vanguard
AUTOMATION
MYCRONIC

vanguard SYMPHONY

The solution for fully automated photonic packaging and integration of hybrid multi-chip assemblies

vanguard SONATA 1000 series

vanguard REPRISE 1000 series

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vanguard SONATA 1000 series
3D lithography for photonic integration

A powerful solution for photonic packaging and system assembly
Universal hardware with software-defined functionality, designed for scalable manufacturing

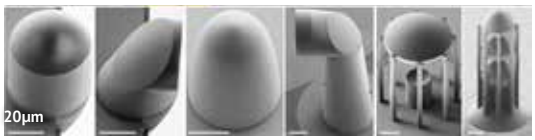
3D printing of freeform waveguides and micro-optical elements are revolutionizing photonic packaging and system assembly. With its vanguard SONATA 1000 series, Vanguard Automation offers the first industrial solution for in-situ printing of **Photonic Wire Bonds (PWB)** and facet-attached micro-optical elements. The system relies on high-resolution multi-photon lithography and is geared towards single-mode and multi-mode package-level connections. We offer future-proof machine hardware with software-defined functionality and customized processes.
The vanguard SONATA 1000 series is at the heart of a modular system concept, that covers the full range from small-scale prototyping to fully automated high-volume manufacturing.

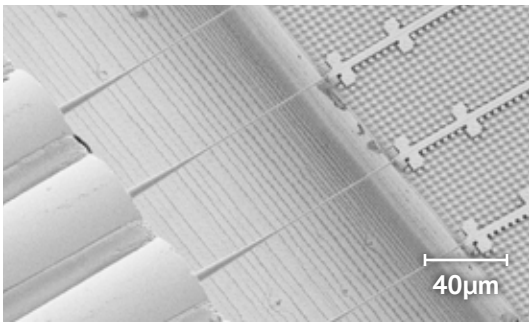
vanguard SONATA 1000 series - Key features
High-precision additive nanofabrication of single-mode waveguides and freeform micro-optics

- **Versatility:** Low-loss coupling to a wide variety of surface-emitting and edge-emitting devices, e.g., silicon photonics, InP light sources, single-mode fibers, multi-core fibers, passive waveguide platforms ...
- **Designed to perform:** Industry-grade machine platform, operated by a powerful application software
- **Future-proof:** Universal hardware concept with software-defined functionality and reconfigurability
- **Turnkey solution:** Tailored processes, comprising fully automated detection of customer-specific coupling interfaces
- **Scalable cost-efficient production:** From stand-alone machine to fully automated manufacturing lines

vanguard SONATA 1000 series - Access the full potential of hybrid multi-chip integration

- ✔ **Performance:** Individually optimized components on complementary photonic integration platforms
- ✔ **Yield:** Assembly of complex systems from known-good components
- ✔ **Cost:** Highly scalable fabrication, no need for active alignment





Images by Florian Rupp

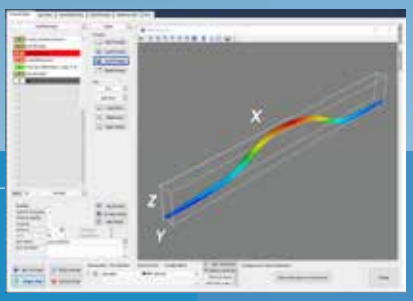
vanguard BrightWire3D
Process-oriented application software

Comprehensive process management tool suite

Operated by powerful application software for process management and software-defined tooling, our machines can be configured to offer customized functionality for a variety of applications.

vanguard Composer - Process management software based upon ficonTEC* PCM (Process Control Master)**

- Graphical interface for process configuration and management
- Programmable machine processes including in and output dialogues
- Remote-serviceability and -control via internet
- User management



vanguard BrightWire3D

- High-precision additive fabrication processes for photonic wire-bonding and freeform micro-optics
- Graphical interface for configuration of fabrication processes
- Powerful toolbox for interface detection by state-of-the-art machine vision
- 3D waveguide router
- Tailored fabrication process development module for customer-specific optical interfaces

* ficonTEC is the recognized market leader in the field of automated assembly and testing of micro-optics and opto-electronic components.
** ProcessControlMaster (PCM) is ficonTEC's user-friendly control interface that is shipped with all machines and multi-machine assembly lines.

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vanguard REPRISE 1000 series
Fully automated post-processing

A powerful solution for photonic packaging and system assembly
Universal hardware with software-defined functionality, designed for scalable manufacturing

Freeform waveguides and micro-optical elements are about to revolutionize photonic packaging and system assembly. The vanguard REPRISE 1000 series offers fully automated post-processing of 3D printed micro-optical elements, comprising the development of photoresists and adaptable localized encapsulation on wafer level.

vanguard REPRISE 1000 series - Key features

High-precision additive nanofabrication of single-mode waveguides and freeform microptics

- **Versatility:** Post processing adaptable to a wide range of assemblies and geometries, e.g. SOI and SiN chips, InP lasers, and SMFs.
- **Designed to perform:** Industry-grade machine platform, operated by a powerful application software
- **Future-proof:** Universal hardware concept with software-defined functionality and reconfigurability
- **Turnkey solution:** Tailored processes for fully-automated post processing of customer-specific assemblies.
- **Scalable cost-efficient production:** Compliments the vanguard SONATA 1000 series to a fully automated manufacturing solution

vanguard REPRISE 1000 series - Access the full potential of hybrid multi-chip integration

- ✔ **Performance:** Optimized encapsulation for high-performance optical interconnections
- ✔ **Yield:** Reproducible post-processing of complex assemblies
- ✔ **Cost:** Highly scalable post-processing of complex assemblies

About Vanguard Automation

Vanguard Automation combines a decade of research in integrated photonics with more than 20 years of experience in building high-precision assembly machinery to propel photonic integration and packaging. Headquartered in Karlsruhe, Germany, Vanguard Automation develops process technology and machines for creating low-loss photonic connections between passive and active optical components leveraging its unique IP portfolio for Photonic Wire Bonding and facet-attached micro-optics. Augmenting nano-print technology, Vanguard Automation's solutions enable high packaging density, increased design flexibility and fabrication throughput.

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