

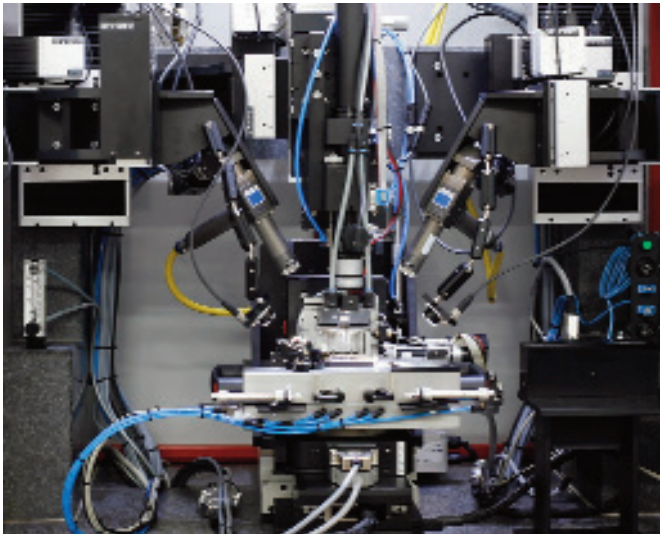
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# NanoWeld Linear

Advanced Alignment and Micro Welding Station  
for Production and Process Development



***nanosystec***



*The NanoWeld combines excellent yield with short cycle times – for high capacity production at minimum cost.*

## High Capacity Production Solution

The NanoWeld Alignment and Welding Stations combine ultra-precise hardware with a powerful software package. Depending on the device to be aligned and welded, process times for a full cycle including loading and unloading are in the range of several minutes.

The feedback signal for the alignment can be any position-dependent value, might it be optical power, beam pointing), polarization extinction ratio or a sensor output.

## Modular Architecture

In order to provide the best price-performance-ratio, the functional groups in the NanoWeld are chosen and combined according to the specific process: for example the motion system, machine vision, weld laser and feedback signal instrumentation for the alignment process.

If the requirements change, the NanoWeld can be easily upgraded with additional instrumentation. The modular concept with device specific trays allows running different device types on the same station easily. To change over from one process to another takes only seconds.

## Repeatable Alignment and Welding

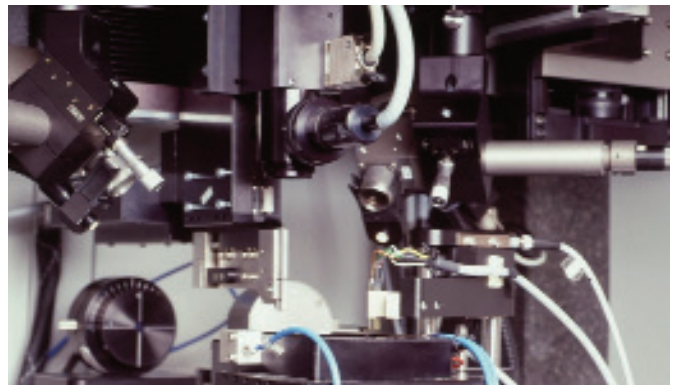
Thorough design and continuous optimization of all functional groups lead to superior mechanical stability. Mechanical references with tight tolerances provide a repeatable manufacturing situation from device to device.

High-precision alignment stages with crossed-roller bearings and absolute position feedback ensure active alignment in the sub micron regime. Fast search algorithms cut the process time to a minimum. These include spiral scans and proprietary optimization scans which are carried out for several axes simultaneously.

The motion stages are mounted onto a vibration-isolated granite structure. This solid set-up makes the NanoWeld insensitive against disturbing external influences.

Extended diagnosis functions both in hardware and software ensure maximum transparency on the system condition.

By reducing all these uncertainties in the production to a minimum, a fine tuning of the process can be accomplished. Possible failures of a device batch or a machine component will be identified in an early stage in order to provide maximum uptime.



*The precise positioning of the weld heads and their symmetrical orientation ensures repeatable weld joints with low shift and high strength.*

## Stable Welding with minimum Shift

In order to get minimum weld shift, stable gripping mechanisms and compliance tools will be used to bring the parts in surface contact. In addition, tight mechanical tolerances of the devices lead to stable welding results.

The smaller the diameter of the weld spot, the less energy will be introduced. In the standard version, the stations work with a 300 micrometer weld spot size.

The weld spots are oriented symmetrically. This configuration provides the most stable conditions to join the parts. The spots deliver the same amount of energy with a deviation of less than 2.5%.

The long focal length of the weld optics combined with a small optics diameter maintain a long beam waist in the focus. Even when the Z position of the weld head changes slightly, this does not affect the spot diameter and the weld results.

## Laser Induced Micro Adjustment

If the weld shift has to be kept well under a micrometer, an additional fine tuning procedure will be applied. The material in the weld joint shrinks when it cools down after welding. Depending on the shift in the first weld spot set, additional single weld spots at calculated positions achieve micro bending.

Alternatively, a gentle mechanical bending procedure will be applied for appropriate clamp designs.

The goal is always to establish a repeatable procedure with a high yield.

## Mechanical and Electrical Customization

By customizing the NanoWeld station in the mechanical layout and the electrical set-up, the ideal manufacturing process for the respective device can be realized.

This includes the motion axis configuration, the loading station as well as device-specific grippers and handling systems. In addition, the NanoWeld system can be laid out as an in-line production solution.

## Powerful Machine Vision Capability

The NanoWeld Stations use automated machine vision algorithms. These include pattern recognition, edge detection and autofocus.

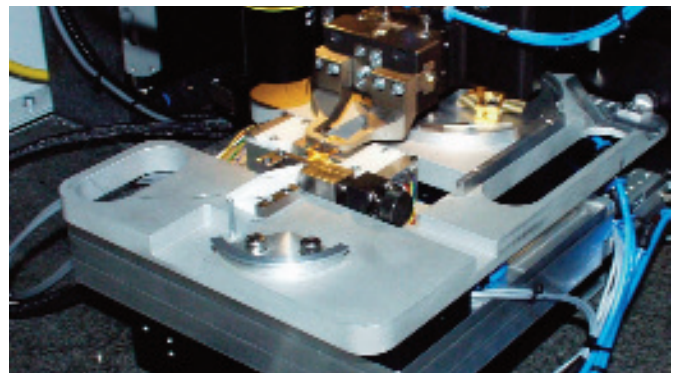
The LED illumination can be adjusted in brightness for ideal imaging conditions. By using a motorized zoom lens, the positions can be identified with an uncertainty of several micrometers in the high magnification while in the low magnification a large field of view can be shown.

The weld heads are equipped with cameras. The focal position of the weld spot is aligned to the imaging plane of the camera. Cross hair generators are adjusted to the center of the weld spots. In this way, the screen picture can be used to ensure that the weld spots are set at the correct position. This process can be fully automated.

## Interchangeable Device Trays

Working with removable device trays has two advantages: First, the loading and unloading time will not block the production system. This improves productivity.

Second, different designs of the trays allow to manufacture different devices on the same station. The device-specific wiring and mechanical fixation remain on the trays. If new or modified devices need to be tested, this does not impact the structure of the NanoWeld station.



*Interchangeable device trays allow producing different device types and change over to new device designs.*

## Different User Levels

Five user levels differentiate the access rights. These rights can be individually assigned for standard operators, skilled operators, service personnel, set-up engineers and administration mode. This structure provides a smooth and secure operation of the systems in high technology production environments.

## Process Monitoring

Digital inputs in the general machine control or in the motion controller are permanently monitored and can be displayed. Depending on the process, automated actions follow when a certain interlock or emergency function changes the status. Also a power, pressure or vacuum outage will be detected. An automated shut-down can be executed.



*Critical machine functions are permanently monitored. Automated sequences follow as soon as such an input changes its status. Standard monitoring signals include voltage, pressure, vacuum and interlock/emergency stop.*



*Remote access reduces the time when support is needed. The tool works through a secured internet connection.*

## Remote Access

The NetViewer Remote Access software works through a secured internet connection. The fast and easy access helps to save time in case any support or trouble shooting needs to be executed on the system. For safety reasons, nanosystec can only access the system when the user accepts. For each event, a new session will be started.

## Statistic Process Control

Process data can be retrieved during the production. It serves as a basis for quality assurance and process improvements. Typical values include positions, power level at maximum, power shift after assembly, cycle time, etc.

## Connection to Database

Standard commands in the sequence editor write into or retrieve data from a local or network database. Depending on data retrieved, the process can be adapted accordingly.

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