

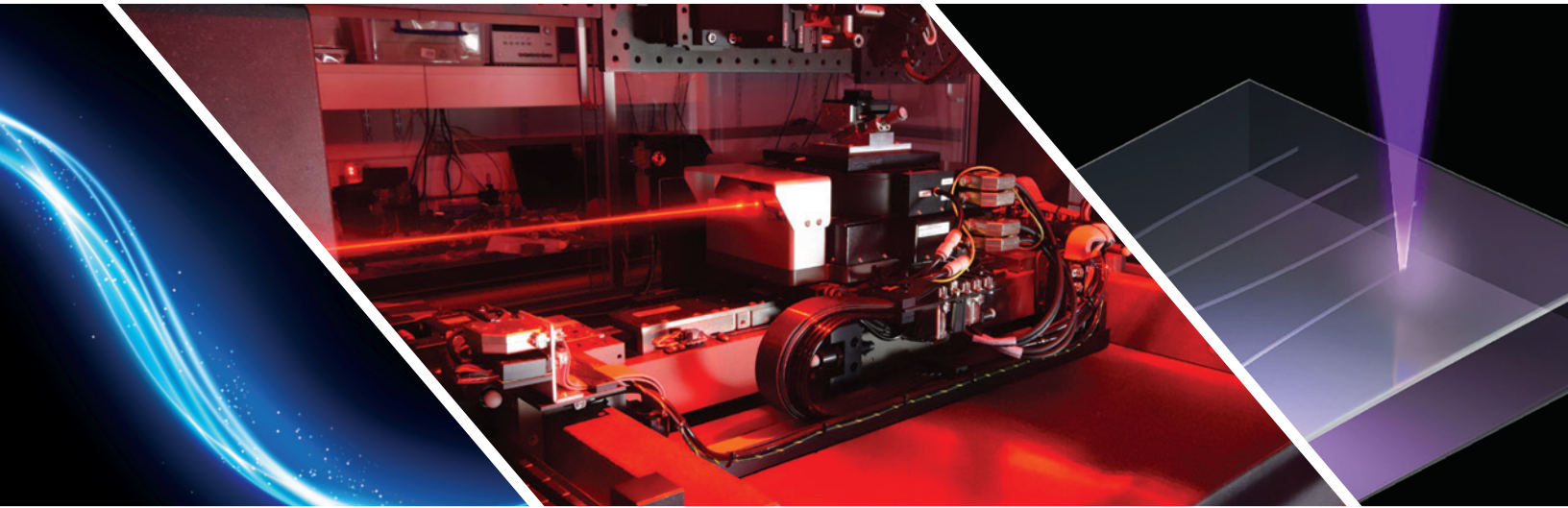


FIBER BRAGG GRATING & WAVEGUIDE WRITING

Motion-Synchronized Laser Control for Photonic Device Manufacturing

To do laser direct writing of nanometer-level optical features on specialized substrates, an innovative photonics component manufacturer needed a cutting-edge motion and laser control solution.

THEIR GOAL: Enhance yield and throughput for a waveguide and fiber Bragg grating laser manufacturing process.



CHALLENGE

To meet rising market demand, the photonics component manufacturer needed to improve production output for their laser direct writing processes. This required:

- ◆ Sub-micron dynamic tracking stability during processing to enable repeatable feature generation
- ◆ Tight coordination between the laser & motion systems to ensure precise, consistent processing of optical components
- ◆ Increased processing speeds & a larger working area to increase total system throughput
- ◆ Elimination of laser processing stitching errors that affect the manufactured devices' performance

SOLUTION

Aerotech's engineering teams addressed these challenges, providing a solution that includes:

- ◆ Cross-axis calibration so the motion system can dynamically correct for off-axis error motions during processing
- ◆ Position Synchronized Output (PSO) for consistent spatial energy distribution that results in higher resolution & accuracy
- ◆ Large-travel air-bearing stages to increase the number of parts processed per production run & meet critical requirements such as bidirectional repeatability & dynamic straightness
- ◆ Automation1, a single controller for all laser scan head & motion axes, and Infinite Field of View (IFOV) for seamless processing & error correction



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Industry-Leading Performance

Aerotech's planar air-bearing stages—the highest performing option available anywhere—integrate direct-drive motors and high-dynamic stiffness components. This results in industry-leading geometric and dynamic tracking performance, enabling laser direct writing system OEMs to increase their process's throughput and yield.



PlanarHD Planar Two-Axis Air-Bearing Stage



AGV3D 3-Axis Laser Scan Head

Motion-Synchronized Laser Manipulation

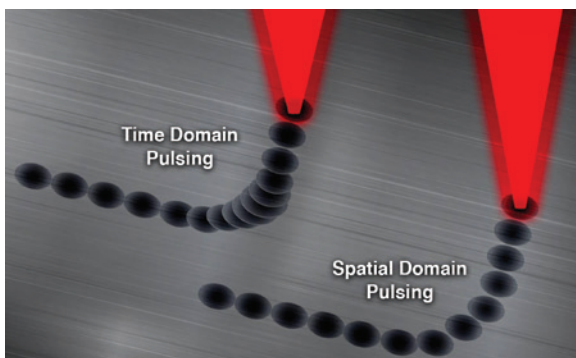
Aerotech's three-axis laser scan heads deliver industry-leading precision for three dimensional (3D) laser processing by maximizing the available working volume and minimizing the focused spot size. Combined with the highest levels of thermal stability and dynamic performance on the market, these systems enhance process quality, expand system versatility and can be controlled in tight synchronization with Aerotech's other motion platforms via Automation1.

One Controller for All Motion

Automation1 controls laser scan heads as "just another axis," simplifying system integration and configuration while enabling tightly coordinated synchronized motions. Use Automation1's Infinite Field of View (IFOV) functionality to harness the laser scan head's dynamic advantages and correct for error motion contributions from the servo stage(s).



Automation1 Motion Controller



Position Synchronized Output (PSO)

Advanced Laser-Triggering Capabilities

Automation1 also includes integrated laser control features like Position Synchronized Output (PSO) to enable synchronized laser triggering based on the position feedback of the galvo and servo stages. Coordinating laser firing in the spatial domain rather than the time domain increases maximum processing speed and ensures more uniform results, improving throughput and yield.