



Application Story: Stellex Monitor Aerospace, Inc.

CNC Retrofit *Improves Accuracy and Productivity for Aerospace Components at STELLEX MONITOR*

Stellex Monitor Aerospace Inc. of Amityville, NY has announced the completion of a total CNC retrofit on the fifth of their ten Cincinnati Milacron gantry-style milling machines, used in the production of various titanium and aluminum aerospace components. The turnkey retrofits were provided by the Siemens Machine Tool Business, located in Elk Grove Village, IL.

Originally equipped with ACRAMATIC "Big Blue" controls, these machines now have new Siemens digital servo motors and drives, Siemens SINUMERIK 840D CNCs, running on a Windows XP platform with true 3D five-axis cutter compensation and full five-axis real-time kinematic transformation. The results have already been documented, according to Gary Kahrau, vice-president, Stellex Monitor, to include reduced set-up time, improved surface finish, reduced secondary finishing operations and, thus, significant improvements in overall productivity at this leading builder of aerospace components and assemblies.

Founded in 1948, Stellex Monitor operates a 250,000 sq. ft. modern facility, producing struts, spars, landing gear, bulkheads, crown beam assemblies and other medium to large parts from titanium, aluminum and stainless steels for commercial and military aircraft and aerospace vehicles, including the space shuttle. Their customer base comprises the major airframe builders, including Boeing, Northrop-Grumman and Lockheed Martin.

The oldest Cincinnati five-axis gantry mills retrofitted were built in 1978 and, according to Kahrau, "They actually perform better now than when they were new, owing to the significant improvements in the CNC control technology. The SINUMERIK 840D CNC includes specific features for five-axis aerospace cutting simply not available from other control suppliers."

"During the last five years, Siemens development engineers have worked closely with Boeing's Fabrication Division in Wichita, KS and EADS' military group in Augsburg, Germany to develop and refine a robust suite of five-axis aerospace machining specific software features. These features are now available to all Siemens 840D users," states Tim Shafer, National Sales Manager, Siemens.

Kahrau elaborated on just some of the 840D features that are showing a benefit to Stellex Monitor:

"The open architecture of the control allows us to create our own screens and integrate with our ERP system. We store all our own data on a proprietary ERP system. The data files are dispatched to the (Siemens) 840D, where our custom Shop Workstation program resides. It handles the handshake of the data files with the control. This program is fully integrated with the control's tool management system, as well."

With the real time five-axis kinematic transformation called TRAORI, a more accurate and substantially faster control scenario is achievable. Traditional CNCs require a Post Processor to convert a part's workpiece definition data to machine coordinate data. During post processing, valuable information about the part is stripped from the data. This reduced data set is then sent to the CNC. The 840D control can directly accept the part's workpiece definition data using TRAORI. Complete workpiece definition enables the 840D to calculate smooth and accurate cutting motions, as well as enables accurate three-dimensional cutter compensation. Gone are the short G01 blocks for the A- and B-axis positions that create surface imperfections called "Faceting."

Above left: Retrofit operations in process, all performed by Siemens personnel, who also assisted Stellex with customized software development.

Above right: Cincinnati Five-Axis Gantry Mills were retrofit with Siemens SINUMERIK 840D CNCs to enhance productivity and accuracy. Stellex reports "better than new" performance from these machines.

According to Kahrau, "With the extreme metal removal rates, deep pockets and long contours typically encountered in aerospace production, this unique feature of the SINUMERIK 840D has demonstrable upsides every day for Stellex."

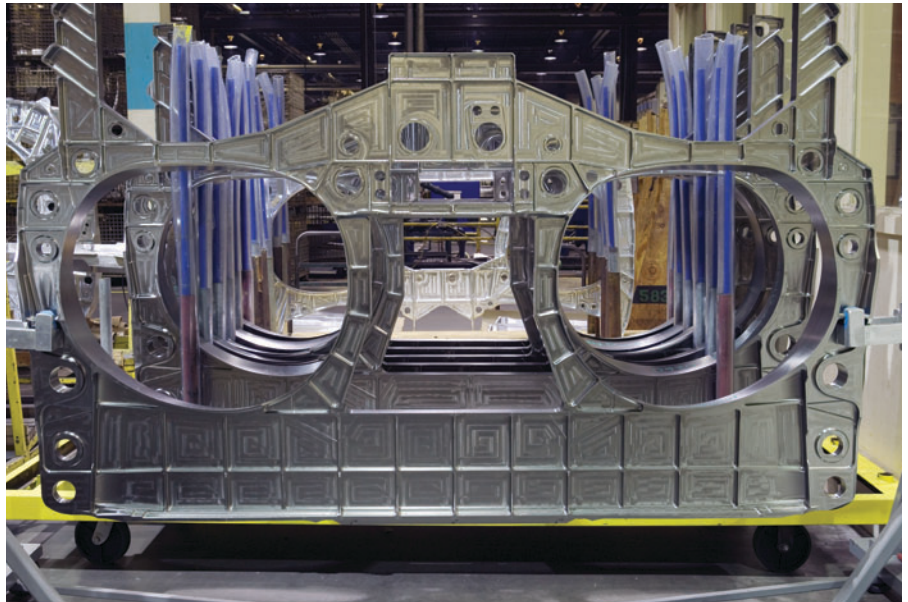
When running the same part on different gantry mills, TRAORI provides different compensates for the particular machine kinematics, thus virtually eliminating specific part programs for each different machine configuration providing flexibility in moving production from one machine type to another.

If desired, the SINUMERIK 840D can also accept the traditional machine coordinate data from a Post Processor. This enables a user to use their old part programs again. Even with this old programming method, the 840D provides a benefit using a unique feature called COMPCAD. When COMPCAD is activated, the 840D calculates, in real time, a fifth order polynomial spline path through the G01 machine position data blocks. This spline is both curvature and velocity steady for transitions. This avoids contour violations, increases the efficiency of acceleration/deceleration curves and eliminates slowdown/speedup at block transitions. The net effect is both a reduction in machining time and improved surface finish by reduction "faceting".

Stellex's Kahrau further expanded upon the open HMI of the CNCs being retrofitted on the Stellex machines. "A cutter diameter compensation and customizable tool management system onboard the 840D give operators quick and accurate information in real time, plus it has the capability to accept additional features, as the application demands," he noted.

In addition to Retrofit services, Siemens also provided an advanced dynamic machine engineering analysis called Mechatronics. Mechatronics is a three step process:

1. collecting critical real-time machine performance data
2. establishing optimized parameterization of the CNC and servo drives
3. verifying optimized performance of the machine

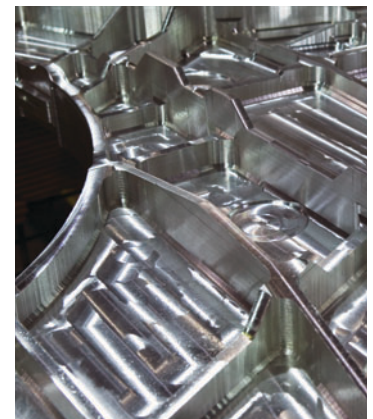


3. verifying optimized performance of the machine

In commenting on the Siemens Mechatronics service, Kahrau cites the servo analysis, ball bar tests, acceleration/deceleration tests, bi-direction compensation work-up and other protocols as being key to the end results. "Our machinery accuracy is better now than when the machines were new, plus our five-axis gantry has never performed so well and the rotary axis error was literally cut in half."

Shafer states, "Siemens is very pleased that a premier aerospace subcontractor such as Stellex Monitor, having researched the CNC landscape, chose the 840D with the rich suite of five-axis machining features and true openness." He continues, "The CNC, servo motor and drive retrofit package, designed specifically for Cincinnati Milacron five-axis gantry mills, can be installed in four weeks of machine downtime." ■

Above and below: Typical aerospace components/structures produced from titanium, aluminum and stainless steel at Stellex Monitor Aerospace facility in Amityville, NY.



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