Wavefront metrology for sports optics testing

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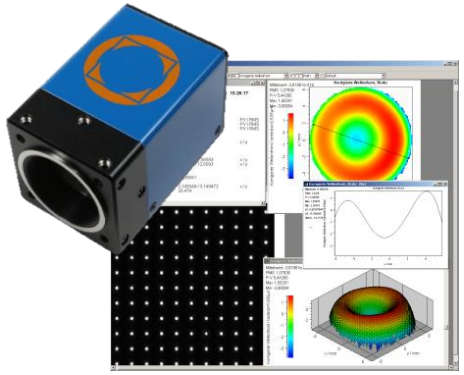
Optocraft GmbH

Wavefront metrology for testing of Optics and Lasers



Shack-Hartmann wavefront sensors

Subsystems, Modules

Turnkey instruments

Optocraft GmbH

Basics

General

- Founded in 2001
- Located in Germany
- ISO9001:2015

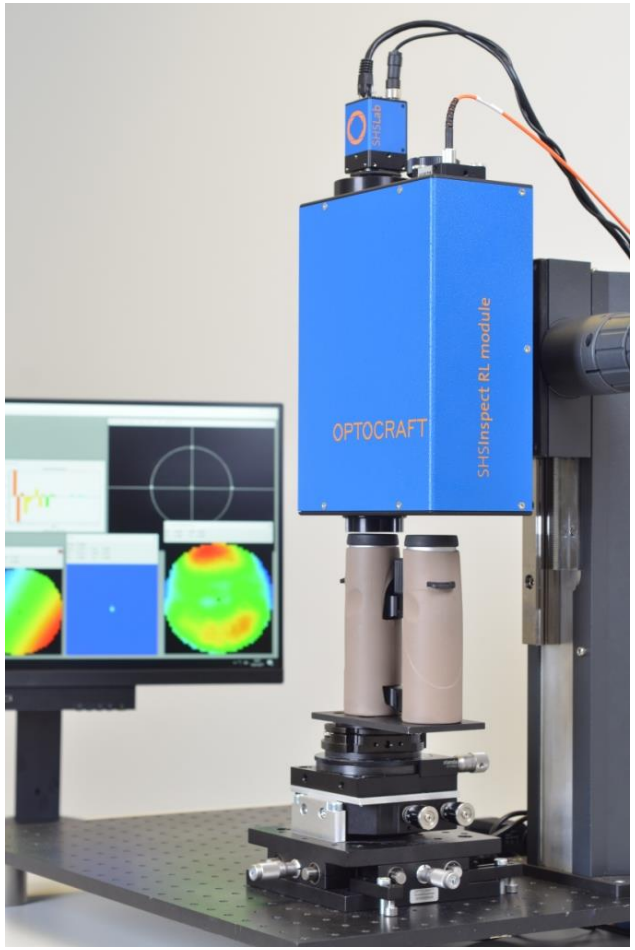
Strong team

- 29 employees
- Distributing partners in JP, USA, CN, S. Korea, Israel
- Since 2018: Partnership with µEpsilon

MICRO-EPSILON

SHSInspect RL module

Flexible optics testing



Test configurations

Reflected light testing

Double pass testing

Test samples

Afocal: flats, binoculars, riflescopes, etc.

Finite-infinite: objectives

Finite-finite: imaging objectives

Mirrors: laser mirrors, astronomical telescopes etc.

Adjustment: lens assemblies, etc.

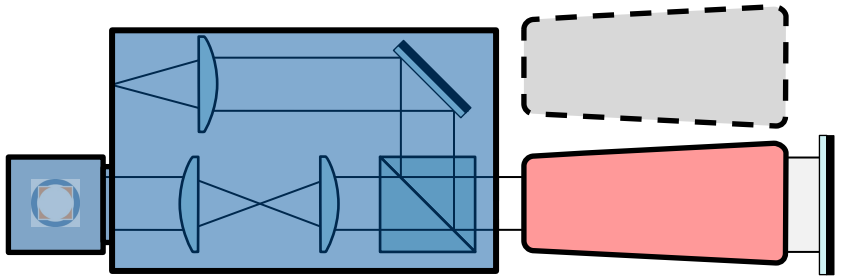
Sports optics testing

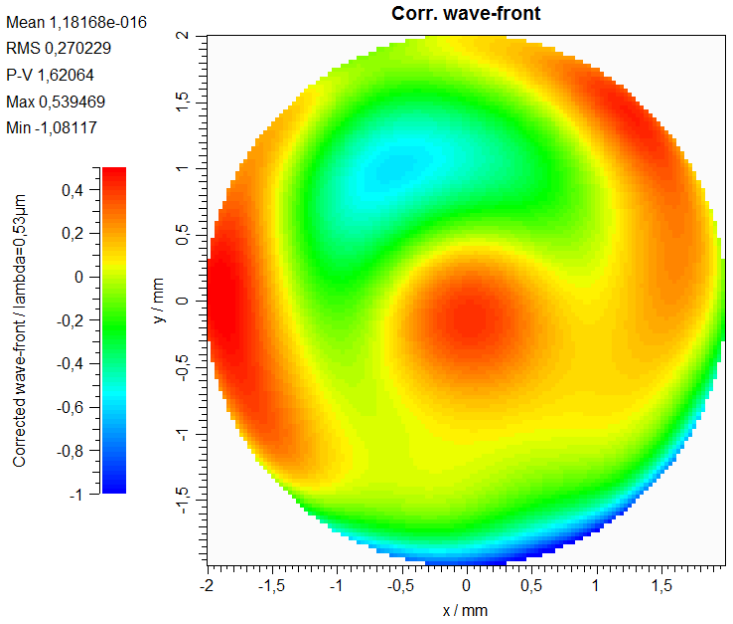
Alignment, measurement of transmitted Wavefront, PSF, MTF

Example:

Low cost binocular, type 8/32

Bad wave-aberrations and MTF

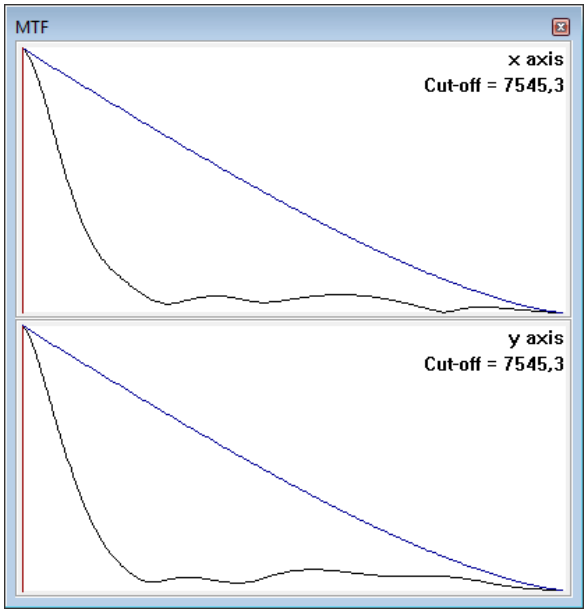




Zernike coefficients (ISO)

Residual: 0,177781 / 0,0226154

C0	0,00324534	piston
C1	0,169853	tilt, x
C2	0,131577	tilt, y
C3	-0,0062782	defocus
C4	0,30194	Ast. 0°, 1st
C5	0,245668	Ast. 45°, 1st
C6	-0,226896	Coma x
C7	0,456848	Coma y
C8	0,107192	Sph. ab.
C9	-0,0891147	trifoil 0°
C10	-0,0270934	trifoil 30°
C11	-0,00965905	Ast. 0°, 2nd
C12	-0,00516398	Ast. 45°, 2nd
C13	-0,0512775	
C14	0,022803	
C15	-0,240848	radial term
C16	-0,0106657	tetrafoil 0°
C17	-0,0218737	tetrafoil 22,5°
C18	0,00654497	
C19	0,000177761	
C20	-0,00719637	
C21	-0,00658784	
C22	0,0346188	
C23	-0,01942	
C24	0,0298676	radial term



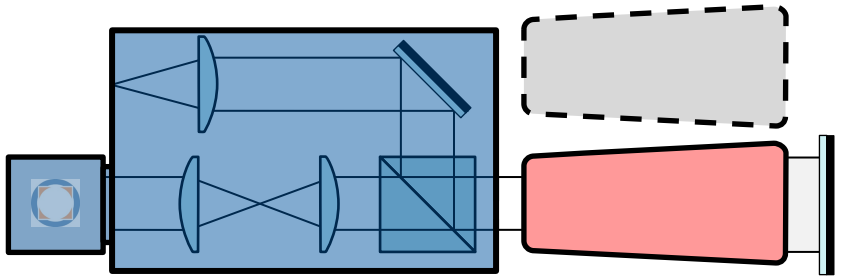
Sports optics testing

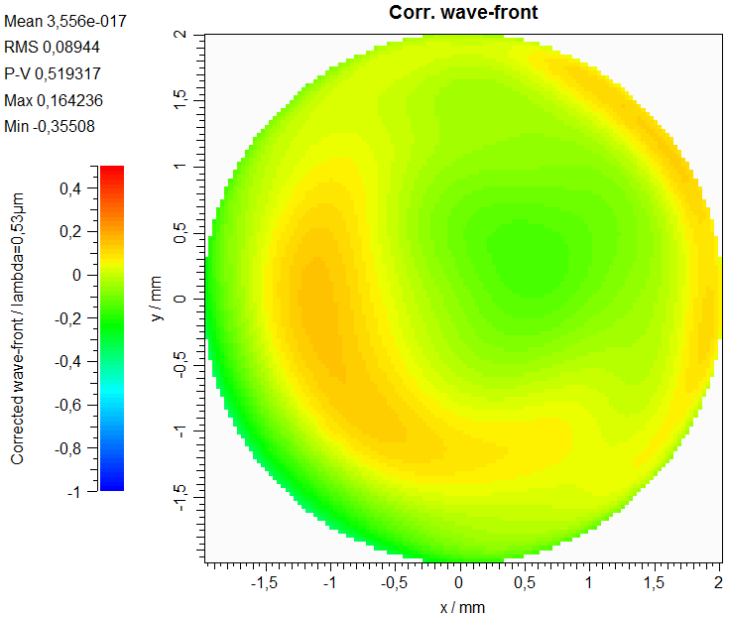
Alignment, measurement of transmitted Wavefront, PSF, MTF

Example:

High quality binocular, type 8/32

Good wave-aberrations and MTF

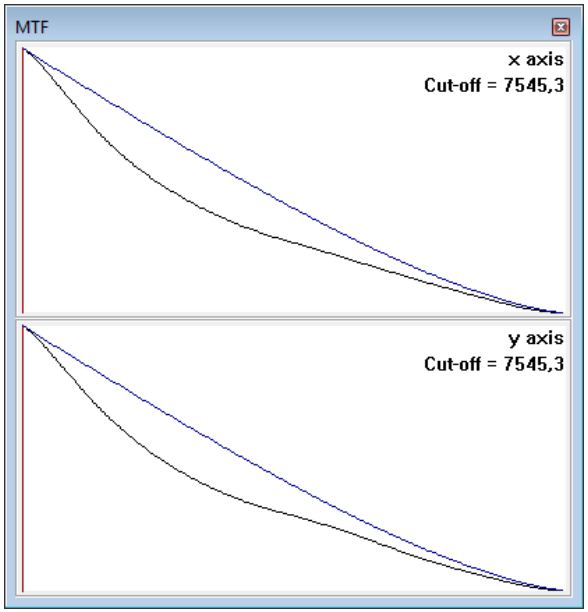




Zernike coefficients (ISO)

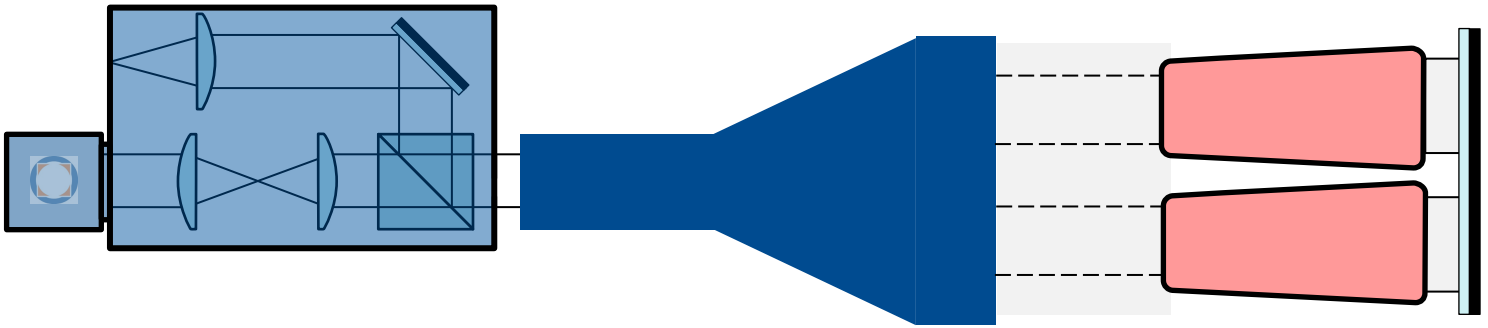
Residual: 0,10264 / 0,0124033

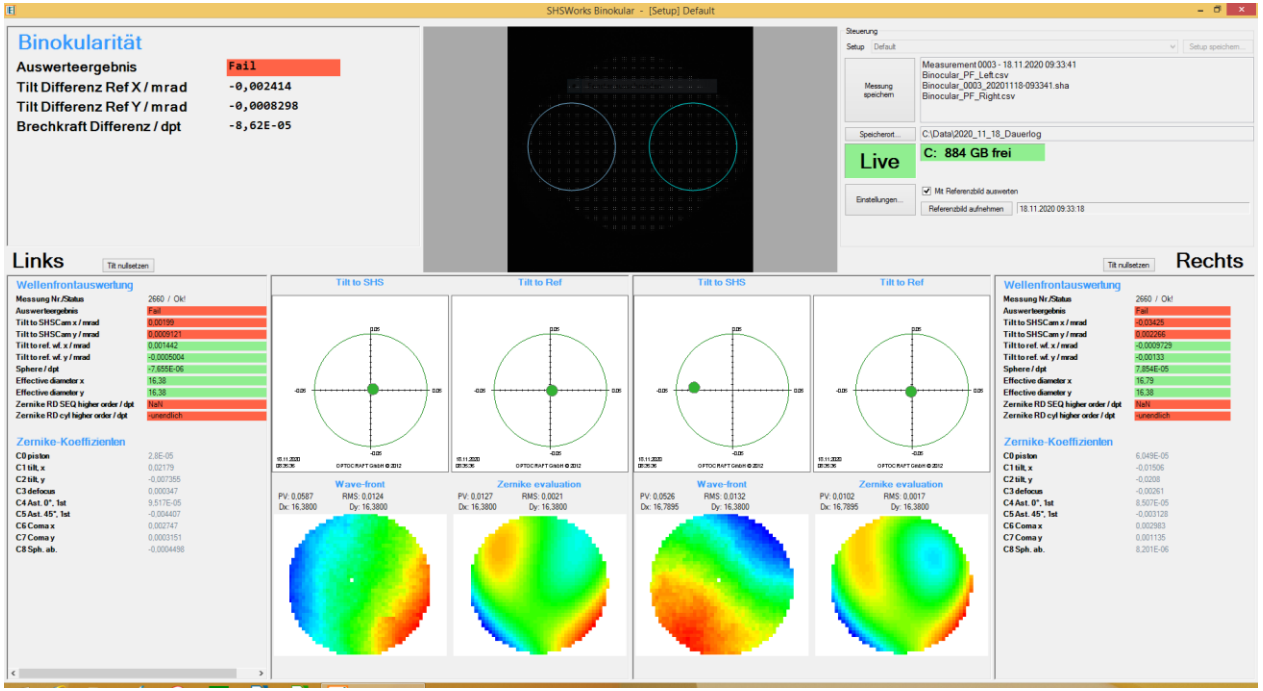
C0	0,00159112	piston
C1	-0,0990527	tilt, x
C2	-0,413557	tilt, y
C3	0,0114315	defocus
C4	0,00975902	Ast. 0°, 1st
C5	-0,042015	Ast. 45°, 1st
C6	0,179796	Coma x
C7	0,118828	Coma y
C8	-0,0708118	Sph. ab.
C9	-0,0145618	trifoil 0°
C10	0,0154949	trifoil 30°
C11	-0,00537732	Ast. 0°, 2nd
C12	0,00312184	Ast. 45°, 2nd
C13	0,00350841	
C14	0,00818352	
C15	0,0184964	radial term
C16	-0,0092237	tetrafoil 0°
C17	-0,001606	tetrafoil 22,5°
C18	0,0103515	
C19	0,00599015	
C20	0,00516787	
C21	0,00273564	
C22	-0,0157551	
C23	-0,0104659	
C24	-0,016985	radial term



Sports optics testing

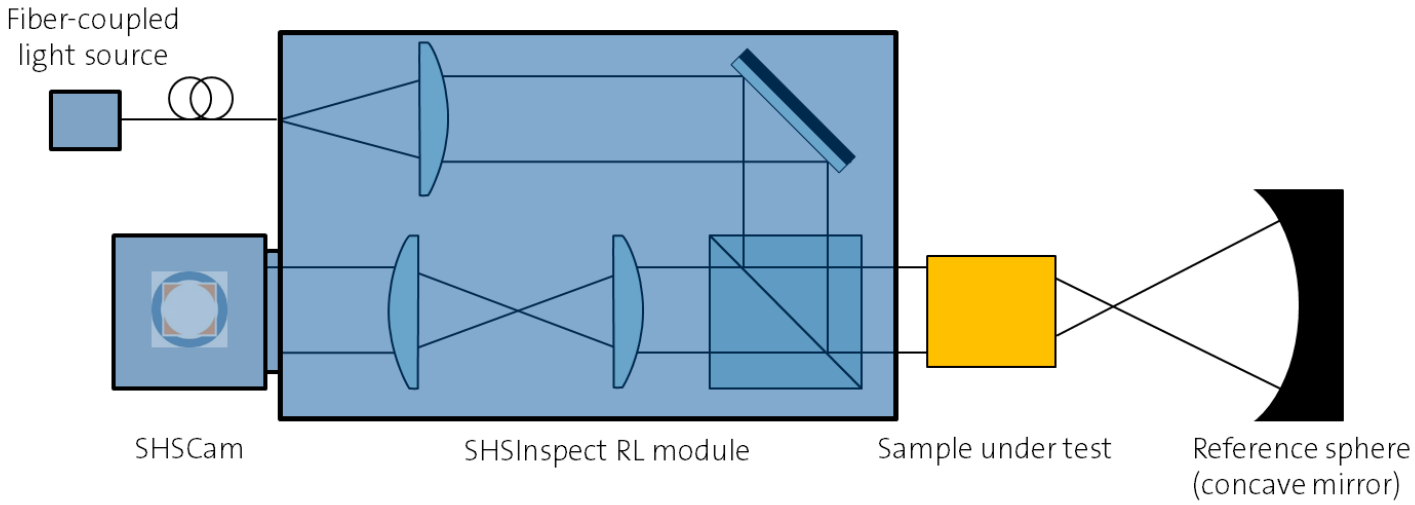
Binocular alignment and testing, dual channel configuration

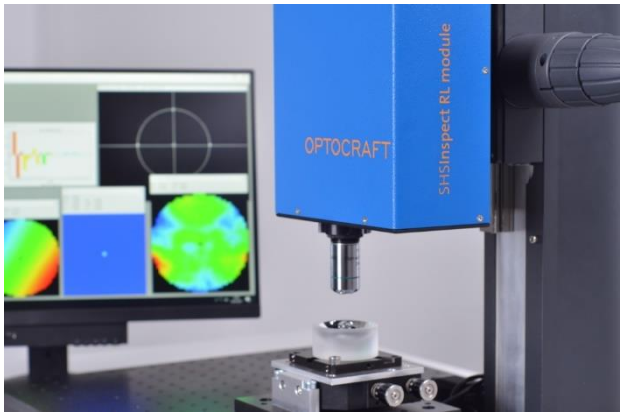




SHSInspect RL module

Measurement of objective lenses





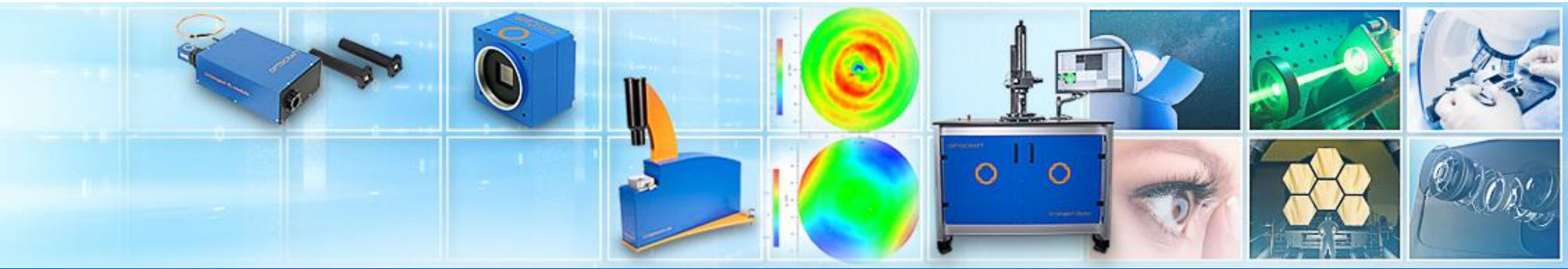
EPIC questions

What can Optocraft do for you?

- Share expertise in optics testing
- Deliver smart solutions for optics testing
  (Wavefront sensors, modules, turn-key systems)

What can you do for Optocaft?

- Challenge us with your metrology application
  - What are your current challenges?
- Provide special optics
  - Off-axis parabolic mirrors with lambda/10 PV
  - Meniscus lenses
  - Plano precision cuvettes

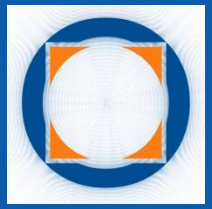


Know your quality -

Optical metrology made by Optocraft!

Contact:

sales@optocraft.de

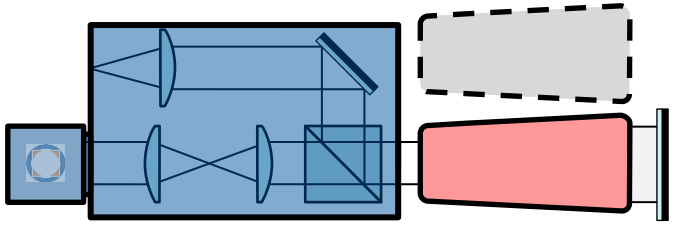


SHSInspect RL module

Double pass configurations

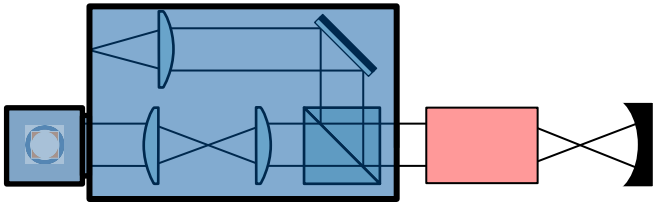
Infinite-infinite

Plano measurement beam
Reference flat
Filters, telescopes, binoculars



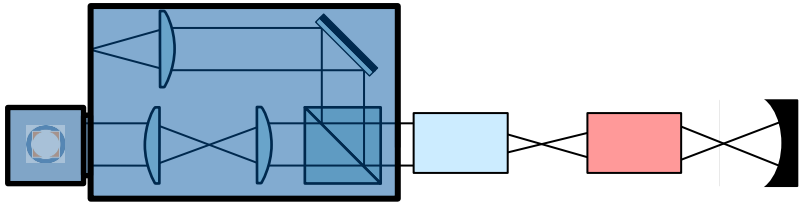
Finite-infinite 1

Plano measurement beam
Reference sphere
Objectives, lenses, sub-systems



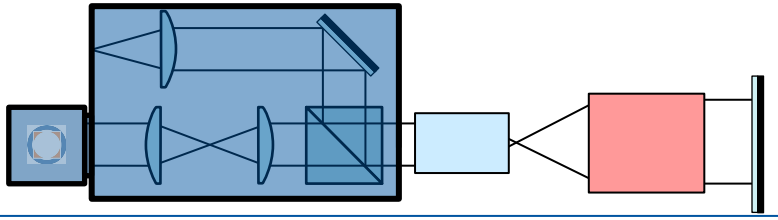
Finite-finite

Spherical measurement beam
Reference sphere
Objectives, lenses, sub-systems



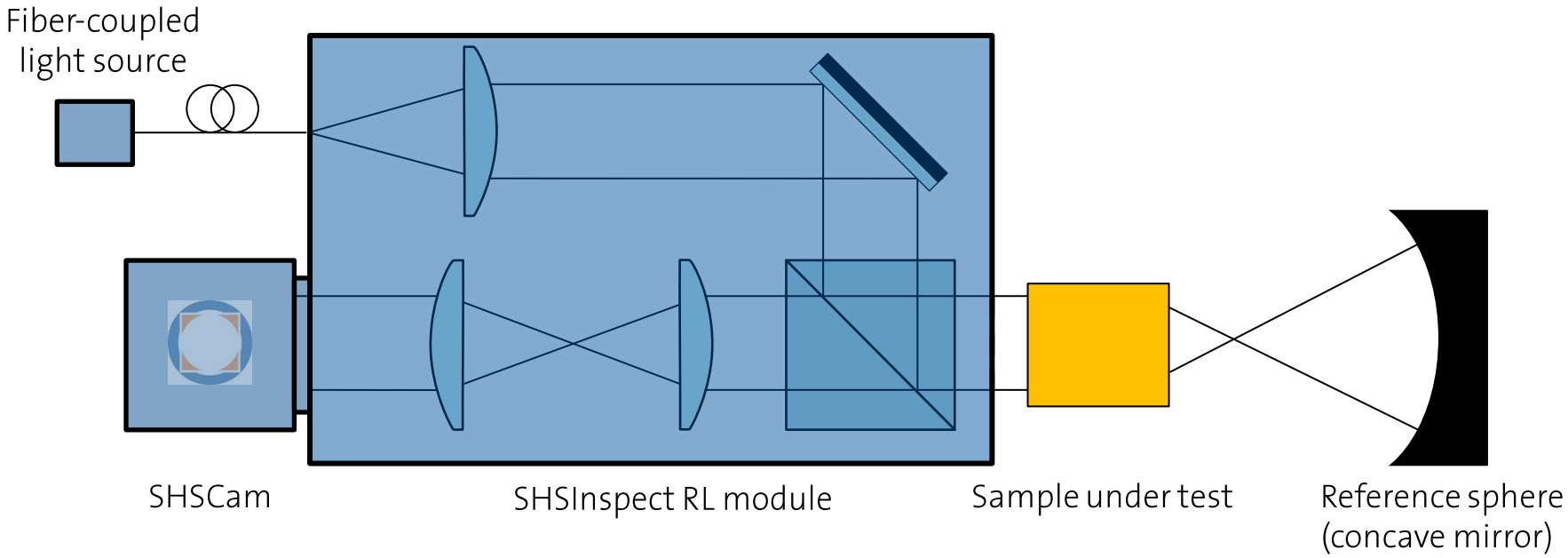
Finite-infinite 2

Spherical measurement beam
Reference flat
Objectives, lenses, sub-systems



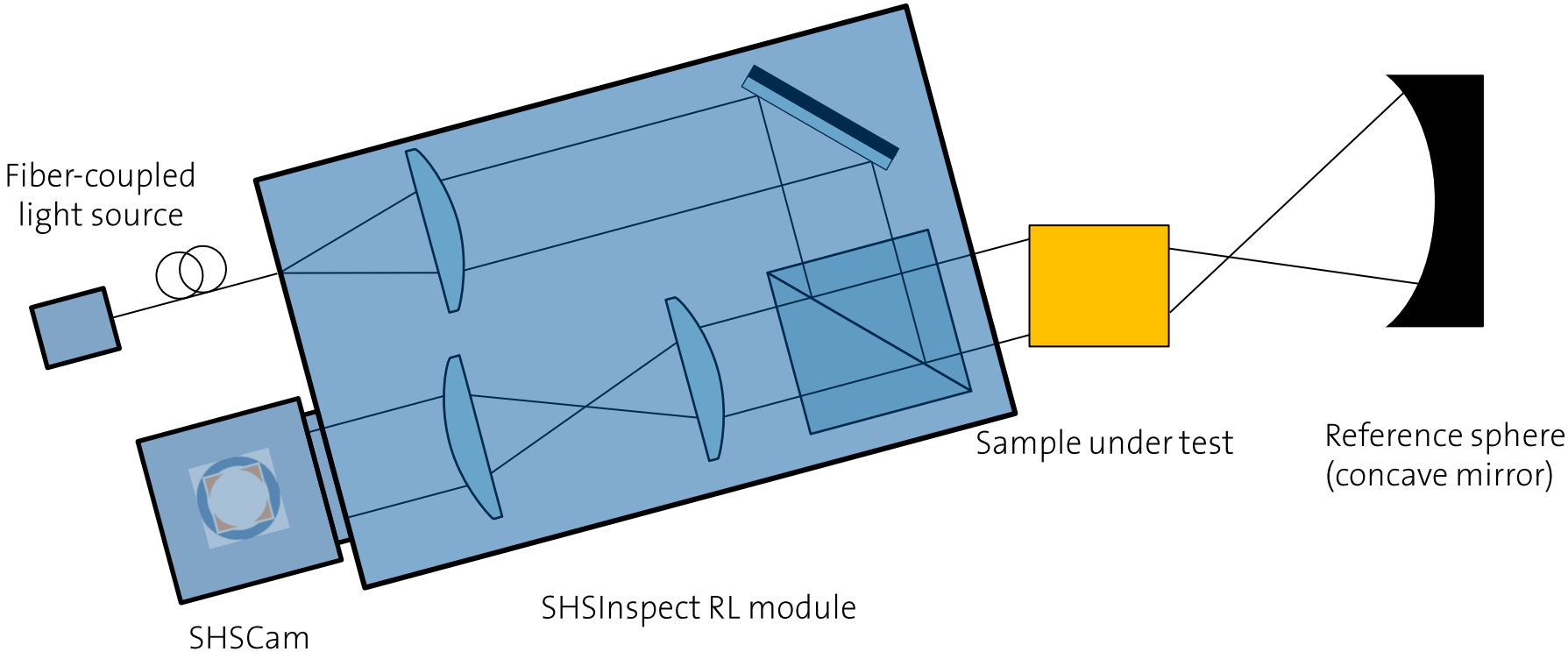
Optics testing in 2Xpass configuration

Finite-infinite configuration, off-axis measurement



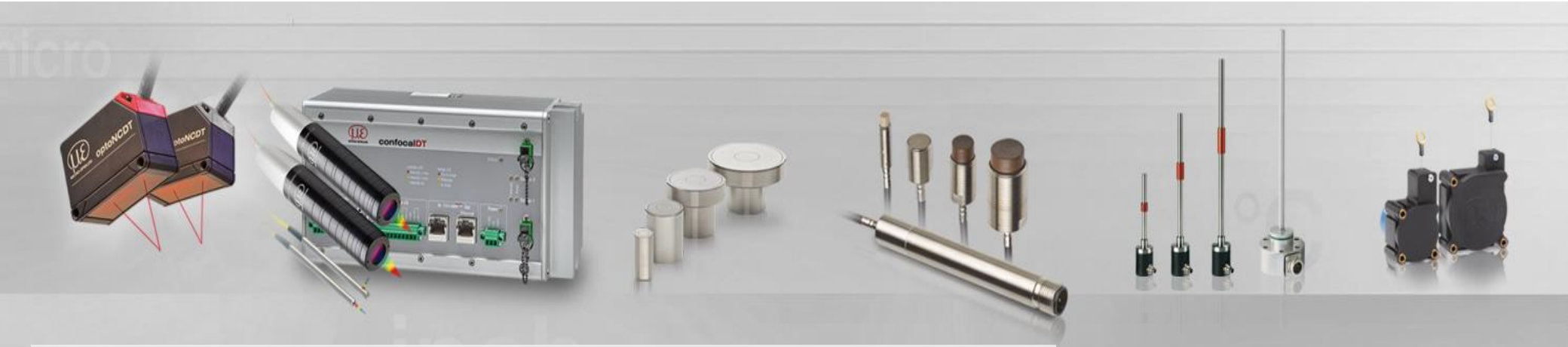
Optics testing in 2Xpass configuration

Finite-infinite configuration, off-axis measurement



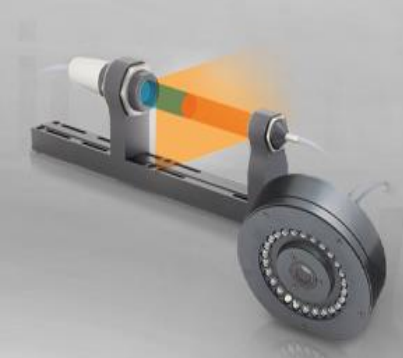
Micro-Epsilon Products

MICRO-EPSILON



Contactless distance sensors

Tactile distance sensors



Color Sensors

IR Temperature-Sensors

2D/3D Metrology Surface inspection

Measuring and inspection systems