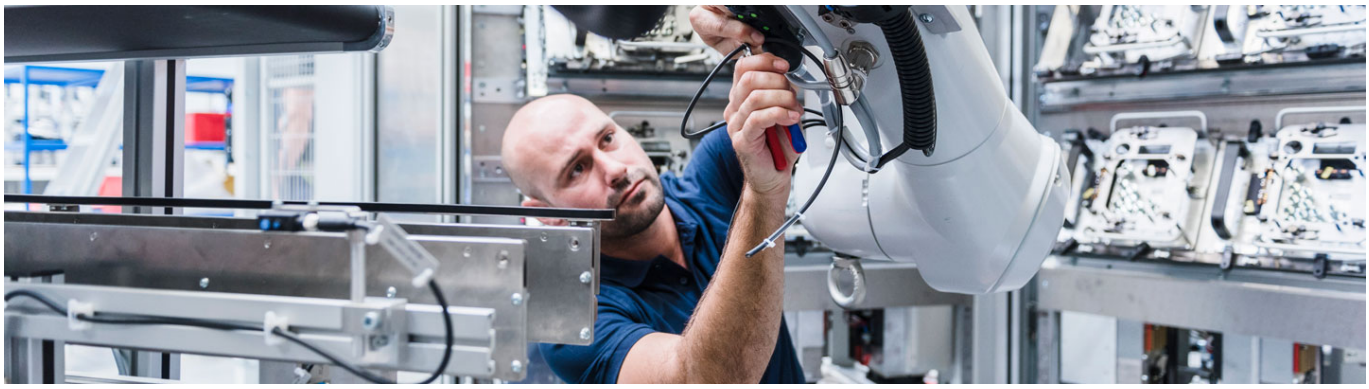

Machining

16 Tooling and Machining Tactics for Optimizing Metalworking Production

Kip Hanson | Jul 23, 2019

Everyone wants to decrease downtime and make their CNC machine tools as efficient as possible. Luckily, technologies for machining, tooling and metrology have made it much easier and more productive than ever before.

Most manufacturing and part-making experts agree that job shops typically achieve overall equipment effectiveness (OEE) values of 50 percent or less. That's like buying an expensive steak and throwing half of it away.

But by implementing a few time-saving, cost-cutting and productivity-boosting technologies, it's possible to improve this number significantly. Here are a few top ways to get started—including many other technologies that can make a difference.

5 Tactics for Optimizing Machining Part Production

#1: *Offline Tool Presetting*

Check out the return on investment calculator on any leading tool presetter brand's website and you'll find that payback only takes months, even for a shop that sets up a couple of jobs per week. Most presetters use a camera to measure tools—some use hard probes, but many are operated manually and others are completely automated.

The one that is right for your shop depends on the number of machines, tool changes, production hours and hourly rate. But one thing is clear—using a CNC lathe or machining center to touch off tools is an incredible waste of time.

Warning: First, before you rush out and buy one for your CNC lathes, presetting requires some sort of quick-change tooling system, so you should probably start there. Second, take a hard look at your future needs before investing. Many shops buy a low-end presetter to get started and end up trading it in a year later for one with more bells and whistles.

#2: *Machine Probing*

Experienced machinists will tell you that measuring parts with the machine that made them is asking for trouble. And while that might be true for extremely close tolerance work, today's machine tools and probing systems can easily measure features to within a thou' or two, opening the door to unattended machining.

Probes also make setups both fast and foolproof: No more edge finders or tramming. They are also commonly used to automatically monitor and compensate for tool wear and broken tools. This is especially useful for avoiding the cascade of tool destruction that occurs after a drill breaks early in the machining process and no one is around to catch it.

#3: *Quick-Change Tooling*

The opportunities for OEE improvement here are endless. For machining centers and EDM equipment, zero-point workholding systems make job changeover into a one-minute-or-less affair. The same can be said for ***quick-change chucks and top jaws*** on a CNC lathe.

On the cutting-tool side, quick-change stick tools and rotary tool holders not only reduce machine downtime, but they eliminate the hassle of bending over to inspect tools or digging in the chip pan for dropped screws and inserts. Pop the worn tool out, stick a new one in and press cycle start.

#4 Toolpath Simulation

Wouldn't it be cool to upload a program to the machine, push the green button and walk away? How about doing that on a brand-new job? Scary, right?

Toolpath simulation software makes this fantasy into a reality, particularly for those shops that have implemented one of the offline presetting systems. Because most presetters are able to "talk" to external software systems, programs can be proven out well in advance, using predefined tool lengths and diameters and workholding that puts parts exactly where the programmer intended—no more collisions, no more crashes, far less downtime.

And for longer-running jobs, such as more than a few dozen pieces, these software systems give programmers the ability to fine-tune toolpaths and drastically shorten cycle times.

#5: Automation in Manufacturing, Robotics

Automation is no longer limited to high-volume production environments. Whether collaborative or industrial, ***robots*** are making their way into shops both large and small—tending machine tools, applying glue and paint, deburring parts, and filling boxes.

If you're not welcoming these worker bees onto your production floor, rest assured the shop down the street is. Robotics can substantially reduce overhead costs and make life miserable for anyone who quotes against them.

Do you need a technical question answered? Ask the MSC Metalworking Tech Team in the forum.

Industry 4.0: 10 Tactics That Leverage Manufacturing Data in Part Production

There are literally dozens of other ways to improve machine tool productivity, and that's without embracing the big kahuna: Industry 4.0 and all that its "big data" can do to improve manufacturing operations. Here are more ways:

- #6: *High-pressure coolant*
- #7: *Tool balancers*

- #8: ***Shrink-fit and hydraulic toolholders***
- #9: Bar code and radio-frequency identification (RFID) tool tagging
- #10: Pallet changers and magazine-style bar feeders
- #11: Modular ***end mills*** and drills
- #12: ***Vending machines***
- #13: Dampened ***boring*** bars
- #14: Advanced cutting-***tool materials, coatings*** and geometries
- #15: ***Trochoidal*** and other high-efficiency toolpaths

#16: Additive Manufacturing, 3D Printing

Contrary to early rumors, 3D printing isn't going to replace machining or fabricating anytime soon, if ever. But that doesn't mean you should ignore it. Also known as additive manufacturing, this "make anything" method of building parts complements traditional manufacturing technologies.

It's a great way to whip up a prototype for a customer, print a low-cost assembly jig or produce low-volume parts. Consider it one more tool in your manufacturing toolbox, not as a competing process.

Of course, the term "additive manufacturing" itself is quite vague, covering a handful of distinct types of 3D printers and a few dozen or so brand-specific technologies. The systems range in price from a few thousand dollars for a low-end, extrusion-style desktop machine to $1 million or more for a laser-based, metal-capable 3D-printing system.

If you're thinking these technologies would be a cool addition to your existing machine tool lineup, you're right. Just remember that:

A: For the best results, parts should be designed with 3D-printing in mind

B: Secondary post-processes will be required, including machining, vibratory finishing and heat-treating

C: Plan on a fairly lengthy learning curve—some in the industry suggest six months or more will be needed for some level of 3D-printing proficiency.

The Time and Investment Trade-Off Will Pay Off

I know what you're thinking: We're too busy just getting parts out the door each day—who has time for all this stuff?

It's important to recognize that saving time and money means investing time and money.

The more time and money you invest, the more you'll get out. Start small, learn what brings the best results and then scale up as time permits.

Are you considering high-performance machining? Learn how. Read "***Is It Time to Embrace High-Performance Machining?***"

How do you monitor for tool wear and broken tools today? Talk to your peers in the metalworking forum. [registration required]

