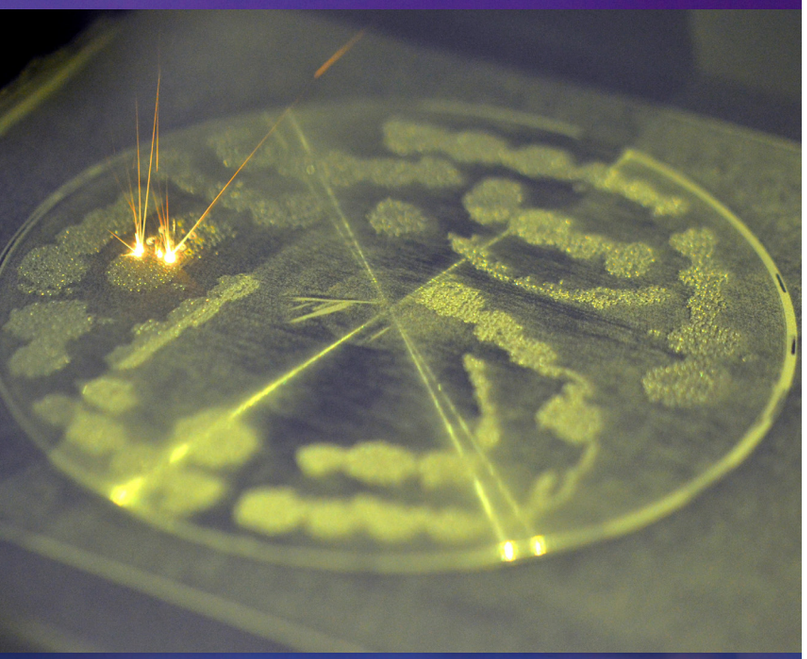
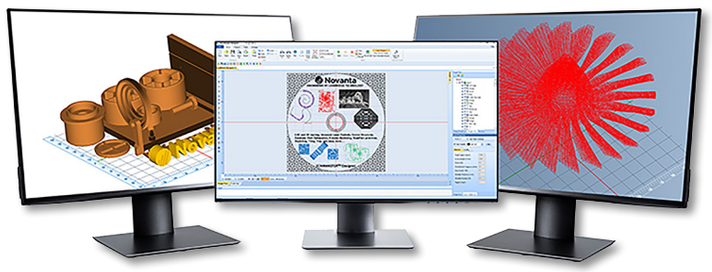
Novanta
PHOTONICS

Design & Control Laser Processing

Progressive user software and laser controller for seamless operation





Avoid Bumps in the Road

Laser processing systems are highly flexible and efficient for a wide range of applications. The key to getting the system up and running fast and easily is heavily dependent on the system controls and user interface. Mixing and matching laser system controllers and UI software can present a plethora of compatibility and integration issues that cause build delays and frustration for operators.

ScanMaster Designer (SMD) and ScanMaster Controller (SMC) are designed and configured for optimal operation of Novanta laser processing sub-systems and components. Novanta SMD and SMC have unique features and capabilities designed specifically to meet the specialized needs of our customers.

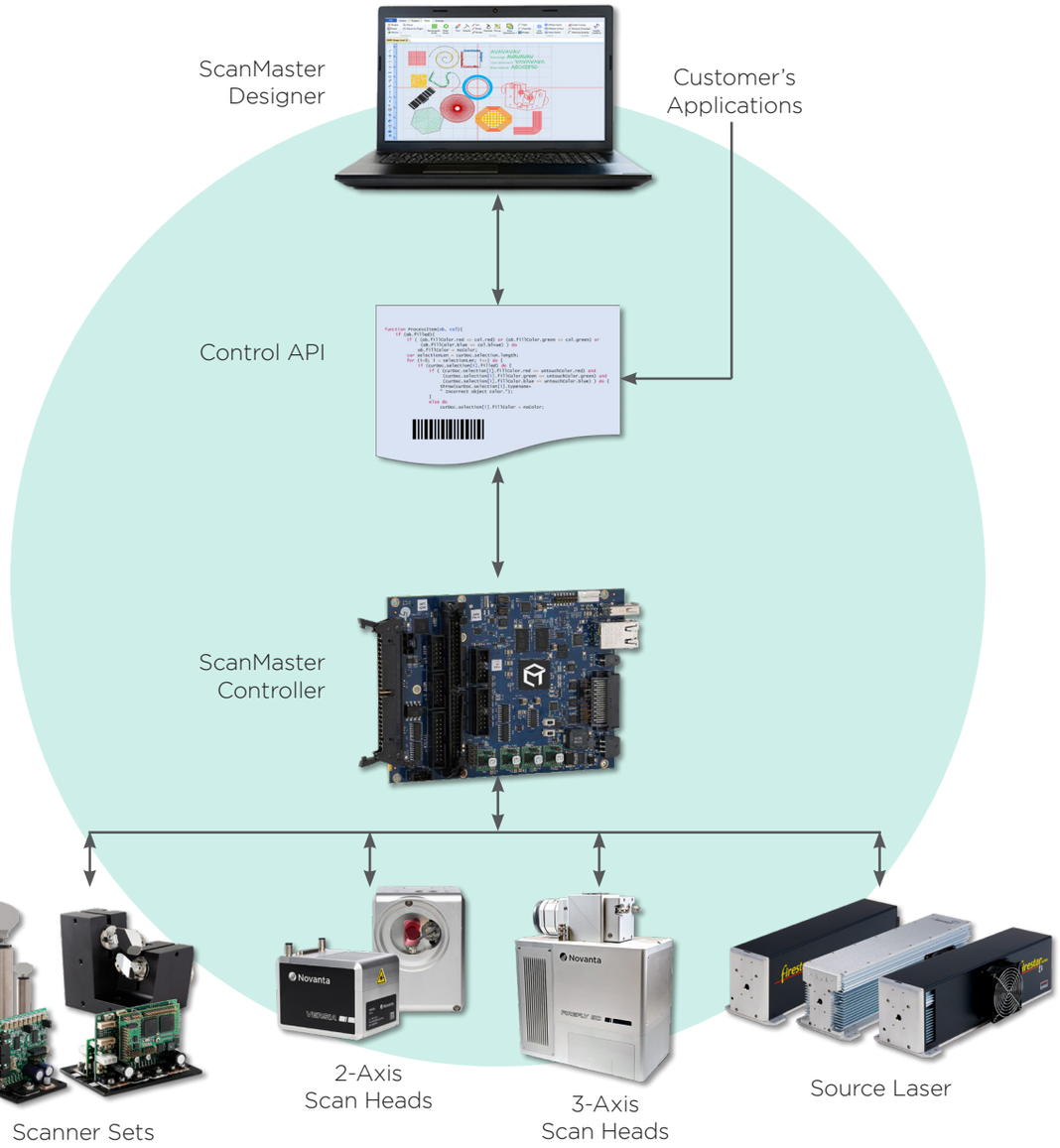
About SMD & SMC

ScanMaster Designer (SMD) is a powerful software application designed to support Novanta's ScanMaster Controller (SMC). With SMD you can create and scan virtually any image using graphical shapes, text, linear barcodes, 2D data matrix barcodes, QR-Codes, or imported raster images and graphics. SMD also features ScanScript, a powerful scripting language with a comprehensive library of commands for supporting any laser scanning scenario.

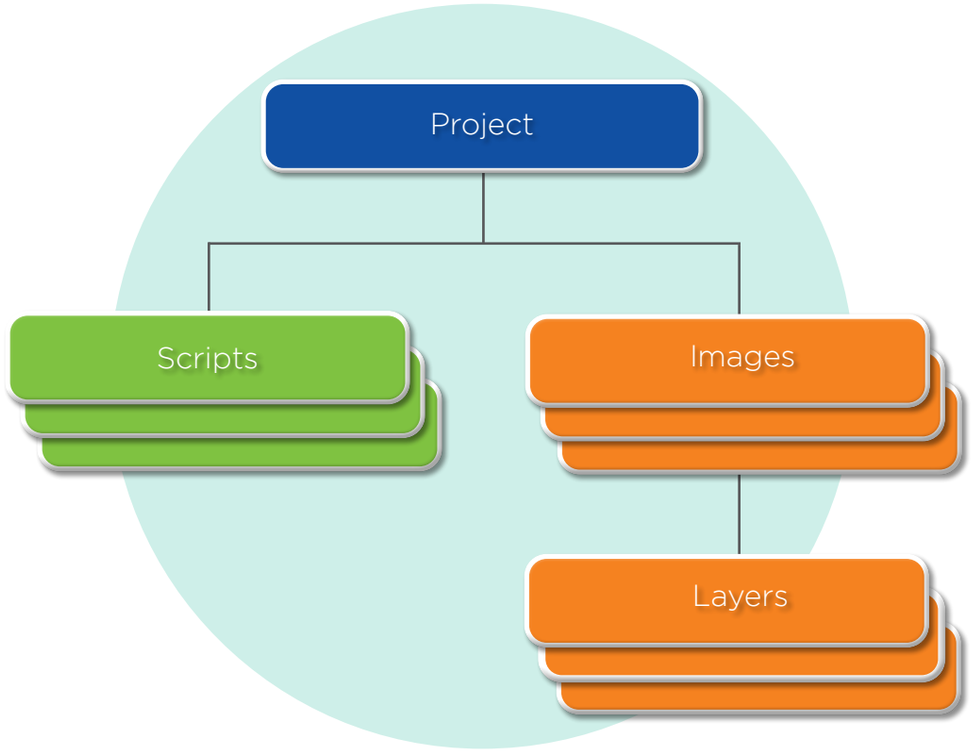
SMC is a self-contained controller that provides advanced hardware and software control technology to drive laser scanning systems using proprietary algorithms and predictive controls. The Ethernet-connected SMC board permits remote embedding and control of a scan-head and laser system. It can control two scan-heads with up to three motion axes each with concurrent laser timing control. It also provides integrated synchronization I/O for connection to factory automation equipment.

Basic System Architecture

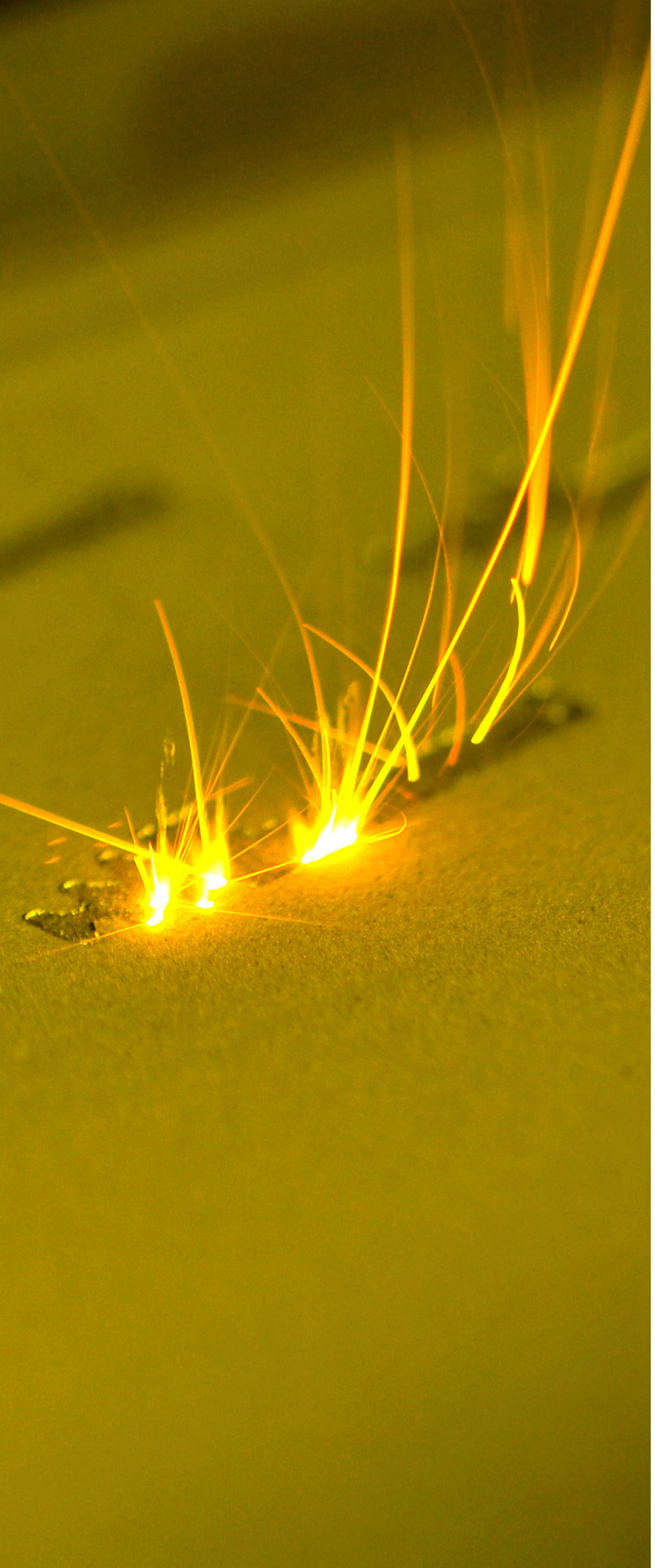
The advantage of the SMD/SMC architecture is that it provides users with detailed laser processing control for multiple aspects of a project.



The above diagram is a visual representation of the ScanMaster architecture, showing how ScanMaster Designer connects to the Scan Controllers and other scanner products.



A job, represented in ScanMaster Designer as a Project. A Project consists of two entities—The Script and the Image. The Image is a drawing made up of one or more Layers that hold shapes and other elements (text strings, barcodes, and pictures). Layers simplify the creation of complex images and define the order of execution. The Script entity executes flow control, to support integration with the rest of the system, and to allow programmatic manipulation of Images and settings. There is no restriction on the number of Images and Scripts in a Project.



SMD/SMC Highlights

- **Single Software/Controller Solution** – perfectly matched and designed in unison for optimal performance with built-in advance application features.
- **24-Bit GSBus** – highest command resolution available permits unprecedented position accuracy and output.
- **SyncMaster** – advanced laser scanning head and XY linear stage synchronization expands work field size and fits production environments with unmatched accuracy and speed.
  (Link: https://novantaphotonics.com/product/scanmaster-designer/)
- **High-Fidelity 3D Marking** – enables accurate marking on 3D objects with an integrated 3D model design capability and file importing.
- **Built-In ScanScript** – single solution for multiple applications includes application-specific features.
- **Skywriting** – delivers uniform laser density when processing complex shapes and tight corners to avoid “burn marks” caused by over-processing.
- **ScanPack Trajectory Planning** – intelligent trajectory planning delivers faster throughput with higher accuracy.
- **Synchronization** – high degree of stitching accuracy for multi-scanning head systems.

Specialized Applications

Key features developed and customized especially for industrial applications

Additive Manufacturing

To enhance quality part production, the SMC/SMD features superior command resolution, trajectory planning, and predictive controls. Additive Manufacturing users can achieve:

- Precision and quality
- Throughput improvement
- System failure detection
- Process data archiving
- Integrated process monitoring and control

API Support – Two programming API levels are supported: a low-level vector-oriented API, and a high-level shape-oriented API. The low-level API uses XML syntax for setting laser timing and scanner parameters, and for specifying motion vector sequences at any desired speed. The high-level API (SMAPI) abstracts the low-level details of the hardware control and permits the direct creation of shapes and images and provides access to the integrated ScanScript features of the SMC.

An additional ancillary API, the Broadcast API, allows a client application to identify SMC controllers on the network and to get relevant information about those controllers. On a configurable periodic basis, the SMC modules broadcast identification packets to the network. The API captures broadcast messages from all available SMC controllers and makes this information available to the client.

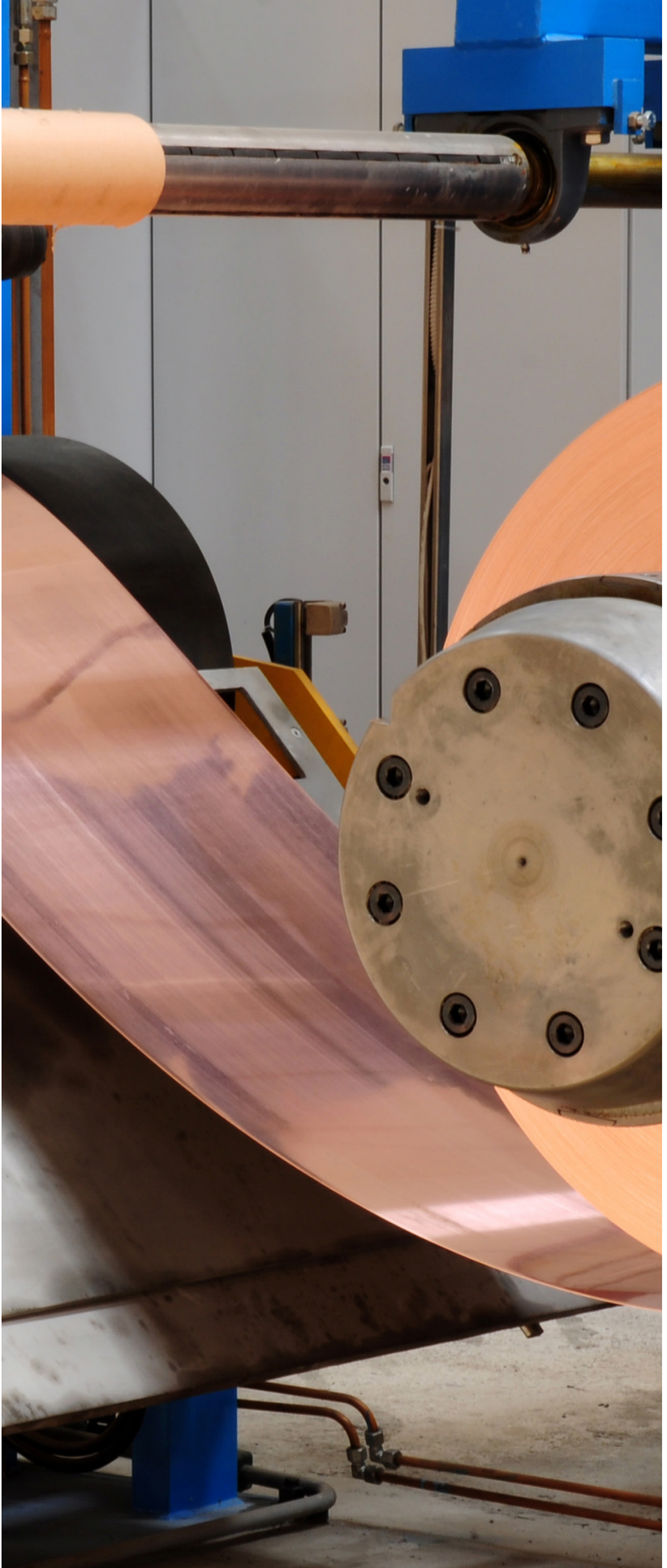
ScanPack – advanced trajectory planning delivery greater throughput with higher accuracy using an innovative control scheme to plan and optimize the scanner moving trajectory based on scanning-system capability as well as the user's accuracy requirements. Unlike the Traditional control mode, ScanPack does not rely on delay settings (Mark Delay, Jump Delay and Poly Delay) to optimize the process. Instead, it relies on end-user input for the accuracy requirement, (for example, Max Radial Error for corners).

Learn More - (https://novantaphotonics.com/using-wobble-based-laser-scanning-techniques-in-additive-manufacturing-applications/)

Marking & Coding

Novanta's SMD/SMD excels at marking and coding applications. The Project construct enables complete control of text and images by separating them into layers with the ability to set each with its own set of laser properties and define the order of execution. Dynamic barcodes and text can be rendered on-the-fly in response to pre-programmed serialization sequences, or external data sources.

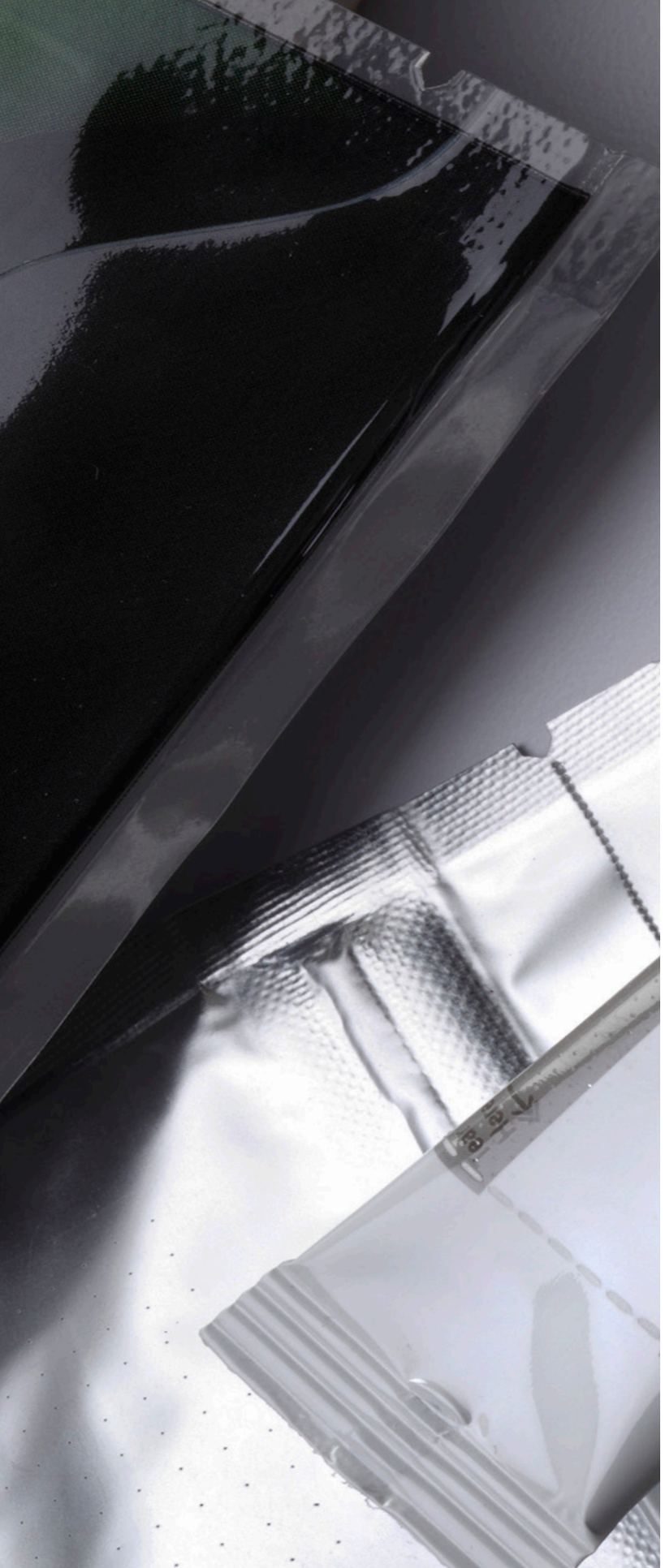
- **Hatching Support** – elaborate pattern support including checkerboard and helix with automatic hatch capability to produce vivid graphics and text.
- **Flexible File Import** – import raster and vector images with automatic parameter set assignment.
- **Mark-on-the-Fly** – stand-alone operation with real-time barcode and text rendering.
- **Tray Marking** – unique step & repeat capability to extend the marking area for batch processing systems.
- **Extensive Project Storage** – more than 15 million vector moves buffer with more than 3.5GB on board storage capacity.
- **Learn More** - (https://novantaphotonics.com/wp-content/uploads/2021/12/NOVT_Whitepaper_Improving_Character_Marking_Quality.pdf)



Material Processing

Laser processing applications in material processing are broad and diverse. Novanta's SMD/ SMC solution includes an equally broad range of features to optimize laser processing results.

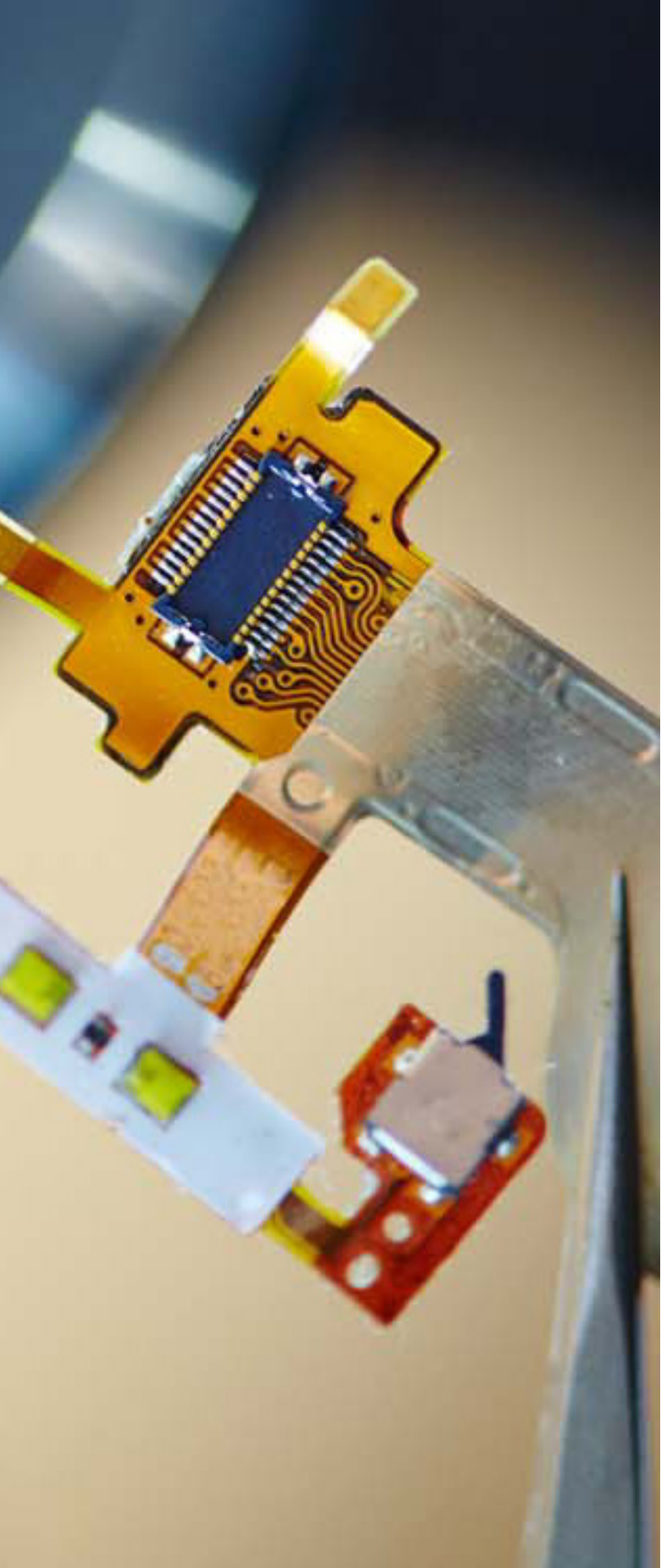
- ScanPack – when applied in material processing applications ScanPack improves throughput by optimizing scanner movement trajectory, eliminating the need for delay settings.
- Skywriting – eliminates laser over-processing that can cause burn marks and excessive edge melt by delivering uniform laser density.
- Wobble – especially useful in sensitive welding applications whereby the processing vector modifies with a repeating circular pattern defined by the parameter and amplitude settings. The repeating circular pattern distributes laser energy evenly across the wobble vector.
- Hatching – as with coding and marking the elaborate pattern support enables complex laser patterning, especially useful when applying ablation processing to modify surface textures.
- SyncMaster – material processing often involves larger format materials. SyncMaster expands work field size with advanced laser scanning head and XY linear stage synchronization with unmatched accuracy and speed.
- **Learn More** - (https://novantaphotonics.com/application/material-processing/)



Converting

Laser processing systems are quickly becoming more popular in converting applications due to their flexibility, lower change-over costs, and lack of added consumables. Novanta's SMD/SMC solution optimizes laser processing systems for converting operations with practical features for system builders.

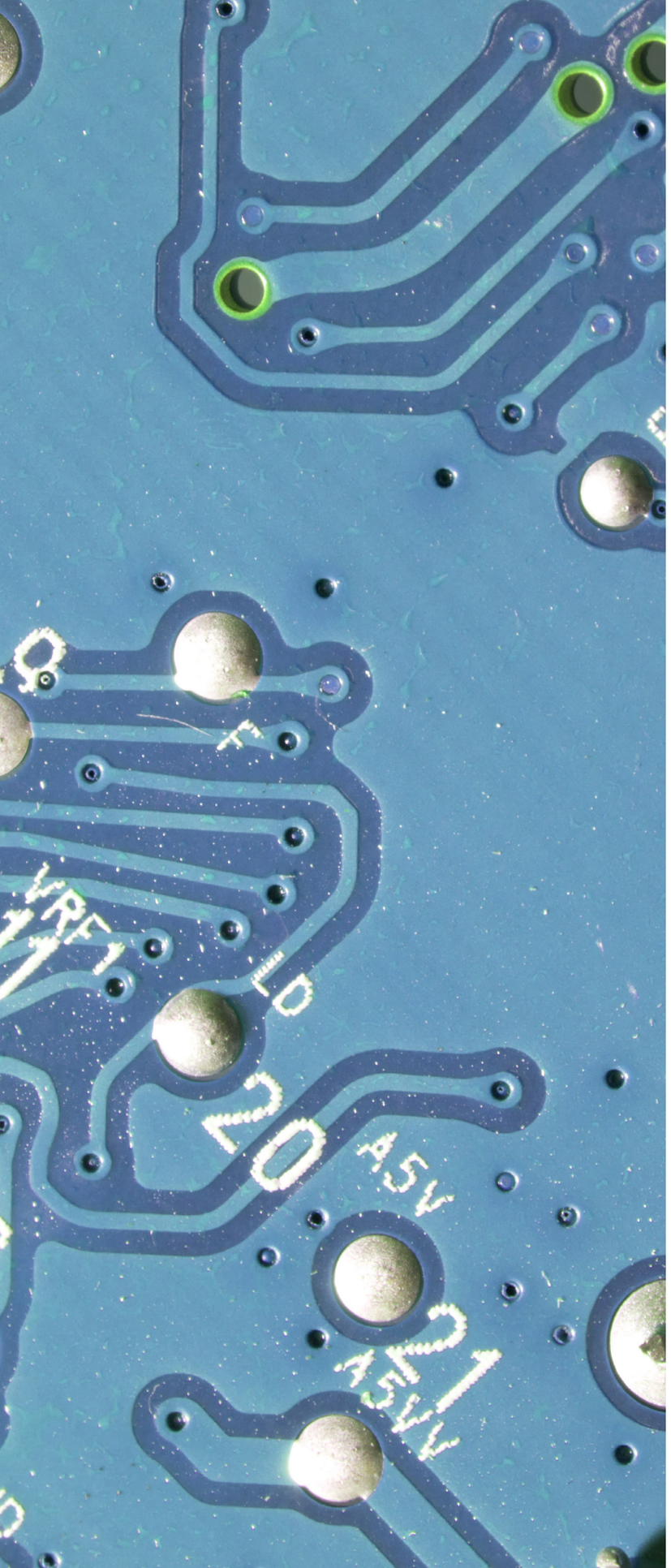
- **On-The-Fly Operability** – highly precise synchronization between the source laser and scanning head delivers accurate cutting, scoring, and perforating patterns for in-motion and roll-to-roll systems.
- **Tiling** – a step and repeat process that enables processing of areas larger than the laser processing area by synchronizing the laser processing sub-system with the movement of the processing bed.
- **Speed Compensation** – automatic adjustment of laser parameters to match the speed of in-motion systems.
- **Extended Field Coverage** – excellent beam and laser spot size controls from 150 x 150 mm to 1500 x 1500 mm.
- **Learn More** - (https://novantaphotonics.com/galvanometer_scanning_tech_and_co2_lasers_converting/)



Micromachining

High precision with ultra-fine levels of control for accurate, repeatable processing results. Novanta's SMD/SMC pairing optimizes zero contact drilling, cutting, etching, and ablation processes to create intricate parts and components with industry leading controls and software features.

- **Position Accuracy** – 24-bit GSBus command resolution enables unprecedented position accuracy and control.
- **Proprietary Algorithms** – ScanPack algorithms enable fast, precise galvanometer control and laser synchronization with predictive controls that increase laser scanning performance by eliminating delays and optimizing laser processing paths.
- **SyncMaster** - advanced laser scanning head and XY linear stage synchronization expands work field size with unmatched accuracy and speed.
- **Multi-Head Processing** – control multiple laser scanning head with up to 3-axes each with a single controller and matched software solution.
- **Learn More** - (https://novantaphotonics.com/application/detail/micromachining/)



Via-Hole Drilling

Novanta's SMD/SMC solution improves drilling project throughput while maintaining high drill hole position accuracy using two distinct methods that incorporate a high-speed digital scanning head and smart controlling methods.

- Closed Loop Method – utilizes real time in-position signal from the scan head before firing the laser.
- Dynamic Open Loop Method – the SMC uses the jump time look-up table to determine the time to wait before the next move instead of waiting for the in-position feedback signal
- Learn More - (https://novantaphotonics.com/fast-and-accurate-laser-drilling-with-high-speed-digital-scan-head-and-smart-controlling-methods/_)

Improve Your Laser Processing Productivity

Novanta is uniquely positioned, helping OEMs, system integrators, and end-use customers optimize the performance of laser processing sub-systems with its ScanMaster Designer and ScanMaster Controller. As both designer and manufacturer of critical laser processing components, we have intimate knowledge of their design and operation, and have the application expertise to get the absolute most out of the equipment. Novanta is forward-looking, delivering...

- **Continuous processing improvement** with progressive features, proprietary algorithms, and unique configurations for high-precision applications.
- **Faster up-times with easy, flexible integration** into machines or in-line systems, and modern, CAD-like user interface.
- **Avoid laser source and beam delivery integration challenges and shortcomings** realized when combining components from separate sources with a perfectly matched software and controller solution from Novanta.

Contact us for more information about ScanMaster Designer & ScanMaster Controller

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