

# OptiWorks Workshop のご案内

日時：2014年10月31日（金）

午後9時30分より午後5時30分まで

場所：OptiWorks 社および大阪産業創造館（地図参照）

大阪市営地下鉄堺筋線／中央線堺筋本町駅②⑫出口より徒歩約3分。

この度フランス FOGALE 社から **Busines Development Manager**、**Cyrille Gosset** 氏が来阪することになり、最近商品化された **Low coherence laser** を使った非接触光学厚さ測定器の紹介を受けることになりました。この測定方式は複数の反射光の干渉を測定、その干渉光のずれをセンサーで検出、光学長さを測定するものです。この光学系によってレンズ単体の厚さ、組レンズの位置情報、レンズの偏芯状態を観察することができ、様々な応用が可能と思われます。測定範囲も各種選ぶことができ、それぞれのユーザーに対しても自由に仕様を選ぶことができます。当日実機によるデモも行う予定ですので是非お越しになりご覧いただけたらと思います。

皆様のお越しをお待ちしています。

デモ予定機種

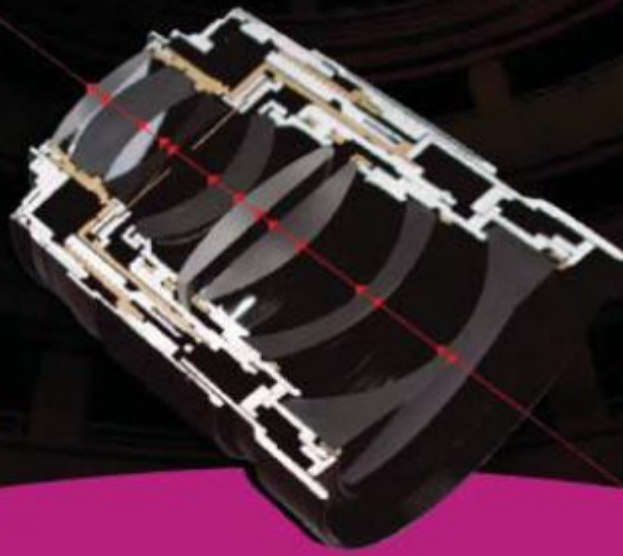
FOGALE Lens scan system LS-200



**FOGALE** nanotech

# LENScan system

Gain deep insight into your lenses



PHOTOGRAPHY  
CINEMA  
PHOTOLITHOGRAPHY  
CUSTOM OPTICS  
MICROOPTICS  
INTERFEROMETER POSITIONING



# LENSCAN system

*Gain deep insight into your lenses*

**FOGALE nanotech** introduces a new metrology tool for the design and fabrication of optical systems.

The **LENSCAN system** allows the direct measurement of the position and the center thickness of all optical elements (lenses, cubes, flats...) of an assembly along the optical axis.

It can be used with large benefits in terms of time saving and quality assessment at all steps of the optical design and manufacturing process:

## ***R&D, troubleshooting***

- Identification of wrong or badly positioned elements in assemblies
- Measurement of actual airgaps to feed optical design software

## ***Production***

- Real-time adjustment of distances between elements during assembly

## ***Quality control***

- Verification of individual lens thickness before and after polishing
- Control of lens material
- Control of assemblies after production

# Applications

The range of applications covers the whole field of the optics design and manufacturing process:

## ***Position and thickness of elements along the optical axis***

Lenses, prisms, flats, CCDs...

## ***Control of optical assemblies***

Position of lenses  
Thickness of airgaps  
Thickness of glue in doublets

## ***Control of individual components***

Thickness and group index

## ***Positioning of interferometer references***

Control of aspheric elements with full-field interferometers

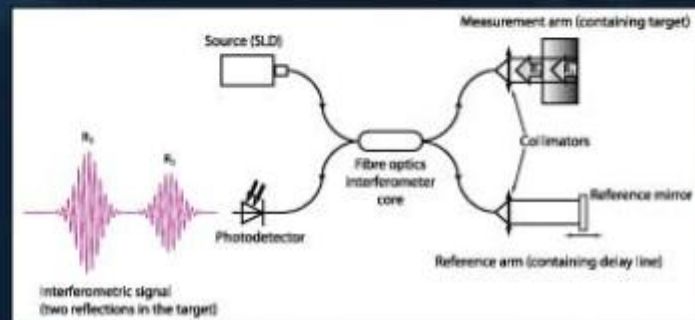
OPTICAL SYSTEMS  
MULTILAYER STRUCTURES  
HIGH ACCURACY POSITIONING

## Principle of operation

### Measurement of microscope objectives, imaging optics, photolithography optics...

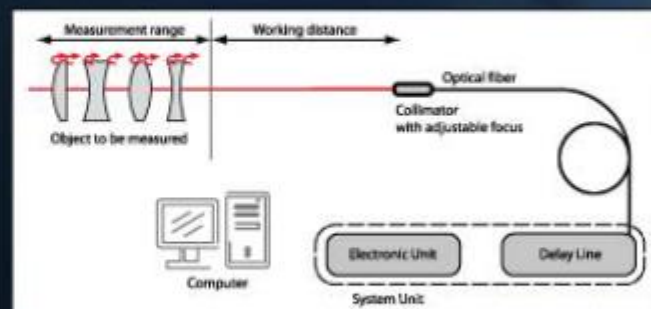
The **LENSCAN** system relies on the measurement principle of low coherence interferometry.

- Working as an optical comparator, its high accuracy is guaranteed over the full measurement range.
- Most lens assemblies can be measured in one scan.



Easy-to-use results are available with minimized setup time thanks to a comprehensive range of accessories:

- Measuring heads (collimators) compatible with most applications
- Optoelectronic units, with various measuring ranges and accuracy grades
- A comprehensive software suite, with all necessary adjustment tools and data analysis functionalities



## Hardware specifications

Up to 600 mm  
of measuring range

Optoelectronic units	ED-5	LS-40	LS-200	LS-600	LI-600
	Single Unit			Electronic Unit / Separated Delay Line	
Measurement range	5 mm	40 mm	200 mm	600 mm	600 mm
Measurement time	> 50 Hz	< 2 s	< 5 s	< 30 s	< 30 s
Absolute accuracy ( $\pm \mu\text{m}$ )	1	1	1	1	< 0.15
Measurement channels	1	Up to 4	Up to 4	Up to 4	Up to 4
Working distance	Up to several meters				
Minimum measurable thickness ( $\mu\text{m}$ )	< 30 $\mu\text{m}$ (option : < 10 $\mu\text{m}$ ) in air				
Light source	SLD @ $\lambda = 1310 \text{ nm}$				
Computer interface	PCI	PCI, PXI or PCMCIA			
Control software	LENSCAN				



### Collimators

Motorized collimator	MC 30	f = 30 mm	2" mount	Full software control
Manual collimators with adjustment scale	CR 10	f = 10 mm	1" mount	
	CR 30	f = 30 mm	2" mount	
Mini. collimators diameter 3.3 mm				

### Accessories

- Standard and custom sample holders



## A software dedicated to the optics industry

Specifically designed for the optics measurement applications, the **LENSCAN** system software uses its built-in intelligence to make your measurements reliable, quick and easy.

Its functionalities and interfacing capabilities are as efficient in laboratory as in production:

- Full control of interferometer and motorized collimator
- Metrology beam alignment tools
- Storage of configurations
- Exhaustive diagnostic features for the reliability of the measurements
- Built-in optical glass catalogue
- Programmable pattern selection
- Readily usable result: Position, thickness of optical elements
- Available as a Labview® Library or standalone, executable application
- ActiveX server for full control from C environments



## Measurements can be optimized and automatized using the optical design description of the lens assembly.

- Sequential description of the optical system by a text file,

Surface	32.580	4.78	SFL6
Surface	419.002	36.25	Air
Surface	-27.900	1.20	N-BK7
Surface	118.50	1.14	Air

- ... of the best focusing position, with display of coupling efficiency vs. focus for all interfaces,
- Automatic identification of the lenses interfaces in the acquired data from the description of the optics system.



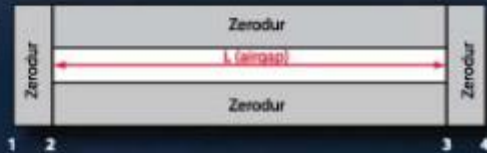
## Absolute accuracy of $\pm 0.15 \mu\text{m}$ over the full 600 mm range

The **LENSCAN** system LI-600 offers an absolute accuracy of  $\pm 0.15 \mu\text{m}$  over 600 mm of distance measurements, and that for all the airgaps in your optical system. The combination of its high absolute accuracy and its long measurement range of 600 mm make this instrument unique.

These specifications can be reached in real-conditions measurements thanks to

- An ultrastable internal metrology to measure the reference mirror's displacements
- An accurate modeling of the beam propagation into the materials,
- A detection scheme insensitive to phase effects induced by coatings,
- A calculation of the refractive indices fully compensated of environmental Effects (temperature, atmospheric pressure, relative humidity).

The system is calibrated and the performance is verified by measuring airgaps enclosed in ultrastable Zerodur® distance pieces whose lengths have been calibrated by external, certified calibration laboratories.



The plot below illustrates the stability of the system. It is a measurement done with a **LENSCAN** system LI-600 of the length of about 75 mm airgap distance in a Zerodur® piece. The standard deviation over all 6850 measurements acquired during 80 hours is 49 nm.

