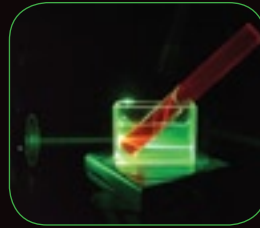
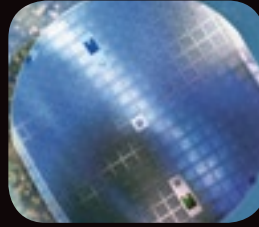
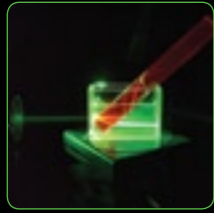


wavefront analysis • space & defense
bioimaging • lens testing • high-
power lasers • industrial quality
control • **adaptive optics**
astronomy • microscopy
x-euv • laser metrology
beam alignment
wafer surface
planeness • nir
synch
rotrons
xfels



Imagine Optic



Pure science

Our product line combines ease of use with the wide ranging functionality that scientific users depend on for aligning and characterizing the vast array of optical systems found in industrial and academic laboratories. HASO™ wavefront sensors enable you to perform complete characterizations of laser beams including phase, intensity, M², and Strehl ratio. When used in conjunction with adaptive optics wavefront correction devices such as deformable mirrors, HASO allows you to optimize the beam's shape and focal spot.



Industrial quality control

With the growing demand for high-quality optics in cellular telephones, digital cameras and other consumer goods, precision wavefront analysis has become indispensable as a quality control tool for manufacturers. Fast, feature-rich and easy to integrate, our products ensure on and off-line inspection of optical components including Blu-ray™ Disc lighting modules and liquid lenses, mobile phone and digital camera lenses, intraocular lenses and contact lenses.



Space & defense

The high economic stakes in the aerospace industry impose infallible measurement at every stage of development, especially for instruments embarked aboard satellites like the Herschel space telescope. The adaptability of our products, combined with our unique industry know-how, enables you to benefit from custom-built solutions tailored to your individual needs. When used as part of an adaptive optics loop, they can equally increase the operational distance of freespace communications systems.



Semiconductors

Designed for precision functionality at wavelengths between 193 and 300nm, our HASO UV helps manage costs and improve productivity by optimizing the alignment of the focusing devices used in nanolithography. With our HASO HP, you can reliably characterize optics at the subnanometric scale to ensure the quality of stepper and X-ray optics whereas our newest product, e-Xplorer™, enables users to measure and characterize the planeness of semiconductor wafers.



Microscopy

For those working at the microscopic level, our adaptive optics offer including HASO, mirao™ 52-e, CASAO™ and GENAO™ allows you to substantially improve the imaging resolution of OCT, confocal, multiphoton and wide-field microscopes. This provides you with the ability to image deeper inside living tissue and other measured samples than ever before. Even more, HASO enables you to characterize the objectives of today's high-performance microscopes and guarantee that systems perform up to their specifications.



Synchrotrons & FEL

The SH-LTP™ allows you to perform the final precision metrology on the optical components of synchrotron beam lines before putting them online. Our HASO X and X-EUV function directly on the synchrotron's or FEL's beam and, combined with our adaptive optics solutions, enables you to automatically align beam lines and optimize microfocusing.

Image Optic was founded in Orsay, France in 1996 with the goal to provide companies with the highest quality Shack-Hartmann wavefront sensing equipment available. Since our inception, we have grown from our initial founding partners to include over 30 professionals in domains ranging from pure optics to software to customer support.

Our unwavering commitment to anticipating and responding to market needs has shown through by the vast array of high-quality products and services we have provided to our clients. Today, we are Europe's leading manufacturer and distributor of Shack-Hartmann wavefront sensing and correction technologies, and we continue to grow and develop.

We continuously strive to widen our expertise through collaborative efforts with leading researchers entities including the Paris-Meudon Observatory, SOLEIL, the Laboratory of Applied Optics at the Ecole Polytechnique and the Ecole Supérieur d'Optique.

In 2004, Imagine Optic created Imagine Eyes to address the growing possibilities that Shack-Hartmann technology offered to the fields of medical imaging, notably in ophthalmology. We are equally France's leading reseller of the vehicular dynamics technologies that allow major car manufacturers to ensure quality and safety during many phases of vehicle preparation.

In 2005, we introduced the world's first X-EUV wavefront sensor to respond to customer's needs in this breakthrough domain. Since then, we have totally revamped our entire sensor line with the introduction of HASO3 in 2007 and have launched several new solutions including the SL-Sys neo and AOKit - bio to wide industry acclaim..

Today, our clients are among the world's leading companies including Sony, Nikon, Zeiss, Canon, NASA, the U.S. Air Force, Essilor, Thalès Aliena Space, EADS, the European Southern Observatory, the European Space Agency (ESA), Zygo, among many others. If you would like more information about Imagine Optic, please call us on +33 (0)1 64 86 15 60 or visit our website www.imagine-optic.com.

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"High-precision metrology is now available for adaptive optics... the only precision you can offer is the one you can measure."

Pascal Jagourel

Head of Instrumentation, Observatory of Paris

"The SL-Sys liquid has significantly improved our R&D team's ability to design new lenses as well as the quality of our products on the line."
Pierre Craen, Head of Systems Design, Varioptic

imagine-optic.com

Solutions for industry and science

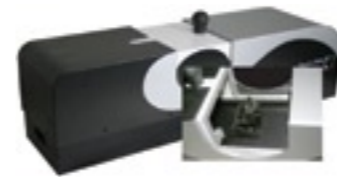


SL-Sys™ neo

The SL-Sys™ neo is a unique lens characterization solution designed for industrial R&D programs and for production line quality control. Based on Imagine Optic's industry leading HASO™ wavefront sensor technology, the SL-Sys neo is the only commercially available system that enables you to completely and automatically characterize convergent (positive power) optical components with pupil diameters ranging from 1-12 mm² over the entire field of view, regardless of the numerical aperture.

One of the many advantages of the SL-Sys neo is its ability to precisely measure the optical element's aberrations as wavefront errors over the entire field of view and/or at any point therein. Contrary to systems that only provide simple Modulation Transfer Function (MTF) data, the precision wavefront data furnished by the SL-Sys neo enables you to move beyond rudimentary good/bad evaluation and into the domain of complete optical component analysis in order to identify the problem's source.

- Precision wavefront characterization of aberrations with either 1,280 or 7,600 measurement points (depending on model)
- Measure back focal length (BFL), effective focal length (EFL), chromatism, field curvature, distortion, vignetting, and relative illumination as a function of the field
- Calculate the 3D MTF and the MTF through-focus for all measured points in the field
- ±45° field angle
- λ/100 aberration measurement sensitivity
- Better than 0.005 MTF measurement sensitivity
- 1000 lp/mm maximum MTF frequency acquisition (automatically adjusted)
- Better than 0.5% focal measurement sensitivity



SL-Sys™ liquid

The SL-Sys liquid is a turnkey solution that provides industrial liquid lens manufacturers with an unparalleled quality control platform. It enables you to go beyond current testing methods that rely solely on focal length and MTF measurements by ensuring the overall lens quality as a function of true optical quality, directly on the production line.

The SL-Sys liquid goes beyond simply indicating if a lens is optically sound or not. The system's advanced features enable you to limit waste by detecting problems earlier in the manufacturing process than other products, as well as by helping to understand their origin and to correct for irregularities using the provided data. Even more, the SL-Sys liquid lets you compare the lens' measured attributes versus its best theoretical optical performance, allowing you to set your own proper quality/cost standards.

- Intuitive configuration interface
- Define the measurement diameter for either all or part of the lens
- Choose between measurement modes – static (wavefront error, power, hysteresis), dynamic (temporal behavior), or both simultaneously
- Enter precise command voltage values to determine the lens' optical power/voltage ratio and its hysteresis
- Select the temporal resolution and analysis range as well as the acceptable values for maximum allowable aberration RMS and hysteresis; minimum and maximum optical power limits; power range at zero commanded; maximum allowable lens-induced tilt on both the X and Y axis; maximum allowable centering error value on both the X and Y axis



e-Xplorer™

The e-Xplorer is designed to help increase precision and reduce costs in manufacturing semiconductor wafers. Its outstanding nanometric sensitivity enables the system to detect even the most elusive defects in form and planeness on wafers up to six inches in diameter. An optional zoom x3 option allows you to significantly increase the system's lateral resolution without compromising precision.

"The AOKit - bio will enable us to image subcellular structures in live tissue at depths never achieved before."
Peter Kner, Sedat Lab, UCSF

imagine-optic.com

Solutions for industry and science



AOKit™

With 10 years of industry leading experience in the domain of adaptive optics, the AOKit line integrates the best of Imagine Optic's products into one solution. The AOKit includes a HASO™3 wavefront sensor that provides true absolute measurement with simultaneous and independent measurements of both phase and intensity; a deformable mirror adapted to your application; and our industry acclaimed CASAO™ command & control software that provides instant access to control all of the instruments in your loop.

The **AOKit - bio** is specially designed to meet the demanding needs of biologists using today's most advanced imaging technologies by incorporating the award-winning mirao™ 52-e Electromagnetic Deformable Mirror as its active component. Whether you use OCT, confocal, multiphoton or wide-field microscopy, the AOKit - bio allows you to scan deeper inside samples with far greater precision than ever before. For the first time, you can dynamically fine tune your image to eliminate severe aberrations thereby improving overall image quality.

The **AOKit - laser** was developed for the demanding needs of laser users. By uniting a new generation of high-quality monomorph mirrors that have virtually no print-through effects with the unique security features of CASAO command & control software, laser professionals can control their beam's shape, increase intensity at the focal point and improve installation security like never before.



SH-LTP™

Imagine Optic's Shack-Hartmann Long-Trace Profiler (SH-LTP), developed in conjunction with the SOLEIL synchrotron, is the ideal solution for performing highly accurate, bidimensional, sub-microradian characterization of large optical component surfaces and planeness of semiconductor wafers. Even more, its wide curvature dynamic range enables it to characterize highly-curved objects (spherical, elliptical, toroidal).

The SH-LTP is comprised of an illumination system functioning at 405 nm and a high-accuracy Shack-Hartmann wavefront sensor that incorporates our patented rotated-square technology in the microlens array to increase spatial resolution to the submillimeter level. Compact, robust and easy to integrate into existing setups, this flexibly designed system can also be delivered with its own translation stage.

Our proprietary software package, StitchWave™, enables the SH-LTP to accurately measure the surface of large optics at the sub-microradian level, while minimizing translation effects.

- 2D surface characterization with improved accuracy using stitching methods
- Sub-microradian performance (accuracy, sensitivity, repeatability)
- Flexible, simple, compact and robust design
- Wide curvature dynamic range
- Sub-millimeter spatial resolution



LIP™

Our easy to use LIP optical system is comprised of a collimator and an interchangeable focusing objective that allows you to augment the measurement abilities of certain members of our HASO3 product line. Combining a LIP with your HASO™ sensor enables you to characterize concave mirrors up to a large diameter. It is also a very powerful solution to align large collimators and telescopes.

LIP functions with the ensemble of the HASO3 family of wavefront sensors thereby enabling users to work with sources ranging from visible light to NIR and with a wide range of spatial resolutions. Even more, and in contrast to standard interferometers, LIP enables users to perform precision metrology even in the presence of turbulence along the optical path and is insensitive to vibrations.

"Thanks to Imagine Optic's products, we are achieving the beam intensity needed for multi-terawatt, and soon petawatt, femtosecond lasers."
 Jean Paul Chamberet, Applied Optics Laboratory (LOA)



Rotation stage $\Theta X \Theta Y$ ™

The perfect companion product for your HASO wavefront sensors, the $\Theta X \Theta Y$ enables you to securely mount the sensor unit onto an optical bench or other structure. The stage's integrated X and Y rotation axis are adjustable with high precision and are designed to work seamlessly with our HASO products, coordinating the angular alignment without translation of the microlens array.

Laser Diode

Monomode fibered reference source available in several wavelengths (635nm, 670nm, 780nm and others on request) with an easily adjustable power output regulated using a potentiometer or optional USB driver.

Magic Source™

A monochromatic point source (635nm, 670nm, 780nm and others on request) ideal for measuring and characterizing high N.A. optics. Magic Source offers users excellent optical quality ($\lambda/100$) combined with a very large numerical aperture (>0.45).

The HASO™3 family of wavefront sensing and analysis products & accessories

Our HASO products, based on patented Shack-Hartmann technology, are the only line of wavefront sensors that provide you with absolute achromatic measurement of both phase and intensity independently, simultaneously and in real-time. With hundreds of satisfied customers around the world, HASO sensors continue to expand the limits of wavefront metrology with their speed, performance and ease of integration. What's more, their insensitivity to vibration and compact design make them the ideal choice for demanding industrial and scientific applications. Key advantages include:

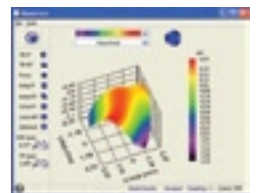
- Dynamic Spot Tracking™ and Auto Spot Finder™ offer an exceptionally high dynamic
- Proprietary calibration, coupled with the exceptional optical quality of our microlenses, enables true absolute measurement and extreme accuracy without the need for a reference source, so you don't spend time recalibrating
- Best combination of dynamic range and accuracy available on the market
- Unique design completely eliminates crossing spots
- Patented, simultaneous and independent phase and intensity measurements

HASO	spatial resolution (n° microlenses)	pupil size (mm²)	accuracy/dynamic	spectral range	frame rate (Hz)	interface
FIRST	32x40	3.6x4.8	$\lambda/100 - 400\lambda$	Mono between 400-1100nm	60	FireWire
32	32x40	4.9x6.1	$\lambda/100 - 520\lambda$	R1 ¹ or R2 ²	50	FireWire
42	42x52	4.8x5.9	$\lambda/100 - 600\lambda$	R1 ¹	50	FireWire
76 - GE	76x100	8.7x11.4	$\lambda/100 - 1200\lambda$	R1 ¹ or R2 ²	17	Giga Ethernet
128 - GE	128x128	14.6x14.6	$\lambda/100 - 1500\lambda$	R1 ¹ or R2 ²	7.5	Giga Ethernet
Fast	15x15	1.7x1.7	$\lambda/100 - 120\lambda$	R1 ¹	950	Giga Ethernet
WSR 32	32x40	4.9x6.1	$\lambda/100 - 520\lambda$	400-800nm or 532-1064nm	50	FireWire
WSR 58	58x74	8.9x11.3	$\lambda/100 - 1000\lambda$	400-800nm or 532-1064nm	17	Giga Ethernet
HP	26x26	12x12	$\lambda/1000 - 250\lambda$	405nm	7.5	Giga Ethernet
NIR	32x40	3.6x4.8	$\lambda/35 - 400\lambda$	1500-1600nm	60	FireWire
UV	50x50 ³	8x8	$\lambda/75 - 2000\lambda$	193-300nm	20	CamLink
X-EUV	50x50 ³	20x20	$\lambda/100 - 5000\lambda$	7-25nm (50-200eV)	0.5	PCI board
X	36x42 ³	0.7x1	0.1nm - 10 μ m	8-15keV	60	FireWire

HASOv3

HASOv3 is the most complete, easy to use wavefront metrology and analysis software available today. Even more, we provide HASOv3 as an SDK for customers that want to build their own feature-rich applications.

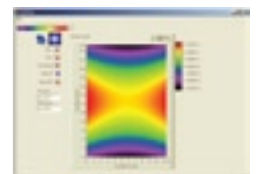
- Zonal and modal reconstruction MTF, PSF, M², spot diagram, etc...
- Editable and printable reports
- Multi-user
- Client-server interactivity via Ethernet and WiFi



StitchWave™

Wavefront analysis software tool that allows you to stitch together the multiple wavefronts that form the totality of the surface to be characterized.

- Offers extended lateral resolution
- Characterize large diameter optics
- Measure aspheric components



1) R1 = range 400-600nm/500-700nm/650-900nm/800-1100nm. 2) R2 = extended range 400-700nm/500-900nm/630-1100nm. 3) Hartmann microhole array.

"The results we have achieved using HASO have been remarkable... Coupled with a deformable mirror, we reached the highest possible intensity."
 Gérard Mourou, Director of the Applied Optics Laboratory (LOA)



mirao™ 52-e Electromagnetic Deformable Mirror

The mirao 52-e Electromagnetic Deformable Mirror is a unique product for professionals conducting cutting edge research in some of today's most exciting domains. Versatile and innovative, when used in in vivo imaging applications, mirao enables users to increase contrast as well as to augment both the axial and transverse resolutions of their equipment. The only product of its kind on the market today, mirao offers unique advantages including:

- Unparalleled stroke of $\pm 50 \mu\text{m}$ (tilt p/v)
- 52 actuators on a 15 mm pupil
- Exceptional optical quality of 10 nm RMS
- 95% linearity
- Virtually no hysteresis (<2%)
- Plug & play USB2 installation
- TRIG out functionality for TTL synchronization
- Compact electronics unit



Monomorph deformable mirrors for high-power lasers

In high-power laser applications with beam diameters between 40 and 150 mm, today's monomorph deformable mirrors offer the best wavefront correction available. When compared to bimorph mirrors, monomorphs provide superior optical quality and wavefront shaping capacities (stroke). Even more, monomorph mirrors virtually eliminate print-through effects which can, during propagation, cause dangerous hotspots inside the laser amplification chain.

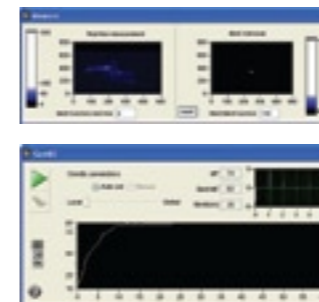


CASAO™ command & control software

CASAO is a unique application that seamlessly combines wavefront measurement and correction features, extensive instrument diagnostics and client/server interactivity via Ethernet or WiFi to provide users with an ergonomic adaptive optics PC workspace. Perfectly adapted to Imagine Optic's HASO™ family of wavefront sensors as well as a wide variety of active components including deformable mirrors, MEMS and SLMs, CASAO is the only software tool that you need to get the most out of your open or closed-loop system.

For newcomers to adaptive optics, CASAO provides a unique, hands-on tutorial mode that guides users step by step through measurement, correction and diagnostics. Experienced users can choose between standard and automatic modes that put the ensemble of CASAO's features at your disposal right away. From sensor configuration to acquisition and on to determining correction, a few clicks are all it takes to get underway.

CASAO provides unique security features for high-power lasers that you won't find anywhere else. When the program detects a suspicious event, it automatically shuts down the loop to let users investigate. It equally offers automatic pupil and loop-gain management features that further enhance operating safety.



GENAO™ command & control software for sensorless adaptive optics

GENAO is a unique, iterative adaptive optics command and control software package that enables users to perform precision wavefront correction in situations where using a wavefront sensor is either impractical or impossible. Perfectly adapted to bioimaging applications, GENAO enables you to correct wavefront aberrations even when, due to absorption by the specimen, the backscattered source signal is extremely faint.

If you're working in multiphoton, confocal, SHG (Second Harmonic Generation), THG (Third Harmonic Generation) or structured light microscopy, GENAO is easy to use and outperforms other software products based on standard iteration algorithms.



Imagine Optic

imagine-optic.com

Imagine Optic SA (main office)

18 rue Charles de Gaulle
91400 Orsay France
Telephone: +33 (0)1 64 86 15 60
Fax: +33 (0)1 64 86 15 61
E-mail: contact@imagine-optic.com

Imagine Optic USA

HubTech21
Cambridge Innovation Center
One Broadway, 14th floor
Cambridge, MA 02142, USA
Telephone: 1-617-583-1350
Fax: 1-617-758-4101

Imagine Optic Spain SL

c/ Norte 63, 2º 5ª
08960 Sant Just Desvern, Spain
Telephone: +34 93 371 32 87
Fax: +34 93 371 32 87
E-mail: contacto@imagine-optic.com