

# NanoGlue

Advanced Alignment and Gluing Station for  
Production and Process Development

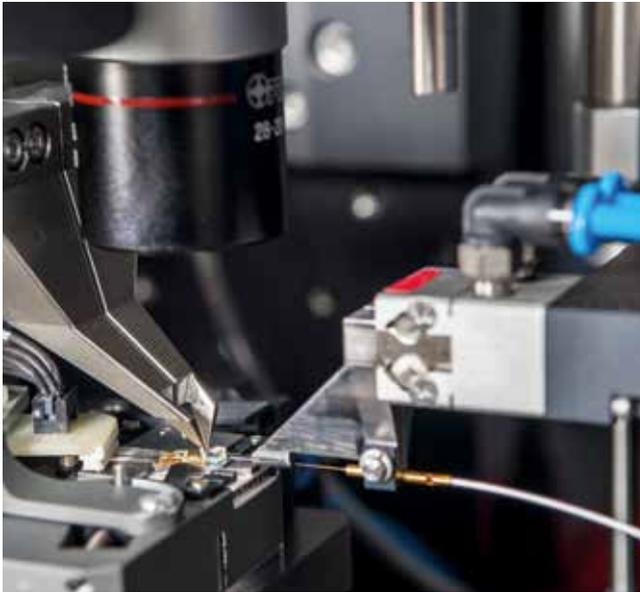


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## Fast Precision Alignment and Assembly

NanoGlue is an advanced workstation for the alignment of opto-electronic components like planar waveguides, diode lasers and diode laser arrays, VCSEL, lenses and lens arrays, photo diodes and diode arrays. The permanent assembly is made with UV curable epoxy. NanoGlue is suitable for research and product development as well as for volume production.

The MTF configuration of NanoGlue aligns optical lens assemblies versus sensor chips. The loss of contrast of an object seen by the sensor serves as feedback signal for the alignment system. As soon as the optimum position is reached, the search stops. Resin dispensing and UV curing follow for permanent fixation. As an alternative joining method, nanosystec offers selective laser soldering.



Device-specific grippers allow for precise positioning of optics and fibers.

NanoGlue consists of modular building blocks. This gives the greatest flexibility for the system configuration at a reasonable cost. The electronic circuits and elements are of industrial grade which ensures very long operational times without interruption.

## High Precision Motion System

The alignment axes have excellent performance criteria and an extremely long life time. The resolution for the linear axes is 20 nm, rotary axes have a resolution of 0.0005°. Linear axes with a long travel range are ideal for automation of the system with loading/unloading and processing of multiple work-pieces in one session. Either one-channel or multi-channel devices can be processed.

The library of alignment algorithms for active alignment contains various routines. The parameters of these routines can be freely selected to achieve the shortest search and optimization times. An unlimited number of search routines can be stored.

## Automated Resin Dispensing and Curing

The automated dispensing of epoxy ranges from volumes of several nl to ml, depending on the dimensions of the work-pieces. The dispensed volume is constant from device to device. This is a significant factor for good and consistent quality of the finished product. Pre-dispensation can be integrated into the process.

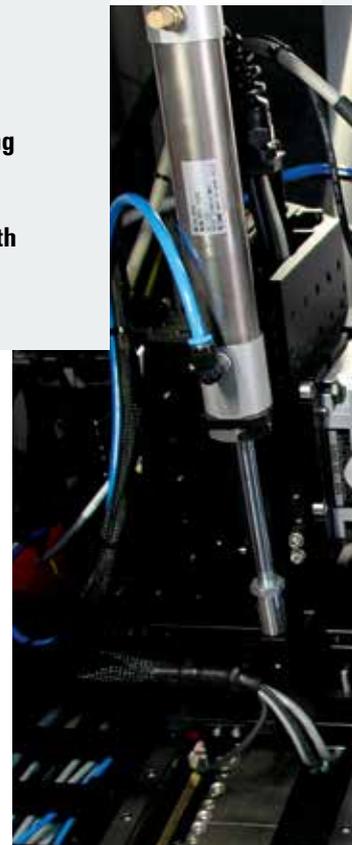
The cartridges with the resin are shuttled into position under the vision system. This allows for monitoring the dispensing procedure and provides an accurate positioning of the needle.

UV radiation cures the glue within or after alignment and dispensing. Either arc lamps with flexible guides or LED sources are used. Thermal curing can be added as well.

### Benefits of NanoGlue

- **Fast precision alignment**
- **Modular building blocks**
- **Greatest flexibility at a reasonable cost**
- **Multiple work-pieces in one session**
- **Automated resin dispensing and UV curing**
- **Short processing times with tray concept**

Example for fully automated optical alignment: A feeder presents cartridges with devices. The gripper on the gantry serves for automated pick-up, serial number detection from an AI code reader and transfer to the nest. A six-axis motion stack with force detection on the optics gripper provides active alignment in the submicron range for perfect collimation and pointing.



## Powerful Machine Vision shortens Process Time

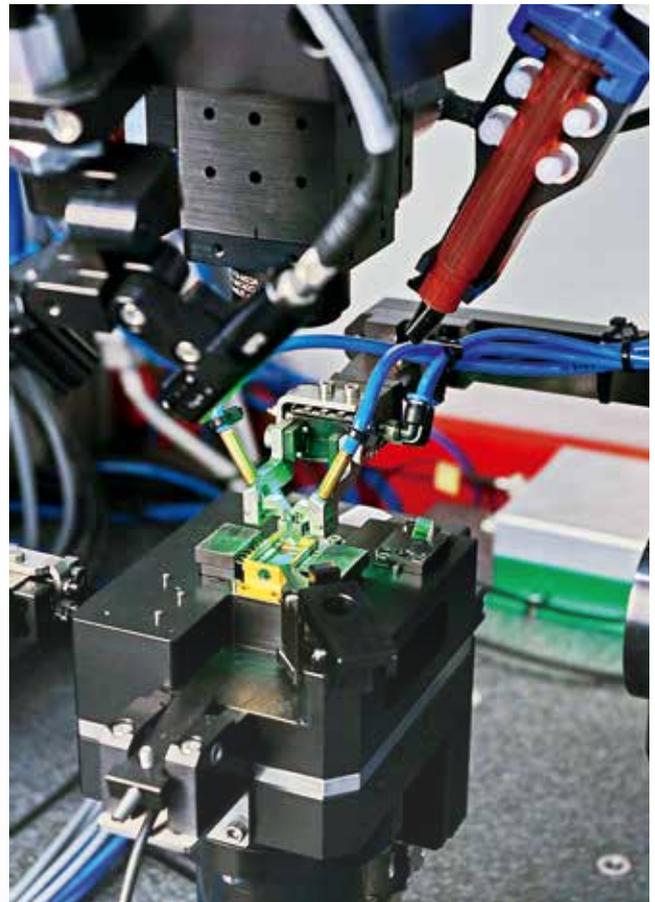
A number of high-performance lenses and cameras is available for integration into the system. Motorized zoom cameras provide variable fields of view and calibrated magnification.

Telecentric lenses are used for determination of the size, the integrity and orientation of components. Cameras for both visible and near IR detect optical channels and other features.

Illumination of the working area uses LEDs with wavelengths from blue to near infrared depending on the characteristics of the surface to be detected.

## Submicron non-contact Measurement

For measuring the dimensional values of a package and adjusting for a good starting position of the alignment process, NanoGlue offers a non-contact measurement with a white light sensor. The spot size on the target can be as small as 15  $\mu\text{m}$  and the resolution achieves less than 0.1  $\mu\text{m}$ .



For small volumes and process development, NanoGlue works with removable device trays. The machine interface allows for repeatable and secure clamping and provides electrical contacts for the device signals.

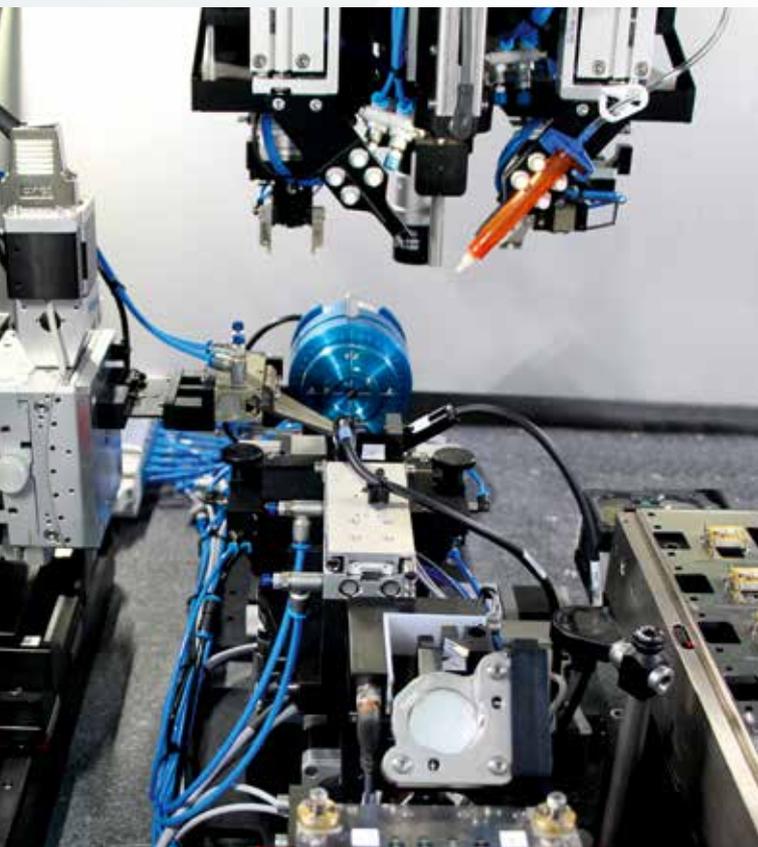
## Versatile Software and Process Programming

NanoGlue uses the software package TestMaster. This powerful and versatile package is the result of several decades of practical experience and continuous development. Besides controlling the instruments and motion controllers of NanoGlue, additional hardware is integrated easily and communication with other computers is quickly installed.

An easy to be programmed sequencer controls all processes. The number of processes to be stored is next to infinite. Activating a stored process can be done either manually over the keyboard or by reading a 1D- or 2D-label with a scanner. In fully automated production lines the master program supervises the station.

## Data Handling and SPC

The alignment and gluing cycle generates a vast amount of data. These data are available for further analysis and support statistic process control. NanoGlue uses an optional local database and can directly write and retrieve data from the customer's central database.



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## Full Process Automation

NanoGlue accepts various method for loading the work pieces and transport of the finished product. The modular design allows for a migration from manual loading to full automation when the production volume reaches the necessary capacity.



Feeders allow for unattended and fully automated operation except for cassette loading and unloading.



The NanoRobot precisely handles small parts in the NanoGlue station. Repetitive movements are executed with an error of less than 5  $\mu\text{m}$ . This performance qualifies the robot for direct placement of workpieces under the weld beam as well as for part inspection in machine vision stations for a visual assessment. NanoRobot has 5 N load capacity and a working range of 300 mm.

For low volume, the presentation of one set of parts or multiple sets is the most cost-efficient solution. Removable device trays already reduce the process time as an operator loads and unloads the parts on the trays outside the station while the process runs with a second set of devices.

For larger production volumes, the use of one or more feeders presents an efficient solution. Each feeder holds up to 20 Jedec trays, Auer boats or custom pallets in a transportable cassette. As soon as all parts are processed, the cassette with the finished goods is taken out and the next cassette with new parts is loaded.

The presentation of the parts with a conveyor belt is another solution. A continuous flow of material enters the NanoGlue station and an exit conveyor brings the parts to the next production step.

Robots complement the loading operations. Mounted inside the station, they take the workpieces from trays or blister packs and insert them into the processing nest.

**nanosystec**  
PRECISION AUTOMATION

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