

## Advanced Tooling Keeps Shop Fast, Agile



Tony Chastenay, All Axis R&D Owner and Operator. All Axis' REGO-FIX powRgrip push-button automatic unit loads/unloads tools in less than 10 seconds. The unit accommodates five different powRgrip collet sizes.

All Axis R&D, a three-man prototyping, pilot production and engineering shop in Claremont, NH, machines between 300 and 500 new part numbers annually. Typical lot sizes range from single-digit runs to perhaps 100 pieces, and the parts routinely require tolerances of  $\pm 0.0001$ " and surface finishes of 8 Ra or better. In addition, the shop also provides customers with manufacturing process engineering assistance. The shop's heavy and varied workload magnified the need for efficiency.

"One of our goals is to manufacture parts in as few operations as possible," said Tony Chastenay, All Axis R&D Owner and Operator. "To increase part quality and accuracy, we try to machine parts on multiple axes so we can complete them in one or two set-ups. At the same time, we work to minimize spindle downtime associated with tool set-up and adjustments."

Getting a tool set up to run correctly can consume a considerable amount of time, according to Chastenay. "Quite often when an endmill exhibits runout or produces a tapered cut, it is not the endmill, it is the way its being held," he explained.

Earlier in the shop's history, Chastenay said that they would typically have to put an indicator on an endmill and move it around in the holder to dial it in and achieve concentricity. "Sometimes this process took 20 minutes, sometimes an hour. In any event, it wasted a lot of time," he said.

"REGO-FIX powRgrip tooling helps eliminate that downtime," said Chastenay. "The system is a hydraulically actuated press-fit tool clamping - one that provides TIR of less than 3 microns. Unlike heat-shrink toolholders, the powRgrip tooling involves no heating and is ready for immediate use after the cutting tool has been clamped into place."

Clamping and unclamping tools into powRgrip holders is accomplished

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"We run REGO-FIX tooling because it is quicker than heat shrink and extremely precise," said Chastenay. "Plus, we can save hours of set-up time on just one tool. That is significant when a job may require as many as 30 tools."

## No More Limits to Machining Large Parts



A pair of saw guides in process. The new Sharp Industries Box Way Vertical Machining Center SV-6332SX allows the fixture of multiple parts on the table, which results in a longer unattended cycle time. This is a key concept to allow a single operator the ability to run several machines at once. With automated probing as part of the setup, the operator can mount the raw stock or parts in a fixture, hit cycle start and walk away, returning only to remove the parts and fixture for the next set. The operator is free to go to another machine and repeat the same process for a different operation or part.

For years Innovative Economical Solutions was forced to enlist outside help when work for parts of a size exceeding 40" came in because their VMCs were simply not capable of handling them. Stuart Caruk, founder of Innovative Economical Solutions, began to consider the purchase of a new machine in order to broaden the company's scope. He felt that working on larger sized parts was a niche his

company should be able to satisfy for his customers.

Mr. Caruk looked into available options that could handle the dimensions he required and found that within the suitable size class the new Sharp Industries Box Way Vertical Machining Center SV-6332SX stood out in regards to its specification and particularly its weight. It is approximately

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## Technology Meets Flexibility and Precision Requirements



Lufthansa Technik provides a large component spectrum for individual customer requirements.

A modern aircraft is a highly complex machine. The safety of passengers - as well as the reliability and cost-effectiveness of an airline's flying operations - depends on error-free functioning of the parts. For Lufthansa Technik AG (Germany), a full-service

provider of technical inspection, retrofitting, maintenance, overhaul and painting, the spectrum of parts is considerable since customer wishes are extremely individual and maintenance and repair work can be unpredictable.

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## Technology Meets

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Next to safety, high quality demands are the focus for mechanical manufacturing in the aerospace sector.

Following the purchase of a state-of-the-art machine pool, investments were also made in high-tech peripherals. The objective was not only to increase process safety, but in particular to ensure maximum flexibility in order



(l-r) Frank Pieterwas and Jan Horn, Lufthansa Technik; Julian Lüdecke, Zoller; and Ulrich Rienks, CAMTECH/Edgecam

Individual requirements include the daily production of high quality components with new geometries.

Over the years, new requirements were added, which necessitated a greater variety of tool data. The distribution over several databases resulted in redundant data management. This led to increased inefficiencies and contained potential sources of error due to repeated manual entering of data. A solution was needed, and expandable systems and maximum data transparency were essential requirements.

Lufthansa Technik found a solution when it partnered with

to respond to market changes. Until this time, only a single manual tool presetting machine was in use. Labels were printed and the data was entered manually into the machine.

The CNC-guided »venturion 450« tool presetting and measuring machine has been in use since 2007. "We decided in favor of Zoller, following a cost benefit analysis," explained Planning Engineer Frank Pieterwas. "Decisive for us was the expandability and linking to the machines."

In addition to the potential of introducing a system-superimposed tool database, there were also a number



The »venturion 450«, a CNC-driven tool presetting and measuring machine from Zoller.

CAMTECH, master reseller for Edgecam in Germany, and Zoller.

In order to meet the individual production requirements for its customers, a tool pool of approximately 2,000 different, complete tools is utilized by Lufthansa Technik. Since 2000, the elaborate NC programs for these complex geometries have been programmed using the Edgecam CAM system, and since 2009 5-axis simultaneous operation has been utilized. Both prismatic parts and free-formed surfaces are milled here.

of application details provided by Zoller that met specific customer requirements. "The graphic user interface for the otherwise laborious presetting of fine drilling tools, for example, or the fact that I can clearly view the cutting edge with the magnifying glass, were key factors in our decision," stated Mr. Jan Horn, CAM specialist at Lufthansa.

The basic machine had been successively extended over the years and Tool Management Solutions had been added. "We wanted the Zoller database because it is a leading system," said Horn. "If a new tool is set up, it can be entered into the Zoller Tool Management database so that the name, description and the T-number are correct. Once entered, it can be used by all employees in a standardized manner throughout the entire process and can be found consistently."

The interface from Edgecam to the

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For Lufthansa Technik, fast response to market changes is now possible.

Zoller Tool Management Solutions had already been developed in 2011. In 2013, the Edgcam-CAM system, the tool memory of the CNC machines along with the Zoller tool presetting and measuring machine were all linked via the Zoller database. This ensured data consistency, from the CAM system on through to the machine.

All data is saved in TMS Tool Management Solutions and accessed by the CAM system. The measuring regulations are saved in the database next to the tool and are available on the measuring machine. "Professional measurements are made at the push of a button

and the tool data is transferred to the machine," said a Zoller spokesperson. "This ensures consistency and eliminates all sources of error due to manual entry. Multiple storing of data was thus abolished."

The tool data is now saved in the Zoller TMS database according to DIN4000 and is available in the Edgcam CAM system as a precise 3D model. The system programs using real data and outputs the data of those tools along with details on the simulation that was performed. These can then be assembled on the machine in the same way they were simulated. "Particularly

in the case of complex processing methods, it is important to have the true tool data available for programming in order to avoid crashes," said a Lufthansa Technik spokesperson. "In addition, it saves enormously on time."

After the first six months of operation, the error rate had already dropped significantly and employees were given optimal support when looking for possible tools to satisfy individual customer requirements. "Of course, the savings cannot be quantified as in a series production," said Horn. "However, being able to efficiently search for tools is a major benefit. The flexibility for the employees is a big advantage due to continuous changes on the NC machines. Everyone simply downloads their NC program onto the machine. The tools are included and have standardized descriptions. Everyone can orient themselves everywhere, and all that is occasionally needed is a tool retrofit. I use a single set of tool data and it applies to all of the machines. Once I have written a program in Edgcam, then it also applies to all of the machines. All I need to do is change the post-

processor, send the NC program and the process is completed. A big advantage with Edgcam is the simple, subsequent change of already programmed parts to other machines."

Lufthansa-Technik often has to respond to market changes extremely fast. Repairs and unique customer requirements are often unpredictable. High flexibility is necessary, especially to realize the external manufacturing ratio of up to 70%.

"We have created a perspective for the future with the introduction of these systems" is how Pieterwas summarized the benefits of the investment. "This also allows us to actively approach the external market. We are independent of our own assembly components. Operating systems, such as Edgcam and those from Zoller,



Data consistency is provided, from the CAM system through to the machine.

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