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Advanced Lens Alignment and Optical Metrology Solutions


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LAS-XUP-VIS™

Ultra-Precision, Meter-Class Centering Station for the Alignment & Inspection of Larger Diameter, Long Radius Optics

The **LAS-XUP-VIS™** is a meter-sized, non-contact lens alignment and inspection station designed from the ground-up for precision lens centration and tilt measurements of single element, doublet, triplet and multi-element lens assemblies with radius ranging from +/- 1 mm to infinity (plano) and diameters from below 1 mm to 1000 mm, including spherical, aspheric, cylindrical and parabolic surfaces. All this can be done with a single objective lens allowing for fast and easy measurement.

The core measurement technology is based on focused laser reflection (see [LAS Technology](#)). A single-mode optical fiber couples the external Laser Generation Module (LGM) to the on-tool vertically-mounted Optical Module (OM) which houses the focusing optics and large-format array camera(s). Software control of the LGM permits fast switching of wavelengths and optimization of the beam power, resulting in superior imaging of the reflected beam with sub-micron measurement precision. The design of the LGM permits up to two of three visible wavelengths (blue, green & red).

The user friendly **CalcuLens™** Assembly software is standard to all LAS™ models and enables computer automated measurement of the alignment errors of a single lens for rapid bottom-up assembly. Extending the measurement to multi-element lens assemblies requires the optional **CalcuLens™** Inspection software thereby adding powerful inspection capability for the quality assurance of finished lens assemblies. The recent addition of **CalcuSurf-1D™** USB lever probe and profiling software to the LAS™ family of products significantly aids the ease and precision of initial setup, resulting in improved utilization during frequent lens assembly changes.

APPLICATIONS

- Centering of single large diameter, long radius lenses & mirrors
- Cementing large diameter doublets & triplets
- Centering & bonding of large diameter multi-element lens & mirror assemblies
- Alignment Inspection of large-diameter multi-lens assemblies (requires **CalcuLens™ Inspection**)
- Measurement of lens vertex height and air gaps (requires **CalcuLens™ Vertex**)
- Measurement of lens Radius of Curvature (requires **CalcuLens™ ROC**)
- Measurement of lens and assembly beam deviation (requires **CalcuLens™ BD**)
- TIR profiling of rotationally symmetric housings and cells (requires **CalcuSurf-1D™**)

SYSTEM CHARACTERISTICS

- Cored granite column and table resulting in stiff metrology loop with low thermal sensitivity
- State-of-the-art Optical Module design optimized for exceptionally high tilt/centration sensitivity at very long radius of curvature

(ROC = 1000 mm to infinity)

- Measurement of larger diameter lenses and assemblies (300 mm $\leq \varnothing \leq$ 600 mm)
- High-precision (< 50 nm runout) \varnothing 600 mm to \varnothing 800 mm encoded rotary air bearing with integrated centration/tilt stage and vacuum through center
- Precision, motorized & encoded vertical linear stage (travel 2000 mm) with nanometer interferometric mapping for micron-level position accuracy
- High-power green (520 nm) laser, fiber coupled to Optical Module
- Large-format, small-pixel CMOS camera provides highest sensitivity to small TIR
- 90 mm Working Distance (WD) objective lens with quick-attached thread for accessories
- Custom objective for measuring alignment of mirror with holes (i.e., Cassegrain)
- User-friendly **CalcuLens™ Assembly** software and data reporting functions conforming to ISO standards
- 0.1 μ m centration accuracy

AVAILABLE OPTIONS

- Red (660 nm) or Blue (460 nm) laser
- Extended vertical focusing travel to 3000 mm
- High-precision (< 50 nm runout) \varnothing 800 mm encoded rotary air bearing with integrated centration/tilt stage and vacuum through center
- Add motorized direct drive to manual rotary air bearing
- Extended worktable diameters \varnothing 800 mm – \varnothing 1000 mm
- 20 mm, 30 mm, 40 mm, 150 mm & 200 mm Working Distance objective lens adapters
- Glue dispensing and UV cure stations
- Reticle alignment accessory
- **CalcuLens™ Inspection** software for measuring alignment of multi-lens assemblies
- **CalcuLens™ Vertex** software for measurement of lens vertex height of tall lens assemblies and lens thickness and air space of shorter assemblies
- **CalcuLens™ ROC** software for measurement of lens radius of curvature
- **CalcuLens™ BD** software for measurement of lens boresight/beam deviation
- **CalcuSurf-1D™** precision USB lever probe with digital gage and real-time profiling software
- **DMI-200** Low-coherence Distance Measurement Interferometer for center thickness and air space measurement of tall lens assemblies
- **3D-SPM** Surface Profiling Module for LAS
- **ROTOwand™** for vacuum lens pick-up & handling

SPECIFICATIONS

SYSTEM	
Dimensions (L : W : H)	1600 x 1500 x 3300 [mm]
Weight	Approx. 1750 kg
Structure	Granite base, cored granite column, heavy-duty stand
System Controller	Includes motion control, laser control, power supplies, USB interface to PC
Power Requirements	110-220V AC, 50-60 Hz, 1 phase, 2 amps (220V), 4 amps (110V)
Compressed Air Requirements	Pressure 70 PSI (5 bar), Flow 4 CF/Min (0.113 CM/Min), Humidity 40 Dew point, Filter ± 0.005 mm
MOTION (VERTICAL)	
Stage Travel (Z)	Standard: 2000 mm, Optional: 3000 mm
Encoder Resolution (Z)	0.1 μ m
Drive Type	Precision ball screw with micro-stepper
Bearing type	Precision square rail
Flatness	Approx. 1 μ m/100 mm
MOTION (ROTARY)	
Bearing Diameter	Standard: 600 mm, Optional: 800 mm
Encoder Resolution	1 arcsec
Drive Type	Standard: Manual, Optional: Direct drive
Bearing Type	Air
Axial runout/wobble	≤ 50 nm



OPTO ALIGNMENT

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Centration Accuracy	$\pm 0.1 \mu$ m
Vertex Height Accuracy	$\pm 2.5 \mu$ m (with 20 mm WD objective adapter)
Radius of Curvature Accuracy	$\pm 0.05\%$ (with 30mm WD objective adapter)
Beam Deviation Accuracy	± 30 arcsec