Unfolding Swiss Style Machines Advances

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By **Bill Koenig**
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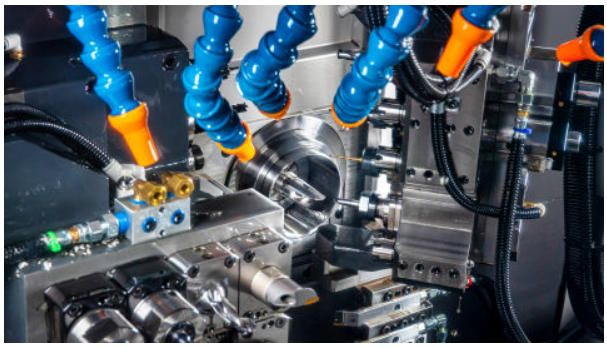
Improvements spur shops to take another look at Swiss technology



Tsugami America's SS327-III-5AX 32 mm, B-Axis Sliding Headstock Swiss Type Lathe. (Provided by Tsugami America)

Swiss-style machines have long been attractive options for producing smaller parts. The machines can perform multiple operations simultaneously. They have compact work zones, meaning cutting tools don't have to travel far to the workpiece and they have high spindle speeds. At the same time, Swiss machines have increased complexity with increased programming needs.

Swiss machines continue to advance with a trend of larger, more capable machines. Advanced programming systems are intended to make the machines easier to use.

"The trend in Swiss machining is to do more work faster, from simple to complex part features, complete in one operation," said George Media, business unit manager for Tsugami America, Windsor, Conn. "Historically, the largest market segment in Swiss machining is 20-mm parts. With the job shop segment continually growing and adopting Swiss technology as

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Improvements go beyond size.

“All our machines have been improving in many areas: size, capacity, speed, power, more tool positions, more axes,” said John Reis, applications manager at Star CNC Machine Tool Corp. The Roslyn Heights, N.Y.-based company has four Swiss-style CNC machines at 38-mm capacity. One machine, the recently released SD-26 type S, offers dual-programmable B-axis units. Also, Reis noted, more tool positions “can provide increased tool life by sharing the workload amongst different tools. It could also offer quicker change over time.”

Important Advancements

“I feel some of the more important advancements are in the designs or tool layouts of modern Swiss machines,” said Christopher Leclerc, Swiss product specialist at CNC Software LLC (Mastercam), Tolland, Conn. “There are Swiss machines now with multiple B-axis stations, multiple B-axis heads on a turret, thus reducing setup time.” And machines with two-thread whirling stations “make it easier to machine bone screws with different thread forms,” he added.

An SD-26 type S machine from Star CNC Machine Tool. (Provided by Star CNC)

Manufacturing changes are also driving increased interest in Swiss machines, added Tom Guzik, application and sales engineer for tool manufacturer Horn USA Inc., Franklin, Tenn. “Current jobs have tighter tolerances that require the precision of a Swiss machine due to the guide bushing versus a chuck,” he said.

Swiss machines also have benefited from recent programming improvements. “Market demands require increased capability of machines to meet the needs of evolving part complexities,” Reis explained. “CAD/CAM software companies are also improving their

solutions."

Mastercam's Leclerc said, "I think with some machine tool builders, the use of Custom M codes for complex operations such as super positioning and balance cutting makes it easier to understand. Machining patterns that tell the machine which head the turret is working on or what spindle is the master helps make things easier to use. The machine tool builders are constantly working on ways to simplify complex machining processes."

New Designs

With Swiss machines, "Complex component designs often lead to easier assembly, longer lifespans, and user interfacing," said Jason Smith, national sales manager of production turning products for Absolute Machine Tools Inc., Elgin, Illinois. That reduces the cost of assembly and results in fewer "errors in the field," and it is easier to train users of the end product and high performance, he said.

Software is a key to the operation of Swiss machines, and Horn's Guzik described how programing is changing.

"Since complicated parts that use the main and sub spindle at the same time require separate programs, both machine tool builders and CAM software providers have evolved advanced programming with synchronization codes to help execute programs," Guzik said. "This also allows the CNC machinist to isolate part of the program to find errors and/or improvements."

There is also more training help for shops when it comes to Swiss machine software. "Available information and training are at your fingertips," said Smith of Absolute Machine Tools. "Training and information are available through platforms such as YouTube, ChatGPT, seminars, etc."

Growing Interest

With increased capability and changes in software, companies say job shops are more interested in going Swiss.

"More shops are utilizing Swiss machines for their part manufacturing today than ever before," Tsugami's Media said. Swiss tech "offers a wide

“There are platforms that can easily hold more than 30 tools. This gives the shop owner tremendous flexibility. The machines also are very capable, allowing you to complete simple parts or complex parts in one operation. No more second operation machining steps are needed. The other aspect we see is they are more accepted as a flexible machine tool than a ‘Swiss-style’ machine. If you take a close look at them, they are a small twin-spindle machine with lots of available tools capable of precision work repeatedly in production or a variety of short run set ups.”

Star offers a program editing software that has machine specific G and M codes, according to Reis. “Synchronization codes need to be commanded on multiple paths in order for communication between the separate programs.” The software “has a feature where the sync commands can be aligned or to inform users when there is a mismatch.”

Other reasons why shops are considering Swiss machines, include:

- Greater size capacities;
- An opportunity to streamline operations; and
- Startup advantages for new shops.

“More of the shops I deal with that did not have Swiss machines before are implementing them, [and] newer shops are starting with them,” Horn’s Guzik said, citing how Swiss machines can work on larger parts than before. In addition, he said, shops are looking at other advantages.

“The main reason they are making the switch is the ability to reduce the number of required machines to finish a part, a smaller footprint to save space in the shop and continuous processes without expensive robot loaders and automation,” he said.

Mastercam’s Leclerc agreed. “I am seeing more shops in the last three-to-five years get into Swiss than ever before,” he said. “As Swiss machine capacities and capabilities expand, it makes sense to condense two machines (a lathe and a mill) to one machine and save floor space. We see a lot of customers buy one Swiss machine and say that is all they need. Then, within a year, they have four or five. Once an owner can see the profit margin of a Swiss machine and reduced run times due to their speed and capabilities, it just makes sense.”

Other factors, including a shrinking workforce, are also coming into play. “Our significant growth began just before the (COVID-19) pandemic and continued immediately following,” Reis said.

“Manufacturers are looking for versatility in turning and milling operations in one machine,” he added. “They are also looking for ways to cope with workforce issues, while still meeting customers’ demands. In most cases, Swiss-type CNC machines offer a one-and-done solution in a package that requires very little operator attention. These features, along with a magazine-style barfeeder, make the package inherently automated.”

Further improvements are expected in coming years. These include increased flexibility and precision.

“I think you will see more tools in tool zones, higher speed spindles, more quick-change tooling options as changeover and uptime are very important in today’s environment,” Media said. “The small parts world is getting more and more complex,” he added. “Part geometries and tolerances are such that multiple tools and higher-speed machining is beneficial and utilized when available.”

At the same time, Industry 4.0 and other advanced manufacturing technology continue to take hold throughout manufacturing. These trends will undoubtedly affect Swiss machines too.

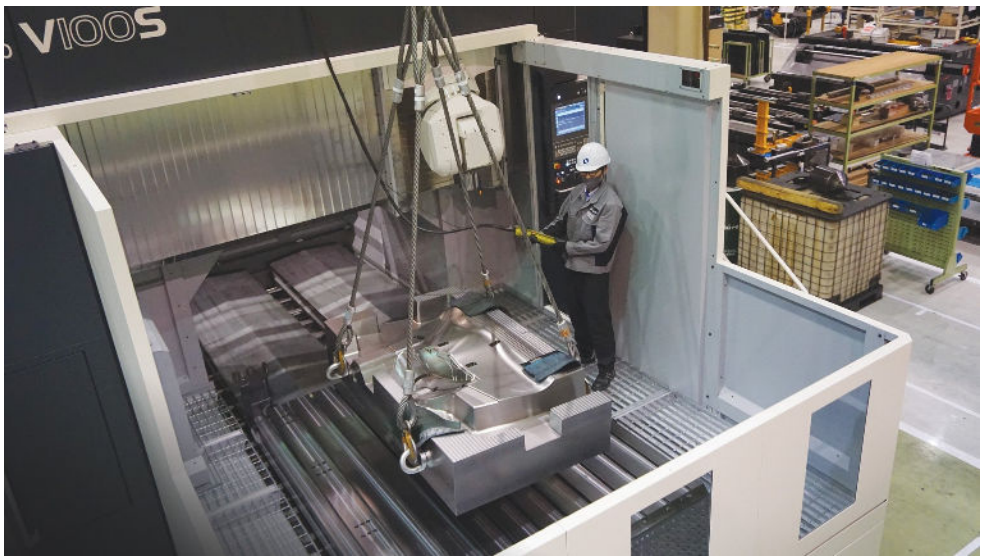
“Eventually, leaders will emerge capable of capitalizing on the new technology,” said Smith of Absolute Machine Tools. “Artificial Intelligence is likely to be a key component. ... (It’s) the wave of the future. Those who integrate today will be the leaders in three years.”

SMART MANUFACTURING

Collaborating with Robots

Between “Blade Runner,” “Terminator,” “The Matrix” and other blockbuster movies, Hollywood has painted a frightening picture—one in which intelligent machines attempt to destroy humanity.

By **Kip Hanson**



TOOLING & WORKHOLDING

Machine Tools for Toolmakers

Shown here: OPS Ingersoll’s Eagle V5C, a “high-speed, ultra-rigid 5-axis vertical machining center (VMC) with enhanced cooling controls.” (Provided by MC Machinery.

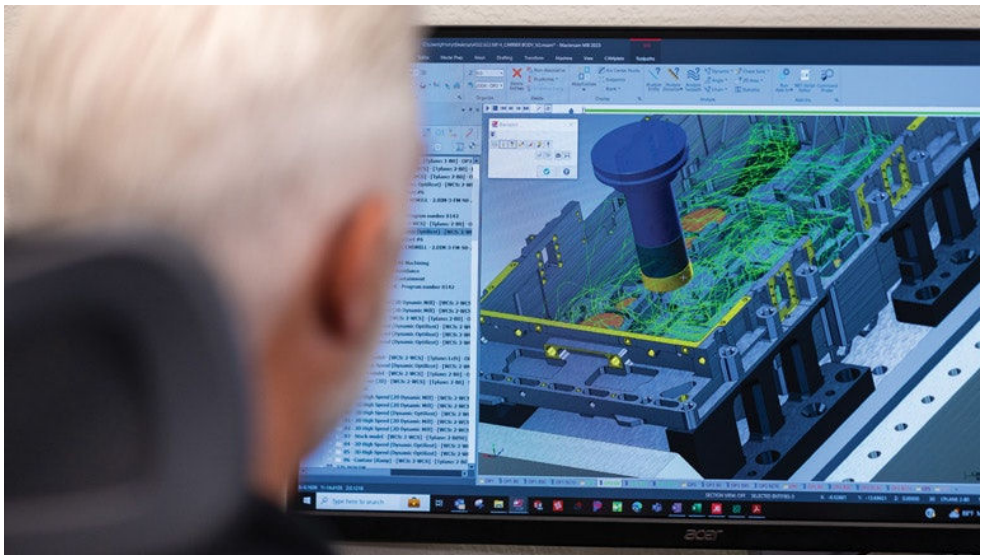
By **Kip Hanson**

MACHINING & METAL CUTTING

Mazak Brings Precision Machining to PRI 2023

Florence, Ky.—At this year's Performance Racing Industry (PRI) show, Dec. 7-9 in Indianapolis, Mazak will demonstrate three automation-ready machines designed with motorsports part production in mind.

By **Mazak Corp.**



SOFTWARE

Pushing the Boundaries of Multi-Axis Machining

Machining a carrier body from 6061 aluminum using more than 660 Mastercam toolpaths. Material was machined from a 200-pound block of aluminum. Final part weight: 14 pounds.

By **CNC Software Inc. (Mastercam)**

MACHINING & METAL CUTTING

Building Better Blisks

The DVF-series five-axis machining centers are designed for high-precision machining of complex parts like this turbine component in a single operation. (Provided by DN Company.

By **Kip Hanson**

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