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### LAS-BT-VIS™ NexGen Compact, Economical Solution for the Alignment & Inspection of Smaller Lens Assemblies

The **LAS-BT-VIS™** is a compact (Bench-Top), non-contact lens alignment and inspection system 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 200 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

Advanced Lens Alignment and Optical Metrology Solutions



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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 lenses
- Cementing lens doublets & triplets
- Centering & bonding of multi-element lens assemblies
- Alignment Inspection of 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

- Compact, bench-top unit
- Measurement of smaller diameter lenses and assemblies ( $\varnothing \leq 200$  mm)

- High-precision (< 50 nm runout) motorized & encoded rotary air bearing with integrated centration/tilt stage and vacuum through center
- Precision, motorized & encoded vertical linear stage (travel  $\leq 700$  mm)
- High-power green (520 nm) laser, fiber coupled to Optical Module
- 90 mm Working Distance (WD) objective lens with quick-attached thread for accessories
- User-friendly **CalcuLens™** Assembly software and data reporting functions conforming to ISO standards
- Sub-micron centration accuracy

#### AVAILABLE OPTIONS

- Red (660 nm) or Blue (460 nm) laser
- 20 mm, 30 mm, 40 mm, 150 mm & 200 mm Working Distance objective lens adapters
- Heavy-duty passive vibration isolation stand & table
- 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
- **Non-contact TIR Probe** with software interface to CalcuLens™
- **Image Analysis Module for LAS-BT: IAM** for on-axis MTF, EFL, BFL, FFL measurement
- **Aspheric Tilt Module for LAS-BT: ATM** to measure tilt of aspheric lenses up to 100 mm diameter
- **LensHandler™** kit for lens edge painting, lens cleaning and inspection
- **ROTOwand™** for vacuum lens pick-up & handling

SYSTEM	
Dimensions (L : W : H)	460 x 510 x 1150 [mm]
Weight	Approx. 80 kg
Structure	Granite base, granite column
System Controller	Includes motion control, laser control, power supplies, USB interface to PC
Power Requirements	110-220V AC, 50-60 Hz, 1 phase, 1 amps (220V), 2 amps (110V)
Compressed Air Requirements	Pressure 60 PSI (4 bars), Flow 4 CF/Min (0.113 CM/Min), Humidity 40 Dew point, Filter $\pm 0.005$ mm
MOTION (VERTICAL)	
Stage Travel (Z)	Standard: 500 mm, Optional: 700 mm
Encoder Resolution (Z)	0.5 $\mu$ m, Optional: 0.1 $\mu$ m
Drive Type	Precision ball screw with micro-stepper
Bearing type	Linear guideway
Flatness	Approx. 1 $\mu$ m/100 mm
MOTION (ROTARY)	
Bearing Diameter	100 mm
Encoder Resolution	30 arcsec
Drive Type	Direct with micro-stepper
Bearing Type	Air
Axial runout/wobble	$\leq 50$ nm
Center/Tilt Stage Diameter	150 mm
Work Plate Diameter	Standard: 150 mm, Optional: 200 mm
Maximum Load Capacity	60 Kg
OPTICAL MODULE	

OPTICAL MODULE	
Sensing Technique	Focused Laser Reflection
Light Source	Standard VIS: Green Visible laser (520 nm) Standard IR: Mid-Wave quantum cascade laser (4.05 $\mu\text{m}$ ) Optional VIS: add Red (660 nm) or Blue (460 nm) Optional IR: replace MWIR with SWIR (1.55 $\mu\text{m}$ ) laser diode or LWIR (9.50 $\mu\text{m}$ ) quantum cascade laser
Detector	Standard VIS: CMOS camera (1600 x 1200) Standard IR: 640x480 microbolometer for MWIR and LWIR, 640x480 InGaAs for SWIR Optional VIS: Large-Format CMOS camera (2500 x 2000)
Objective Lens	Standard: 90mm Working Distance (WD), broad-band Optional: 20 mm, 30 mm, 40 mm, 150 mm, 200 mm WD, broad-band
MEASUREMENT	
Surface Shape	Spherical, Aspheric, Cylindrical, Plano
Surface Radii	$\pm 0.5$ mm to infinity (Plano)
Lens diameter	0.5 mm to 200 mm
Tilt Accuracy	VIS: $\pm 0.5$ arcsec IR: $\pm 1$ arcsec
Centration Accuracy	VIS: $\pm 0.2$ $\mu\text{m}$ IR: $\pm 0.5$ $\mu\text{m}$
Vertex Height Accuracy	2.5 $\mu\text{m}$ (with 20 mm WD objective adapter)
Radius of Curvature Accuracy	$\pm 0.05\%$ (with 30mm WD objective adapter)
Beam Deviation Accuracy	$\pm 30$ arcsec



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