB3
Wavelength range: 380nm-1100nm
Readout speed: 90Hz
Processing speed: 15Hz
37(H) x 30(W) x 79(L) mm

OPTINO-UV-VIS

Max 75x75 spots
Thinned CCD chip
Gigabit Ethernet
Wavelength range: 193nm-1100nm
Readout speed: 7.5Hz
Processing speed: 7.5Hz

OPTINO-NIR

Max 45x45 spots
InGaAs camera
Gigabit Ethernet
Wavelength range: 950nm-1700nm
Readout speed: 100Hz
Processing speed: 50Hz

Technical Specifications: Hardware

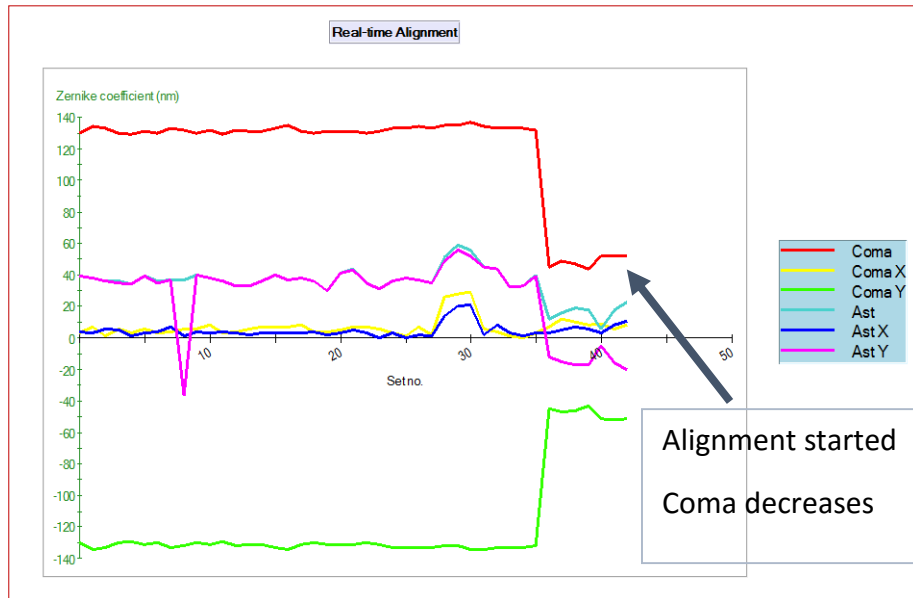|	
Focal ratios covered	Practically any focal ratio can be tested with appropriate collimator
Diameter of optical element that can be tested in parallel light	Practically any diameter can be tested with appropriate accessories
Test setup	Double or single pass
Diameter and focal length of standard lenslets	(0.2mm, 11mm), (0.2mm, 22mm), (0.3mm, 41mm). Others: (0.13mm, 7mm). Special
Camera - connections	Cameras with Gigabit and USB2 and USB3 connection available. 10-bits to 16-bits
No of spots (0.2mm diameter lenslet array and USB3 camera). 9mm pupil	45x45 with (with 0.2mm array). 69x69 spots (with 0.13mm array)
Maximum no. of spots (array with Gigabit camera). 15mm pupil	75x75 (with 0.2mm array). 115x115 spots (with 0.13mm array)
Measure aspherical elements	~15% variation in longitudinal spherical aberration
RMS repeatability of computation of Zernike polynomials	1-2nm rms ($\lambda/600$-$\lambda/300$) at 633nm
RMS repeatability of wavefront measurements	< $\lambda/200$
Accuracy	$\lambda/10$- $\lambda/100$ – depending on the accuracy of the calibration elements
Dynamic range of measurements sub-pupil (tilt subtracted)	-±50 λ
Wavelength range	UV (0.193-1.1µ), Vis (0.193-1.1µ), 0.95-1.7µ
Light sources	LEDs, LDs and Halogen lamps available (at one wavelength or in white light)
Software (control and analysis)	Sensoft
Acquisition speed	15-500Hz (camera dependent)
Processing speed	5-150 Hz (camera and PC dependent)
Power requirement for collimator stepper motor (motorized version)	12V/2A DC
Trigger	TTL 5V

SENSOFT: THE SOFTWARE
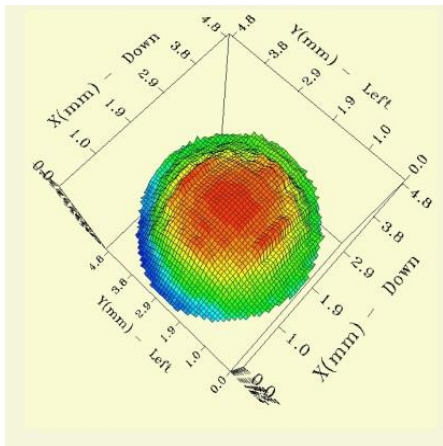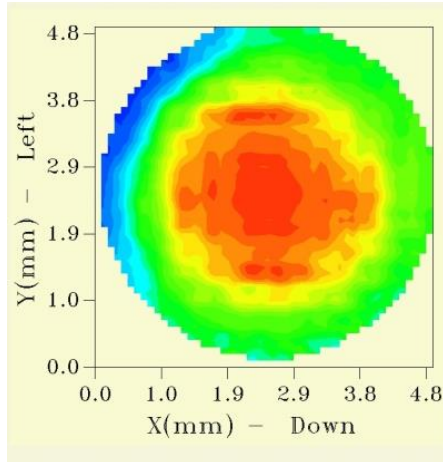
Sensoft: The modular software package

- ✓ Hardware control of Optino (camera, light source and motor)
- ✓ Full Shack-Hartmann (SH) analysis
- ✓ Zernike aberration coefficients: Annular, Standard and Fringe
- ✓ Aberration coefficients: Seidel
- ✓ Wavefront: Zonal and modal
- ✓ MTF, PSF and EE
- ✓ Strehl ratio
- ✓ Spot diagram and
- ✓ Diagnostics (alignment and best focal plane)
- ✓ Loop mode for on-line alignment and best focal plane) using coma, astigmatism and spherical aberration
- ✓ Loop mode for on-line adjustment of spacing of elements to get best focal plane using spherical aberration
- ✓ Average of SH images to decrease noise
- ✓ Automatic control of exposure time

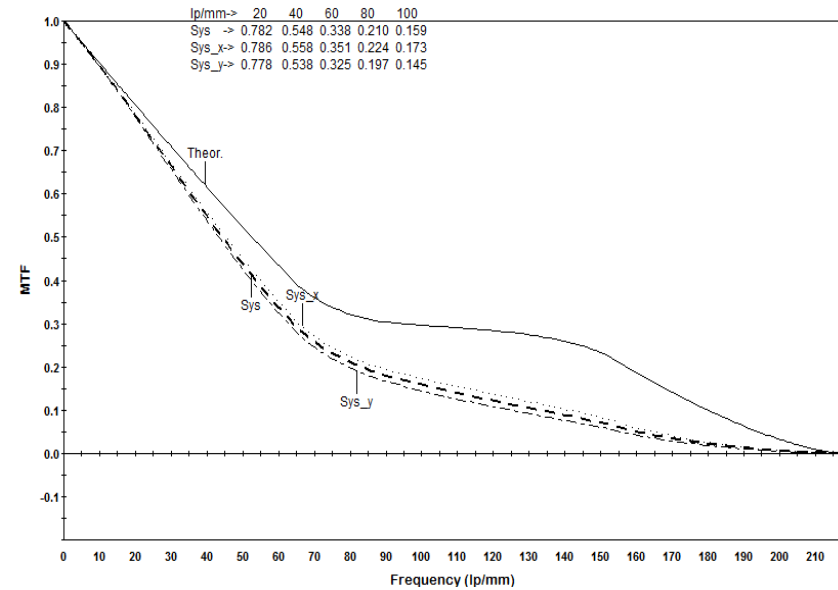## Optino in your production line:

- ✓ Optino – with its own PC - can easily be adapted to the production line
- ✓ Work in a closed-loop with the PC of the manufacturing machine
- ✓ A software module defines the communication protocol and transfers the results between the control PC of Optino and the production PC, minimizing cost and time to develop special software to install on user PC

ON-LINE ALIGNMENT
IN A FAST LOOP

MTF MEASUREMENTS

Alignment started

Coma decreases

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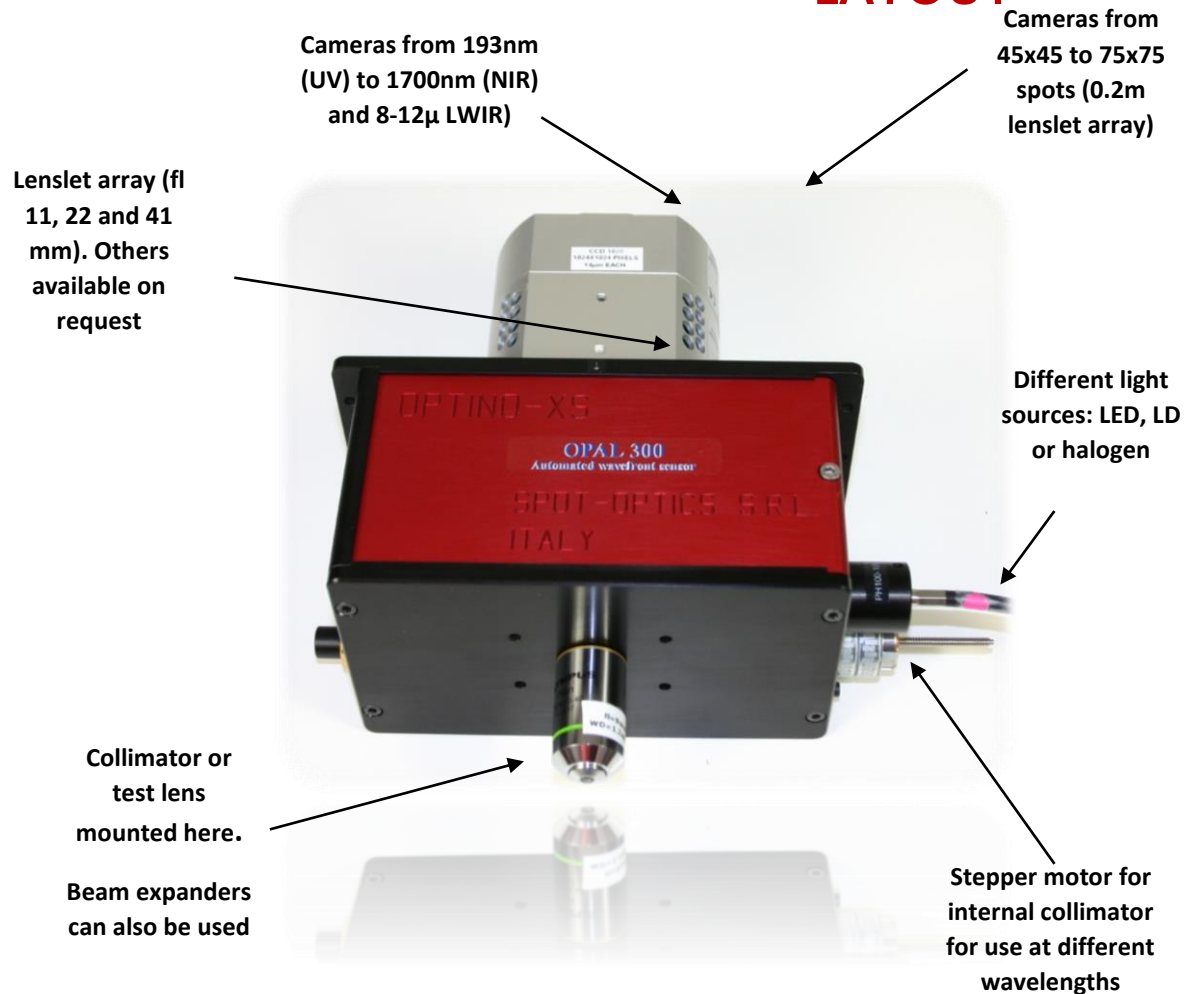and defocus present in the data.

– 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
– Optimal alignment is reached when the coma and astigmatism

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LAYOUT

Cameras from 193nm (UV) to 1700nm (NIR) and 8-12µ LWIR)

Cameras from 45x45 to 75x75 spots (0.2m lenslet array)

Lenslet array (fl 11, 22 and 41 mm). Others available on request

Different light sources: LED, LD or halogen

Collimator or test lens mounted here.

Beam expanders can also be used

Stepper motor for internal collimator for use at different wavelengths

PHYSICAL

Dimensions: 17 (L) x 10 (W) x 10 (H) cm
Weight: 3 Kg
Cameras: USB3, Gigabit Ethernet
Motor power supply: 12V, 2A

KEY FEATURES

Measurement technique
Shack-Hartmann wavefront sensor
Test in parallel light or at the lens focus
Parallel light (with a collimator)
At the focus of the lens (with a pinhole)
Light sources with different wavelength available
Calibration
High-quality parallel light source
Pinhole calibration unit
λ/20 Spherical and flat reference mirrors
Versatile
Test any element in double or single pass
Accessories
Full set of accessories available

SOFTWARE

Easy alignment of lens group via software: the software gives graphical indication of the misalignment of the optical system, using coma and astigmatism.