Metalworking

Getting a Better Grip: How Workholding Tools Are Adapting to 21st Century Demands

Kip Hanson | Oct 03, 2023

There's nothing wrong with using machinist vises. Long the default workholding device for knee mills and CNC machining centers, they grip parts tightly and accurately.

They're also sturdy, cost-effective, come in various sizes and have a host of accessories such as soft jaws, step jaws, stops and speeder handles that expand their capabilities while simplifying usage.

Why look any further?

Making Vises Modular

Dan Panchaud, who's responsible for product management and support at Sowa Tool & Machine Co., offers a few reasons.

While he can recommend several models of traditional "milling machine" vises to his customers, he might—depending on the application—suggest a more flexible, modular approach.

"Our GS Tooling brand of modular vises is designed for shops that need to change very quickly from one size jaw opening to another," Panchaud says. "Instead of wasting time cranking a lead screw as with a regular vise, the operator loosens a movable blocking device, slides it to the desired position and clamps it in place. From there, you tighten the jaw as you normally would."

The modular aspect of the vises is the interchangeability of their various components—the fixed and movable jaws, blocking devices, drive screws and related hardware—all of which fit on other vises within the GS Tooling modular family (all 20 of them), and position within 0.02 mm (0.0008 inch).

"It's a nice system," Panchaud says. "Every sliding or locating surface is hardened and ground. All the vises have a low profile and are height-matched to vises of the same width and type. The jaw plates are spring-loaded and tapered so all clamping forces are directed downward—no jaw lift."

They also have significant range: Some can open a full 32 inches. "Together with the component interchangeability and keyways that provide perfect alignment with the machine axes, this helps to reduce setup time," he explains.

A 'Universal' Workholding Tool

Ralph Mastronardi, president of Rapid Holding Systems, also sells modular and self-centering vises, as well as dovetail-style clamping systems and a broad selection of ***EDM tooling***.

For anyone needing to grip extremely complex or thin-walled shapes, though, he points to the company's RHS Flexible line of fixtures and vises.

Multiple configurations are available, including the D60 inspection tool, all of which use a series of adjustable pins to position and support even the most irregularly shaped workpieces.

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> Eric Nekich
> 5th Axis Inc.

"The pins conform to whatever part you place into them and then lock in place," he says. "In the case of the D60, many people use it as a nest for checking parts on a CMM or vision machine, but it's also quite suitable for non-inspection uses. It's pretty universal."

So universal, in fact, that he recently shipped one to a medical device manufacturer who needed to mill human bones. "If you need to securely nest and hold a delicate part, it's a great option," he says.

Adapt and Conquer: Moving Beyond Soft Jaws

A similar solution comes from an unexpected source: motion control and fluid technology provider Norgren Ltd., whose management "gathered its top machinists and engineers and charged them with the mission to redefine workholding for manufacturers around the world," according to Eddie Saunders Jr., senior content strategy and demand generation manager for ***ADAPTIX by Norgren***.

ADAPTIX replaces the movable jaw carrier and fixed jaw on most machinist vises with a design that eliminates the need for soft jaws, he says.

It uses a series of adjustable, hardened steel fingers equipped with replaceable studs that conform to workpieces of practically any shape and quickly, easily and accurately lock them in place.

"The problem with soft jaws is the time it takes to program and then machine them, after which they might sit on the shelf for months or, in many cases, never be used again," Saunders says. "ADAPTIX brings the greatest value in prototyping and in high-mix, low-volume shops that want to avoid the cost of soft jaws, but it's also an ideal solution for securely gripping castings, forgings, flame-cut blanks, and similar irregular shapes."

Studies show an average monthly savings of $1,732. "The team that developed ADAPTIX estimates it can effectively reduce soft jaw use in a typical shop by upward of 70 percent or more," Saunders says.

Adapting to Robots

Anyone who owns a 5-axis CNC milling machine has probably heard of 5th Axis Inc. and is quite possibly a customer.

The company is known for its dovetail-style fixtures, quick-change bases, self-centering vises and similar workholding products, all of which boast a streamlined, low-profile design intended for, but not limited

to, *5-axis machining*.

Some recent innovations, however, move well beyond its traditional focus—into the lucrative and expanding field of automation.

“Our modular automation components became fully available within the last couple of months,” Sales Manager Eric Nekich says. “The cool thing here is that there’s often no need to reinvest in workholding when you buy a robot, something that’s not true of many competing systems. We have brought a solution to market that can allow customers to redeploy their existing workholding, whether from 5th Axis or another brand.”

The company recently redesigned its zero-point-style RockLock bases for pneumatic activation, integrating patented ejectors that minimize the force needed to load and unload fixtures and pallets, Nekich explains. 5th Axis also developed a series of tailored, low-profile grippers that interface directly with a compact yet robust universal cleat system.

Perhaps the most significant development is the company’s customizable automation shelf and rack kits that sit alongside the machine tool. Nekich notes that, when combined with the other tooling components just mentioned, the new line opens the door to unattended machining.

“Those ejectors make it impossible for the top tooling to get stuck,” he says. “There’s literally no resistance to the robots, so you never have to worry about it erroring out during the night. They also have built-in chip management, so they clean up after themselves with each cycle. Lastly, everything has a crazy-small footprint and a price that fits most budgets. It’s a very cool system.”