LENTINO

# SpotOptics

**The software people for optics**

# LENTINO

## AUTOMATED WAVEFRONT SENSOR

- **Accurate Metrology of standard and aspherical lenses**
- **$\phi$=0.3 to $\phi$=20 mm**
- **F/1 to F/15**
- **Accurate motor for z-movement**
- **Accurate XY and tilt stages for easy centering of lenses**

日本総代理店
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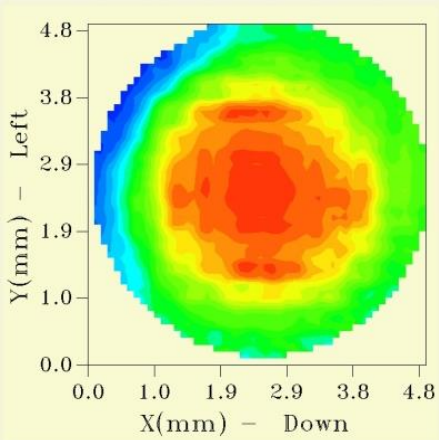
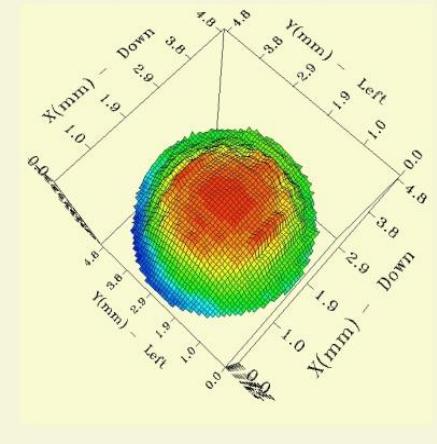
# TECHNICAL SPECIFICATIONS

| | |
|---|---|
| ***Focal ratios covered*** | f/1 to f/15 standard |
| ***Diameter of lens that can be tested in parallel light*** | 20mm |
| ***Diameter of lens that can be tested with pinhole at focus*** | 15mm |
| ***No of spots (with standard camera)*** | 23x23 |
| ***Maximum no. of spots (large format camera)*** | 80x80 |
| ***Diameter and focal length of standard lenslets*** | (0.2,11),(0.2,22),(0.3,41) mm |
| ***Measure aspherical elements*** | ~15% variation in longitudinal spherical aberration |
| ***RMS repeatability of computation of Zernike polynomials*** | 1-2nm rms (λ/600-λ/300) at 633nm |
| ***RMS repeatability of wavefront measurements*** | < λ/200 |
| ***Accuracy*** | λ/10- λ/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 |
| ***Camera - connections*** | Cameras with Gigabit and USB2 and USB3 connection available. 10-bits to 16-bits |
| ***Acquisition speed*** | 15-500Hz (camera dependent) |
| ***Processing speed*** | 5-150 Hz (camera and PC dependent) |
| ***Power requirement for stepper motor*** | 24V/2A DC |

# SENSOFT: THE SOFTWARE




## Sensoft: The modular software package:

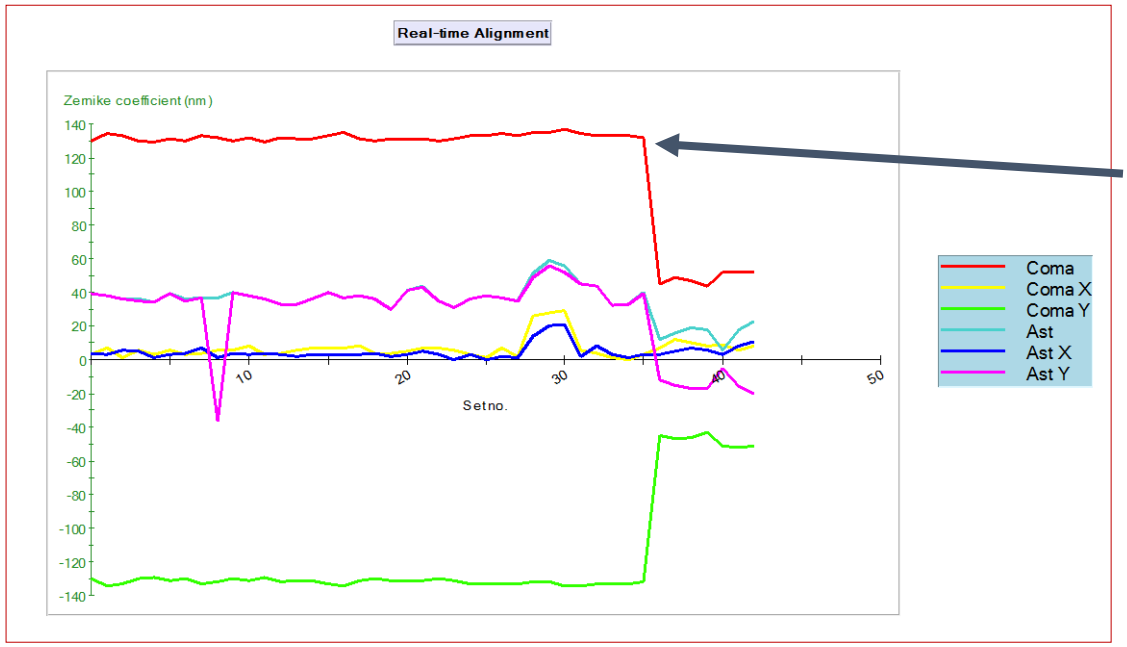
- Fully controls the hardware of Lentino
- Performs the Shack-Hartmann (SH) analysis
- Computes Zernike cefficients, diagnostics (alignment and correct focal plane), wavefront, MTF, spot diagram
- Has a Loop mode for on-line adjustment of optical system

## Lentino in your production line:

- Lentino – 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 communication protocol and transfers the results between the PCs

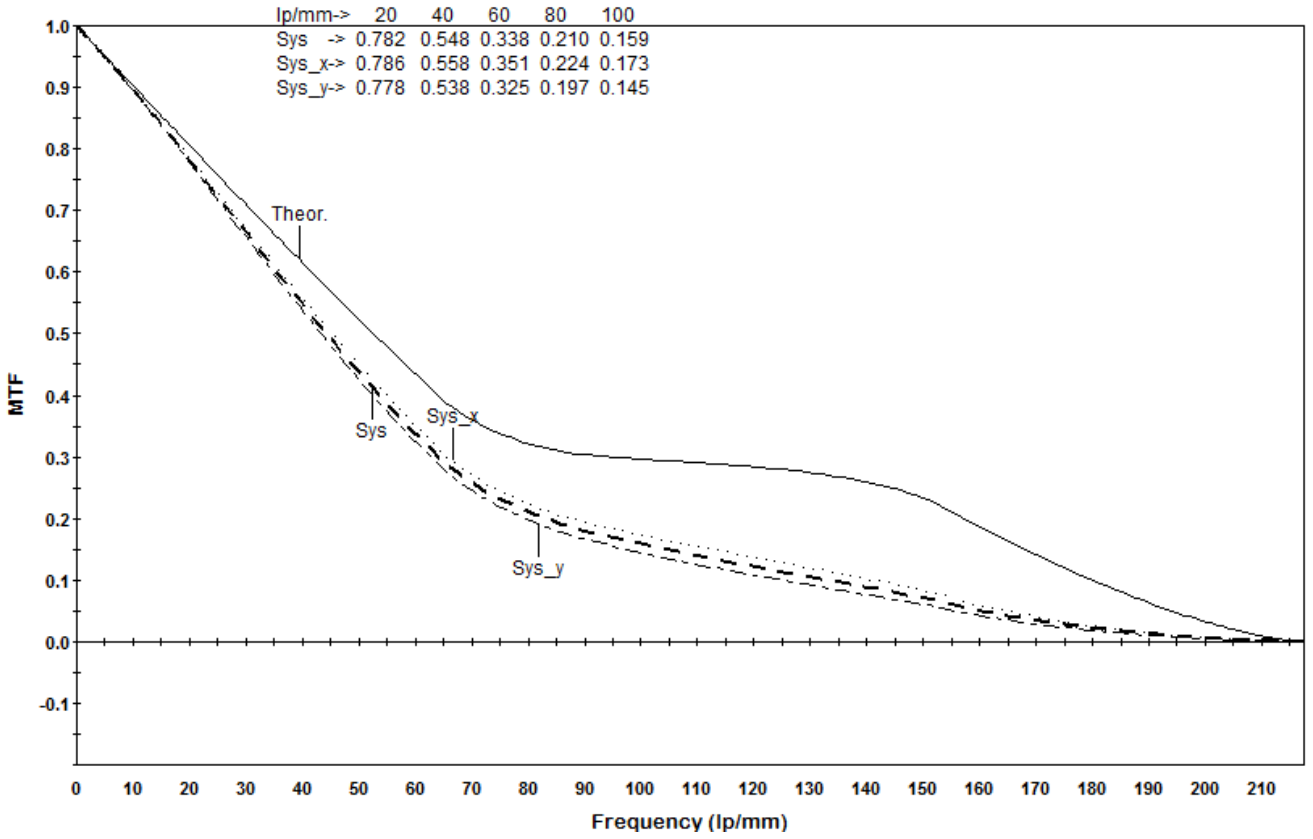
# ON-LINE ALIGNMENT OF COMPLEX OPTICAL SYSTEM IN A FAST LOOP





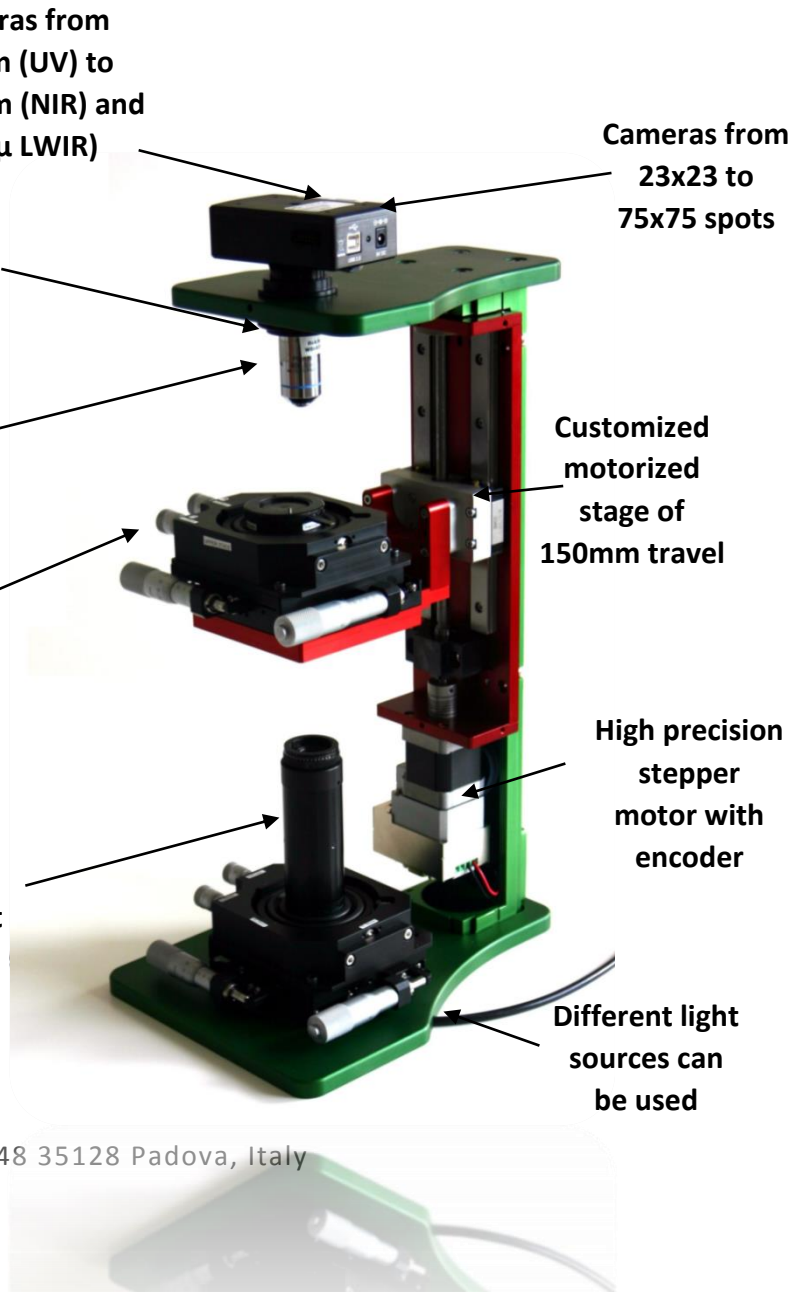

- The alignment of complex optical systems becomes easy by monitoring coma and astigmatism in a continuous loop
- The individual (x, y) components of coma and astigmatism, as well as the total coefficients are displayed
- The optimization can be done for one component at a time, as the software can display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

# MTF MEASUREMENTS




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

# LAYOUT




## PHYSICAL

**Dimensions: 20 (L) x 29 (W) x 45 (H) cm**
**Weight: ~5 Kg**
**Cameras: USB3, Gigabit Ethernet**
**Motor power supply: 24V, 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**
**H**igh-quality parallel light source
Pinhole calibration unit
**Easy access to optical elements**
Easy access to optical group for on-line alignment

## SOFTWARE

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



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