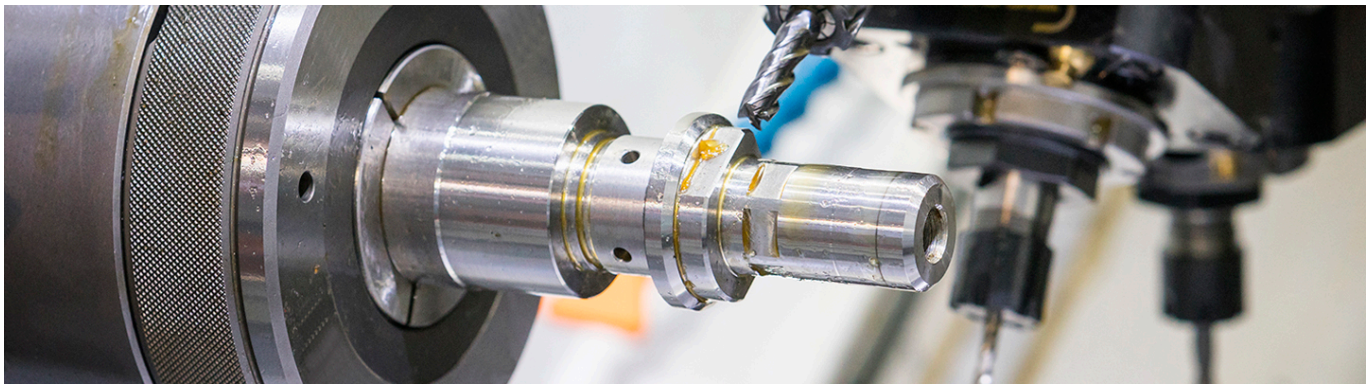

Machining

IMTS 2018: Industry 4.0 and the Future of Tool Holders

Holly B. Martin | Aug 22, 2018

From helping to reduce the impact of the skills gap to allowing more intelligent data to be communicated between tools and machines, the future of tool holding is ripe for more efficiency—with more intelligent automation. We spoke with an executive from Haimer USA on the promise of tool holding's near future.

Is the next evolution from digital manufacturing to industry 4.0 the ability to connect equipment and share data within and between machines? Industry insiders believe so.

"From a tool holding standpoint, industry 4.0 is all about helping customers create a more repeatable manufacturing process by pulling data out so that eventually machines with algorithms and artificial intelligence can take that data and make changes on the fly," says Drew Strauchen, vice president of marketing and business development at Haimer USA.

To demonstrate the possibilities, Haimer will feature its automated ***tool management system***, including the VIO Toolshrink, at IMTS 2018. At the booth [**West Hall, booth #431546**], you'll be able to see a demonstration of balancing a tool holder, shrinking the tool in the holder, checking the balance, and then writing the data to an RFID chip fixed to the holder. When the tool is inserted into a Hermle machine tool, it will read the chip and then determine and set the rpm based on the balance data.

"Collecting balancing information and finding a way to communicate that to the machine so that it can actually make a decision is industry 4.0 realized," says Strauchen.

"Eventually, data will also be able to tell the machine when to change the tool, and how to change speeds and feeds based on the tool life it's getting, but all those things rely on accurate data points," he says. "If the data points are inconsistent from day to day, it's really difficult to start extracting data and doing anything with it, so the first step to achieving that is stabilizing your processes."

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Tool Holder Trends and 5-Axis Machining

"Certainly side-lock holders and collet chucks and end mill chucks are still being used with a high degree of prominence," says Drew Strauchen, vice president of marketing and business development at Haimer. "But from a 20,000-foot view, you'll see growth in these older technologies slow as sales of the newer high-performance tool holders increase."

Strauchen says that one of the many reasons for this sea change is the cutting geometries achievable with 5-axis machining.

"Cutting tools are running faster and they're cutting more aggressively, which requires tool holders with more gripping torque and more runout accuracy and balance accuracy, especially in the case of 5-axis machines, which are becoming increasingly popular," says Strauchen.

Five-axis machines create solutions and opportunities for manufacturers to make their parts more efficiently, but they also create new functional problems to tackle in tool holding.

"One of the problems they create is potential reach issues, because when you add the fourth and fifth axes, there are features of the part that weren't in the way before that are now in the way—and that typically requires tool holders with longer reach capability," he says.

This is another case where shrink-fit tool holders are a better choice.

"You're not stacking collets and nuts and set screws to make this holder, so you can have very slim, narrow profiles that enable customers to reach around part features or into deep, long reach spaces," he says.

"To reach that far with a collet chuck, you would have to hang the tool way out, causing chatter, which creates poor finishes and poor tool life," says Strauchen. "And you can't run it as fast, making you less productive, so being able to keep the tool short in the holder and have the holder itself sticking out farther is always the best route."

The Evolution of Tool Holders

To get repeatable processes, manufacturers need to know how many parts they are going to get per day and how long a tool is going to last—which depend in part on the tool holder itself.

"That means it's not good enough just to have good runout accuracy or good balance or good gripping torque—a tool holder needs to have all of those things and also be repeatable between every single tool change," Strauchen says.

There has been a "natural progression" for many companies toward better tool holding technology as they're getting away from collet chucks and side-lock Weldon holders, which are "difficult to maintain with a good degree of accuracy, because they have so many mechanical parts that wear out over time,"

explains Strauchen.

“Since there are no moving parts in a shrink-fit tool holder, there’s nothing to fatigue or wear out, provided the holders are made from the appropriate substrate and the machine doing the heating is using the right technology.”

Hydraulic holders are another highly accurate tool holding technology. Even though they have a bladder that may need maintenance on an annual or biannual basis, they wear less than the older-style tool holders.

“The whole market in general is moving toward tools that not only have a high accuracy but can maintain those degrees of accuracy over a longer period of time,” Strauchen says.

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> Drew Strauchen
> Vice President, Marketing and Business Development, Haimer USA

Tackling the Skills Gap with Tools That Drive Repeatable Processes Over the Long Haul

Another driver for more evolved tool holder technology is the current skills gap in manufacturing.

“Machine shops have a lot of open positions, so in order to grow, companies are trying to fill the void using automation, lights-out machining and other methods to increase productivity—all of which require a much higher degree of repeatability in their processes,” Strauchen says.

“It’s naturally pushing them toward tool holding technologies that can keep up with modern and more aggressive roughing toolpath strategies, while at the same time reducing the amount of deviations that can occur between tool changes,” he says.

For example, there are myriad things that can happen during a collet chuck tool change to cause deviations in the cutting process, according to Strauchen. Factors include the age of the collet, whether somebody cleaned it out properly, who changed it, and if the person used the right torque specs to tighten the nut.

“Whereas with shrink fit, it doesn’t matter who changes the tool, because it’s always changed the same way,” he says. “It’s unchanging accuracy, the same every time, day after day, month after month, year after year.”

How has innovation in work holding and tool holding made an impact on your shop? Share your stories.