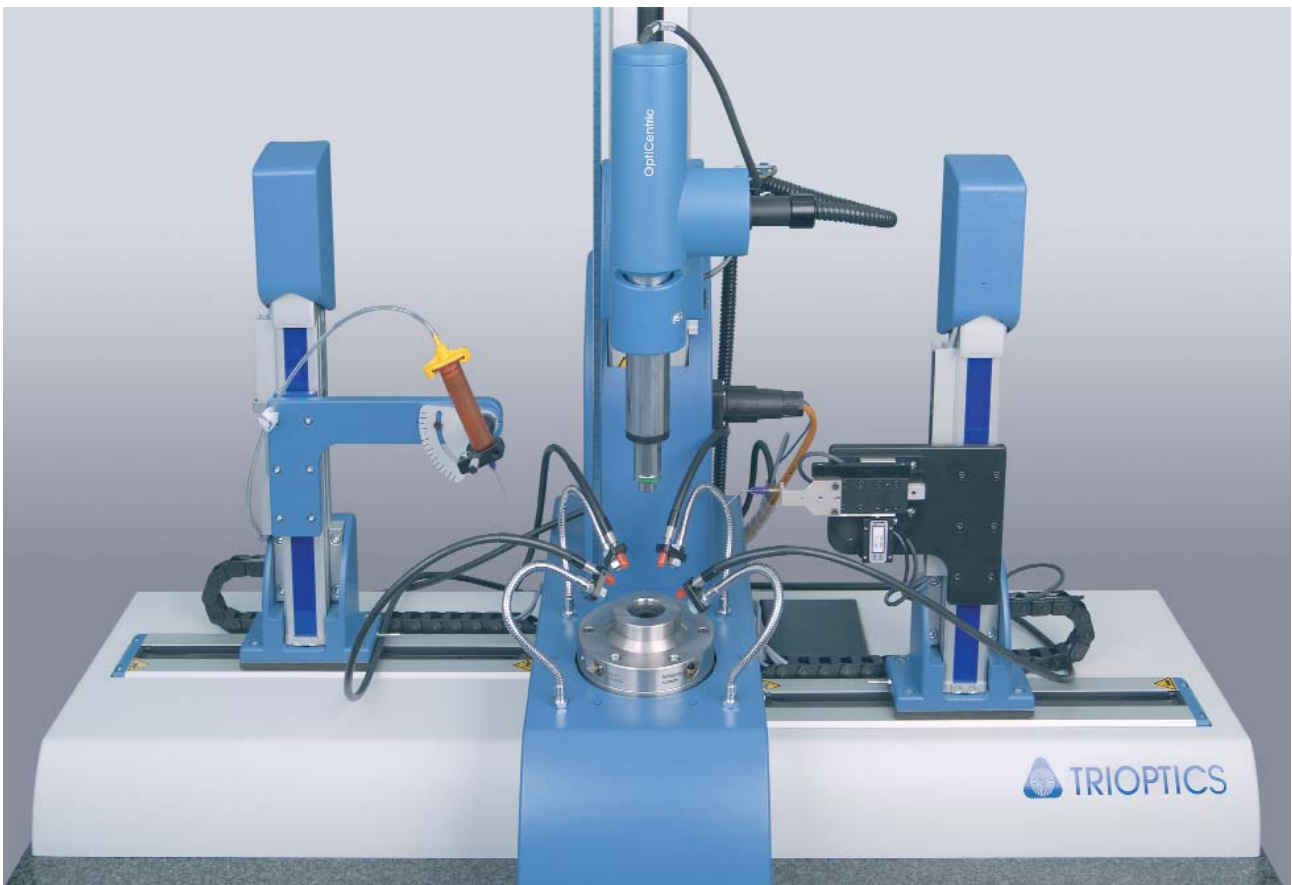


OptiCentric®

Automatic Bonding and
Cementing Station



OptiCentric® Bonding & Cementing Station

Lens Bonding

The TRIOPTICS Automatic Bonding Station extends the capabilities of the OptiCentric® System into automatic manufacturing processes of optical components and systems. Modern objective lenses rely more and more on glue bonded components which, besides the lower cost, save space and weight due to the

abandonment of bulky screwed retaining rings. Glue bonding is especially suited for the automatic centering and mounting of lenses since the mechanical forces to the lens are small and predictable. In addition, the costly pre-centering of the individual lenses can be avoided if the bonding is combined with an automatic centering process, making the fabrication process much cheaper.

The OptiCentric® Bonding Station includes all the devices necessary for the precise and automated centering and glue bonding of lenses into barrels and other optical sub-assemblies. A glue dispenser is mounted on a motorized x-y stepper motor stage for the automatic positioning of the dispenser tip to the glueing position. The dispensing process is computer controlled and the glue can be dispensed continuously or segmented around the lens.

A second x-y stepper motor stage moves a precision piezoelectric manipulator to the edge of the lens to be centered. The piezo manipulator allows a fine positioning of the sample lens with sub-micron step resolution



Automated assembly of infrared optics



Detailed view of OptiCentric® Bonding Station. Left: Dispenser stage, Right: Piezo manipulator stage, Center: OptiCentric® MOT system featuring air bearing stage and electronic autocollimator



The OptiCentric® Bonding Station in operation

and accuracy. The centring process is controlled by the OptiCentric® System which relies on a high resolution CCD autocollimator and the precise sample rotation with an air bearing. High-precision centering results better than 2.5 microns are typically achieved in 2 min. processing time including UV curing time. The UV curing of the glue after lens alignment is enabled by a computer controlled UV light source and several light guide outlets.

The complete bonding process is controlled by an integrated software program for all functions. A simple scripting language allows the flexible programming of the bonding process. The complete manufacturing cycle can be programmed with an easy teach-in procedure using the manual stage controls. Of course, different procedures for varying sample types can be saved in files for later use.

Lens Cementing

Lens manufacturing not only includes glue bonding of a lens to a barrel, but also the

centering and cementing of two lenses to a doublet. For this purpose TRIOPTICS has developed an opto-mechanical device as a supplement to the TRIOPTICS OptiCentric® System. It includes a 2-axis x-y piezoelectric fine-positioning stage and a lens specific grabber. The grabber does the precise positioning of the upper lens to the optimally centered position with respect to the lower lens. The centering procedure relies on the proprietary TRIOPTICS MultiLens® algorithm. It determines first the optical axis of the lower lens and calculates the target position for the top lens. The top lens is then pushed by the piezo driven grabber to the target position under control of the high resolution CCD autocollimator. With this technology, doublets with centering accuracies below 1 micron can be achieved. Similar to the Bonding Station, the complete process is computer controlled. Driven by customer demands in the high volume market of plastic molded lenses the process has been optimized for throughput. The complete cementing cycle including UV curing and manual sample handling is performed within less than 10 seconds.



Measurement tool for miniature lenses



UV curing of a centered lens with four light guides. Left: Dispenser, Right: Piezo manipulator, Top: autocollimator with microscope objective

Specifications OptiCentric® Bonding and Cementing Station

- OptiCentric® Base Station including
 - motorized autofocus stage
 - high resolution CCD autocollimator
 - motorized air bearing rotation table
- Dispenser Unit including
 - 2-axis precision stages for glue dispenser
 - glue dispenser with angular adjustment
 - automated pneumatic dispenser controller
 - foot switch for manual control
- UV light source including
 - high power 300 W UV lamp
 - liquid UV light guide with multiple outlets
 - foot switch for manual control
- Multifunctional PC IO card for instrument control
- Automated positioning unit for alignment of lenses in mounts including
 - 2-axis precision stages for piezoelectric positioning device
 - 1 or 3-axis (depending on application) piezo positioning device(s). For cementing: 2-axis piezo stage mounted on air bearing, incl. lens grabber
 - Piezo controller
- Mechanical gauge for measuring the run-out of reference surfaces on sample or barrel
- Integrated user friendly software for the PC controlled automatic glue bonding process, including
 - Software Kit Assembly for controlling the dispenser unit, its positioning and the UV light source
 - Software Kit Align for controlling the piezo electric stage and sample alignment process
 - Integrated control software for centering error measurement, pass/fail evaluation, teach-in programming of assembly procedures, including password protected security levels and manual positioning of all stages
- MultiLens® module for cementing
- Factory installed PC with software and IO cards installed and tested

