



Machining

The Value of Manual Machining in Today's Manufacturing

Don Sears | Oct 16, 2018

What's the future of manual machining? How is manual machining used to teach the next generation of machine operators, CNC machine programmers and process engineers today? We asked manufacturing professionals and instructors from different regions to find out.

Will manual manufacturing still exist in the future? For learning the fundamentals, all the industry professionals we interviewed say it is still essential.

As automation becomes more and more central to manufacturing, technological skills do play a leading role. But there are dynamics between physical part-making, a machine's capabilities, and programming and modeling software that still require an understanding of manual practices.

But will it be changing in the future? Industry analysts believe automation will change job functions and roles over the long haul.

"[F]ewer than 5 percent of occupations can be entirely automated by adapting currently demonstrated technology," **writes** McKinsey in its article "Human + Machine: A New Era of Automation in Manufacturing." "However, about 60 percent of them could have 30 percent or more of their constituent activities automated. In other words, just by adapting and integrating current technology, automation could change—at least to some degree—the majority of occupations."

Technical colleges, four-year degree programs and manufacturers themselves are keen to adapt—but they are also still grounded in today's reality: People are still at the heart of manufacturing. The demand for a skilled workforce requires a hybrid set of technology skills including machine programming and critical knowledge of part-making inside a machine. That isn't going away—even if automation can help narrow processes and fill gaps, manufacturers will always need problem solvers. And problems can only be solved with a solid understanding of functions and outcomes, say experts.

How can you help find the skills you need? Read "This MFG Day: Shrink the Skills Gap, Hire Apprentices."

The Evolution of Manufacturing Craftsmanship

Is all this automation and technology changing the very nature of craftsmanship?

Yes, says Kyle Lattenhauer, a manufacturing engineering supervisor for Young & Franklin. But that is because craftsmanship itself has changed. While his father-in-law's father may have made molds by hand several generations ago, those molds would be made by a CNC machine today—and take a lot less time.

"The craftsmanship portion of it isn't exactly the same, it changes, but you still need to be a craftsman to make a good part," says Lattenhauer.

Machinists who have only been exposed to CNCs and programming don't really know about parts-making without the right experience, *says* Rusty Gwyn, owner of General Machine-Diecron, a small aerospace shop. Gwyn has experienced machinists who simply are not interested in automation—at all. They feel automation takes the craft out of the work. But it's hard to deny the output benefits that come from newer technologies.

"We tell them, if you want to make \$100K in this building you can, but you have to make your mind up [about programming]," says Gwyn. "That kind of [job] position is available, but that is the bottleneck right now in every job shop in America."

"You can make a part that is functional, but are you making a part that is truly worth presenting?" asks Lattenhauer. "You still have to understand how to run your machine and what tools will blend properly."

Leveraging Manual Milling Machines to Teach the Fundamentals

Joe Vanstrom is a lecturer at Iowa State University in the industrial manufacturing program and has taught professionally for 12 years. He's a big believer in learning the fundamentals of part-making and how machines work.

"For every student, I make them turn down a step shaft," says Vanstrom. "Just so they understand taking a pass on a diameter or how to machine off the face of a part, because if you don't understand the dynamics between your tools, your workpiece and the machine's capabilities, you're going to snap a lot of tools before you get a good part."

It's also important to understand the limitations of a machine's throughput performance and ability to handle different tool lengths—and other part-making features. When students and apprentice machinists better understand how machines work and how parts are physically made by hand, they can more easily account for the parameters needed when programming and designing toolpaths on larger, more advanced CNC machines, explains Vanstrom.

Jose Anaya, the dean of community and student advancement at El Camino College in Los Angeles, agrees. Students today are very visual and gravitate toward 3D modeling and computers and are very interested in additive 3D printing manufacturing—but learning how to make parts and using their

hands with tools are really important for first being a technician in manufacturing, says Anaya.

"You've got to know the basics," he says. "But we take students on a path toward advancement with higher-level machines and automation."

To that end, El Camino College is teaching students how to get comfortable with cobots and robotics that perform "pick and pull" tasks—and how to manage the programming and process engineering behind it. And manufacturers are asking for these skills from *apprentices and new hires*, says Anaya. El Camino participates in the *Aero-Flex pre-apprenticeship program* with Northrop Grumman and many other aerospace companies in Southern California.

"After some experience, an operator can start to hear the machine differently," says Vanstrom. "They start to pick up that a machine is not sounding right, when tools wear or whether the pH is off in the coolant percentage ... These things help the operator understand how to get the most out of their machine's work."

Fundamentally, these programs want to make sure that their students understand how to make good chips, how to make tools last and how to get to and identify good surface finishes.

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Does Manufacturing Automation and Software Make Things Too Easy?

Is manufacturing software and automation making things too simple and push-button? Sometimes it can, but there is a balance between technology being useful and it being overkill.

"Yes, but that is a good and positive thing," says Anaya. "But the fallacy of that is that you still need to understand what you are doing—and what is going on behind the software."

Productivity software and other automation are not always the exact solution—if you do not know how to properly apply them to your exact business needs. Case in point: One of El Camino College's manufacturing partners, a small aerospace manufacturer in Gardena, California, bought software that failed to meet its needs—and went back to doing things manually. After working with El Camino, the company found the right way to apply the software—and eventually made it work. But it took some rethinking and effort to get its processes right.

"Software is making it better, but I don't think it's making it too easy," says Kyle Lattenhauer, a manufacturing engineering supervisor for two divisions of *Young & Franklin* and *Tactair* in Liverpool, New York. These two divisions make fluid control parts for the power generation and aerospace segments. Lattenhauer has over 25 years of manufacturing experience.

"Software is the necessary connection," he says. "But I can tell you there are people in this shop that'll disagree with me ... some people who have been doing things here the same way for 20 years and cannot see how software [and automation] is not replacing them."

So why use it? Using software and automation practices is more efficient. You can do more complex features a lot easier and reasonably, he explains.

"You have a lot more freedom once you understand the machine to make one-offs accurately," says

Lattenhauer. "Before, it took weeks to make a part ... There were just so many setups—especially in the aerospace side of things where there is so much sculpting, so much blending."

Plus, there are some parts today that you just cannot make without a CNC machine. There are radii that you just can't get to without one, he says.

What has your experience been with manual and automated machining? Share with your peers.

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