

 **AEROTECH**

A New Era in Galvo Performance



High-Accuracy and Throughput

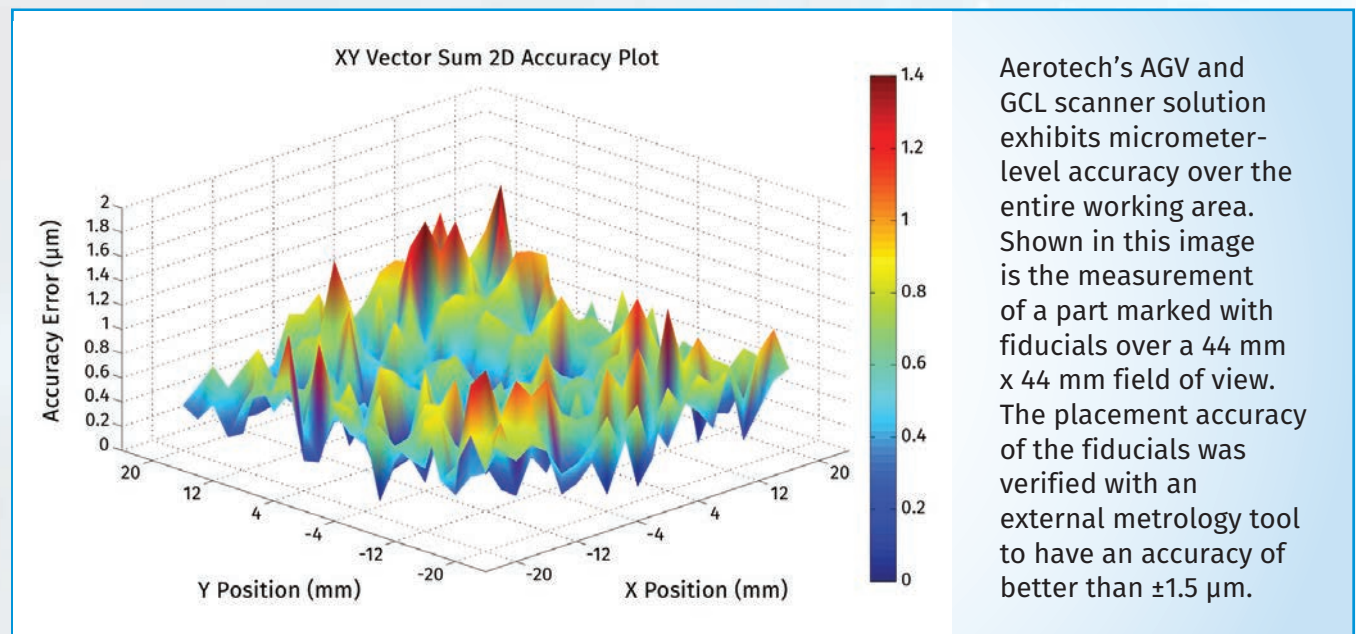


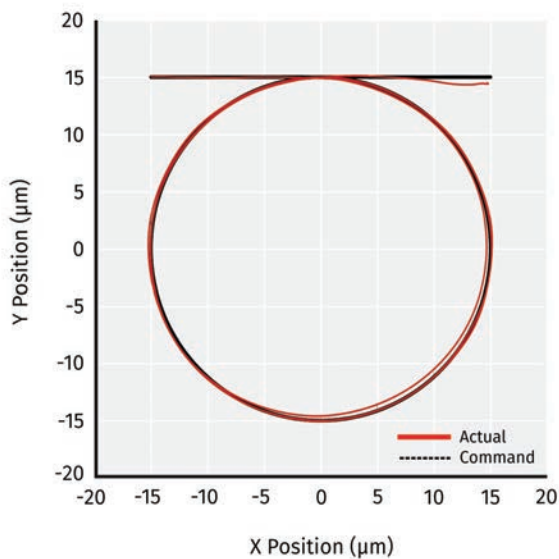
Infinite Field Of View (IFOV)

It is common practice to use servo axes in conjunction with scanners to machine or mark objects that exceed the scanner operating field of view. These applications are implemented using a move-and-expose sequence where the scanner would mark the part, and the servo would reposition the part for a subsequent marking operation. This approach has limitations when a feature being marked exceeds the field of view of the scanner. Small angular and linear offsets in the servo axes produce discontinuities in the features that cross the boundary between adjacent marking fields. Infinite Field Of View combines the servo and scanner control into a single command stream, automatically separating the motion content appropriately between the two subsystems as if the user were only commanding servo stages. The scanner system also captures and accounts for the servo system's tracking error in real-time. This means with IFOV you get galvo scanner dynamic performance with the travel range of servo stages, making it now possible to machine large features with continuous system motion and extreme throughput rates.

When Precision Matters

Aerotech's AGV scanners are designed with high-resolution feedback devices that are thermally stable and exhibit virtually no gain or offset drift. Control electronics are completely separated from the scanner to provide the highest levels of thermal stability. The Nmark® GCL uses advanced interpolation electronics to provide up to 26-bits of effective resolution. Advanced calibration techniques enable accuracies at the image plane to the single-digit micrometer level.





The AGV and GCL combine to form a high-throughput solution in applications like via drilling. The image above shows the AGV/GCL performing multiple 30 µm diameter circles at a rate of 3000 times per second, with less than 1.5 µm of tracking error.

Continued Excellence in Combined Scanner/Servo Motion

Aerotech's Nmark GCL closed-loop scanner drive for the Automation 3200 motion platform allows for direct conjoined control of galvo scanner and servo motion for micromachining and marking of parts of unlimited size and complexity. The 100% digital scanner control removes the need for programmable delays and allows laser firing based on the combined real-time position feedback of the system, known as Position Synchronized Output (PSO).

Making the Difficult Easy

Direct, coordinated control of scanner and servo axes in one integrated software environment eliminates the programming overhead associated with interfacing two separate control

systems, resulting in reduced implementation time and increased marking efficiency. Scanner motion can be combined with rotary axis motion to machine on the face or edge of cylindrical profiles. Rectangular bitmaps that exceed the scanner field of view width can be marked in one continuous operation. Complex operations comprised of many small features distributed across a large area can be machined in a continuous fashion with a significant reduction in processing time.

Full Featured I/O

The Nmark GCL can interface to a variety of lasers with many specialized functions. The GCL comes equipped with an external clock input for synchronization with mode-locked lasers. Control signals can be configured as sinking or sourcing, 5-24 VDC, allowing for easy interface to many different laser manufacturers. Integrated features allowing for the scaling of laser power as a function of velocity and position give unprecedented process control. General purpose analog and digital I/O are also provided for control or monitoring functions such as door interlocks, pump operation, and material handling. High-speed encoder inputs are available for synchronization of servo axes in applications involving moving material (marking on the fly).

Many Design Choices

The available 10, 14, 20, and 30 mm apertures with standard F-Theta lens interfaces provide maximum application flexibility. The AGV can be configured to accommodate a multitude of wavelengths ranging from 343 nm to 10.6 µm with mirror and lens coatings available for short-pulse (ps and fs) lasers. Furthermore, a variety of focal lengths are available as standard, with correction files provided to remove lens distortion effects.

Visit www.aerotech.com for more detailed information on the configuration and capabilities of the entire AGV product line

A3200 Nmark GCL

- Closed-loop, two-axis servo drive for Aerotech's AGV series scanners
- Infinite Field Of View (IFOV) seamlessly combines AGV and servo motion to expand the scanner work area
- Full servo state control with "zero-tracking error" eliminates speed-related part distortion such as necking on circles and rounding of corners
- Position-based laser firing (PSO) with windowing maintains consistent spot spacing over a wide range of operating speeds
- External clock input for synchronization with mode-locked lasers



Nmark AGV Galvanometer

- Highest accuracy scanner available attains single-digit, micron-level accuracy over the field of view
- Optical feedback technology and heat management significantly improves thermal stability
- Industry-best resolution of >26 bits when used with Aerotech's Nmark GCL controller
- Wide range of apertures and focal lengths
- Many choices of mirror surface treatments for a variety of laser wavelengths
- Integrated air and water cooling options to minimize motor drift and mirror lensing



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