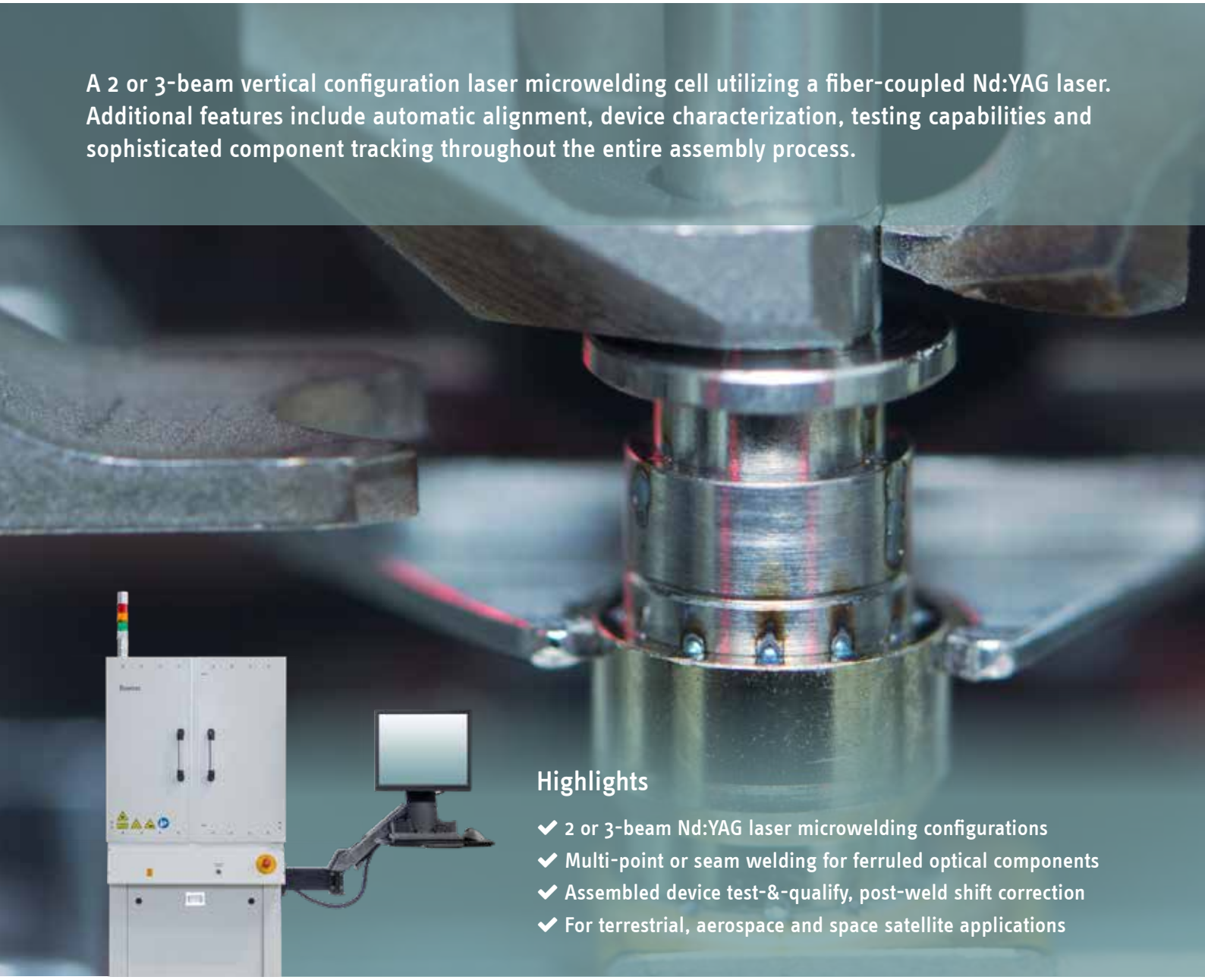
MANUFACTURING MADE LIGHT
Solutions for integrated photonics. Built to scale.

LASER WELD

An automated microwelding station for photonics

A 2 or 3-beam vertical configuration laser microwelding cell utilizing a fiber-coupled Nd:YAG laser. Additional features include automatic alignment, device characterization, testing capabilities and sophisticated component tracking throughout the entire assembly process.



Highlights

- ✔ 2 or 3-beam Nd:YAG laser microwelding configurations
- ✔ Multi-point or seam welding for ferruled optical components
- ✔ Assembled device test-&-qualify, post-weld shift correction
- ✔ For terrestrial, aerospace and space satellite applications

PHOTONICS AUTOMATED ASSEMBLY AND TESTING
FROM LAB TO FAB

ficonTEC
photonics assembly & testing

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Laser Weld systems are fully automated align-&-attach microwelding production cells for photonics. These systems are typically used for optical assembly and for coupling light out of photonic device packaging (butterfly, TO, custom), using, for example, either ferruled optical components or single/multi-fiber coaxial assemblies.

Comprising a vertical dual-stage layout, each stage has its own high-precision multi-axis movement. A 2-beam configuration enables direct fiber-to-chip coupling and confocal optical train assembly of miniature components in common package formats. A 3-beam configuration features 45° or 90° beam out-of-plane incidence for fillet or butt/lap-style welding of coaxial components, respectively.

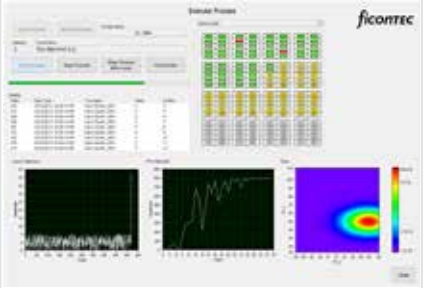
The welding process can be performed passively or on actively driven components and can incorporate an optional inert gas feed for improved weld quality. Post-weld characterization and testing procedures enable performance and yield monitoring, with post-weld shift correction capability available for out-of-spec results.

System upper and lower tooling

Equally spaced weld spots

Software control

PCM is ficonTEC's unified process-oriented control interface that ships with all turn-key stand-alone systems and multiple machine configurations. PCM features an intuitive UI and an up-to-date feature set that includes all machine vision, high-resolution positioning, system management software and test routines required to reliably and repeatably drive passive/active alignment and bonding process hardware.



Freely configurable operator interface

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Laser microwelding in process

Operator safety

- Fiber-coupled 2 or 3-beam delivery and Laser Class 1 safety enclosure
- Fully programmable process automation, device characterization and optional ML-based process hardware monitoring reduce operator interaction

120° beam arrangement of laser weld heads

Key features

- Fully automated 2 or 3-beam microwelding station
- Motion system precision and tolerancing for fiber alignment
- Precision goniometer angular control of the lower stage
- Standard and custom device package tooling available
- LaserHammering™ post-weld shift correction capability

General tasks & applications

- Suitable for all ferruled optical components and devices
- Fiber-to-chip, fiber-to-package, single or multi-fiber devices
- Coaxial laser diode modules, optical isolators, WDMs
- For terrestrial, aerospace and space satellite applications

LASER WELD cell for photonics

Laser microwelding stations for micro and nano-fabrication and bonding tasks generally do not provide sufficient motion precision and tolerancing for (fiber-)optical assembly. ficonTEC's LASER WELD systems are the very latest evolution of over 20 years of development for this very application.

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ficonTEC is the global market leader for automated assembly and test solutions for modern optoelectronics and integrated photonic devices. In serving development and manufacturing needs for telecom/datacom interconnects, sensors & lidar, camera modules, high-power diode lasers and many other integrated applications for over 20 years, ficonTEC's suite of process capabilities is unmatched.

Additionally, a unique and modular approach to production equipment design means that each solution is the automated and optimized embodiment of a customer-defined process.

Contact us

ficonTEC Service GmbH
Achim, Germany

T +49 4202 51160-0
info@ficontec.com

For ficonTEC subsidiaries in the US and Far East as well as for distributors around the globe:

www.ficontec.com/locations

Core system specifications	 LW800	 LW1200
Motion system	configurable high-precision multi-axis upper and lower tooling stages 3-axis beam delivery control*	
Device handling	pick-&-place from custom carriers	
Temperature control	temperature-controlled chuck on request	
Load options	manual loading	
Feed options	on request	
Machine vision	system referencing and observation camera options | device and I/O port referencing	
Software features	flexible and powerful process programming | Windows 10 PC	
Minimum connections	120 VAC (or country specific) | air/vacuum | process gas on request | 100 Mbit/s network	
Cleanroom compliance	ISO 6**	
Physical features	rugged steel base production cell	
Dimensions (w x b x h, mm)	800 x 1200 x 2000	1200 x 1200 x 2000
Weight (typ., kg)	1300	1800

* alternative multi-axis configurations optional ** others available on request

- All ficonTEC systems are compatible with PXI-based electro-optical instrumentation modules and leveraging of NI's LabVIEW™. Non-LabVIEW and alternative instrumentation environments are also compatible.
- In addition to all driving align-&-attach processes, PCM software also includes AI-based Deep Learning defect recognition capability, optional ML-oriented production data monitoring, and can direct call functions in Python files.

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