STACKLINE
High-precision device stacking & unstacking

Fully automated precision stacking/unstacking for semiconductor laser diode bars. Typically used in preparation for a coating process, and/or for post-process unstacking and optical inspection of facet and side walls (optional). Configurable as a stand-alone or as an in-line assembly cell.

Highlights
- Fully automated passive/active photonic device assembly
- Nominal +/- 2 \( \mu \)m, optional +/- 0.5 \( \mu \)m stacking accuracy
- Integrated high-end flowbox and Class 1 laser safety
- Optional optical facet and side wall inspection
Fully automated semiconductor device stacking and unstacking

Stackline systems have been uniquely designed to provide fully automated device stacking and/or unstacking capabilities. This is realized by drawing together selected capabilities from the ficonTEC packaging toolbox – our ubiquitous machine vision system referencing and component recognition/handling, Assemblyline’s passive alignment routines, and Testline’s AI-based defect recognition facet inspection procedures. Seamlessly managed by a common process-oriented control interface, the result is an industry qualified and flexibly programmable stacking/unstacking system that continues to see wide usage.

Stacking is typically required in preparation for coating (sputtering) processes, with subsequent post-process unstacking and inspection of facets and (optional) side walls. These systems are compatible with all high-precision, flush or staggered spacer diode bar stacking and unstacking needs. Although primarily available as versatile and highly capable stand-alone cells, they can also be configured as in-line process cells for volume production lines. The latest updates include optional, ML-based process monitoring hardware and software add-ons to ensure minimal downtime.

Software control

Process Control Master (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 that includes all machine vision, high-resolution positioning and system management software routines required to reliably and repeatably drive passive/active alignment and attachment/bonding process hardware.

PCM is fully enabled for laser bar alignment with flush or staggered spacers, for automated inspection, and for optical characterization tasks. An up-to-date feature set includes AI-based Deep Learning defect recognition capability, ML-oriented production data monitoring for reduced downtime, and the possibility to direct call functions in Python files.
STACKLINE in high-power diode bar preparation

High-power laser diode bars find myriad application in materials processing and as medical lasers. The so-called wall-plug efficiency can be improved, for example, by high-quality facet passivation (coating), giving higher optical intensity and brightness at superior electrical characteristics.

Modular & (re-)configurable

• Flexible device and standard/custom carrier handling options
• FAB & HVM-ready – configure as stand-alone or in-line cells
• Performance Services options for ML-based operation
• Add or swap modules to re-configure & re-purpose

Key features

• High-precision machine vision motion referencing and alignment
• Pick-&-place from/to standard/custom carrier formats
• Nominal +/- 2 µm, optional +/- 0.5 µm alignment accuracy
• Optional dimensional checking and full facet inspection
• Integrated flowbox, electrostatic protection and Class 1 laser safety

General tasks & applications

• Stacking (flush/staggered) of bare singulated laserbars up to 20 mm
• Device sorting from singulated wafers
• Unstacking from, and inspection of coated LD stacks

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ficonTEC is the global market leader for automated assembly and test systems for modern optoelectronics and integrated photonic devices. An unequalled breadth in process capability has been developed in serving the needs of a broad range of applications, including telecom/datacom and 5G, sensors and lidar, IoT and mobility, high-power diode laser assembly, and many more. A unique and modular approach to production equipment design means that each system delivered is the automated and optimized embodiment of a customer-defined process.

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

STACKLINE systems are suitable for automated, high-precision stacking/unstacking of semiconductor laser diode bars, and are typically used in preparation for a coating (sputtering) process, and/or for post-process unstacking and inspection of the optical facet. Special purpose cells, robotic systems as well as some TESTLINE functionality can be flexibly incorporated to suit customer needs.

<table>
<thead>
<tr>
<th>Core system specifications</th>
<th>$S1200$</th>
<th>$S2000$</th>
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<tbody>
<tr>
<td>Motion system</td>
<td>multi-axis high-precision alignment</td>
<td></td>
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<tr>
<td>Device handling</td>
<td>unstacking ONLY pick-&amp;-place to Gel-Pak, Waffle Pack, custom</td>
<td>stacking/unstacking pick-&amp;-place from/to Gel-Pak, Waffle Pack, blue tape, custom</td>
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<tr>
<td>Temperature control</td>
<td>temperature-controlled chuck, +15 to +80 (+/- 0.1) °C</td>
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<td>Load options</td>
<td>manual loading and/or single conveyor</td>
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<tr>
<td>Feed options</td>
<td>suitable for Jedec or Auer boats, or for customer trays</td>
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<tr>
<td>Machine vision</td>
<td>system referencing and observation camera options</td>
<td>device and I/O port referencing</td>
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<tr>
<td>Software features</td>
<td>flexible and powerful process programming</td>
<td>extended operator-less control</td>
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<tr>
<td>Minimum connections</td>
<td>120 VAC (or country specific)</td>
<td>air/vacuum</td>
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<tr>
<td>Cleanroom compliance</td>
<td>ISO 6**</td>
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<tr>
<td>Physical features</td>
<td>rugged steel base production cell</td>
<td>integrated flowbox for ISO 7 conditions at working area</td>
</tr>
<tr>
<td>Dimensions (w x b x h, mm)</td>
<td>$1200 \times 1200 \times 2000$</td>
<td>$1800 \times 1200 \times 2000$</td>
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<tr>
<td>Weight (typ., kg)</td>
<td>1800</td>
<td>2500</td>
</tr>
</tbody>
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** others available on request