



Machining

4 Tips to Improve CNC Machine Efficiency Before the Chips Fly

Don Sears | Dec 18, 2018

Time is of the essence in today's highly competitive manufacturing world. What can you do to save time before, during and after machining? Here are several methods and approaches that can help.

Why care about time when machining parts? As the cliché goes, time is money. With today's multi-axis and 5-axis CNC machines in manufacturing, there is plenty of opportunity to optimize time for machine shops of all sizes. But before diving into the practical details, let's take a step back and look at what needs to be done before machine commands are programmed and prior to making chips fly off a piece of titanium or stainless steel.

"It's important to know how much time and whose time," *writes* CNC Cookshop in its blog series on CNC productivity. "Ultimately, you probably want to understand the time impact for people and machines—both are scarce resources that have to be scheduled. It costs more to have too many with people or machines idle or too few where you're unable to process as much work as you otherwise could."

Tip 1: Start at the Macro Level: Adopt Lean Manufacturing Practices

So much of lean manufacturing methodology is focused on eliminating waste. At its core, lean manufacturing is about optimization. It's about improving a process or making a quality part in less time than you do it today. It is not by simply working faster, says lean manufacturing expert Jamie Flinchbaugh, because working faster can lead to errors. Manufacturing work can be improved by performing efforts in parallel, eliminating handoffs and rework—and expelling some process steps altogether.

"Technology is often a solution here, whether it is buying faster equipment in manufacturing or developing software tools for the office," *writes* Flinchbaugh for Industry Week.

Improving Beyond One Machine

What do you do when you've optimized your machining to a point where the process and cost-savings do not appear to have any room for improvement? You keep improving.

Tech Manufacturing, an aerospace part machining company, found itself in just this situation. It began looking at all of its machining across the entire process, looking at in cycle time and out of cycle time for 11 CNC machining centers that run 24 hours a day, seven days a week. To really understand the full process, it needed data from machine monitoring software. After monitoring was implemented, the company can now see daily output and opportunities for improvement.

"The first result of doing this, says Mr. Halley [Jerry Halley, engineering vice president], was an almost immediate 5-percentage-point improvement in measured performance," *writes* Peter Zelenski for Modern Machine Shop. "That boost was the early return on simply paying attention to this performance for the first time. And that boost hinted at an important insight, one that the company validated as it went on to find further performance gains with the data. Namely: Even in a seemingly efficient shop, there is still plenty of chronic inefficiency just waiting to be addressed."

Technology abounds in today's manufacturing—and continues to evolve in cutting tools, work and tool holding, coolant and across metrology, and sensors that provide real-time machine data—and in simulation and reporting software. Use it to your advantage.

"Getting people to see the waste, and then giving them the tools and techniques to think differently, to reduce and eliminate that waste—that's the key," says Mike Petkewich, a senior knowledge expert and team manager for lean manufacturing at The Boston Consulting Group, in the article "*Transforming to Lean Manufacturing.*"

Tip 2: Move to the Tactical and Practical on the Shop Floor

It may look easy when you read it, but there's a bit of upfront work to get into the optimization mindset. Mike Lynch, president of CNC Concepts, who consults and trains machine shops on best practices, advises manufacturers to follow the fundamentals, which he boils down to:

- Get organized
- Simplify tasks
- Train your personnel

According to Lynch, organization implies a clean work area with a designated place in a work cell for everything that is needed to do a job, such as having tools and components at the ready. Simplification means having all the needed documentation targeted at the lowest skill level of personnel. It also means minimizing the need for calculations, such as having consistent plus-and-minus tolerance specifications on process drawings—and having information at the ready to help with sizing in critical surfaces. It also includes programming trial machining for test cuts.

"Getting organized, in the long run, saves time and helps limit frustration and duplicated effort, and it

makes the required time much more predictable,” says Lynch. “Simplifying tasks makes it possible for people of lower skill levels to perform while saving time and minimizing mistakes.”



How would you improve or optimize your shop floor? Give your personal take in the metalworking forum [registration required].

Tip 3: Push Your Machines and Tooling to Their Limits

Think of today’s CNC machines like race cars: They are designed to go fast—and handle a lot of throughput and rpms. That built-for-speed mindset is also true of metal removal rates and tooling designed to achieve new and improved performance levels—depending on the material, of course.

“CNC machines are some of the most profitable assets your business has, but when they’re idle, they’re overhead,” notes CNC Cookshop. “Shop after shop has found that the first order of business is to keep the chips flying. The more production the machine is capable of, the more we want to keep it busy making money for the shop.”

Training for CNC Machine and General Machine Safety

You may not think of it as a direct line to time-saving optimization, but training is essential, explains Mike Lynch, president of *CNC Concepts* Inc. Every shop has its own unique set of machines and policies—so employees need to know the optimal way to work in that unique environment. They also need targeted training.

“Look for areas where people struggle,” says Lynch. “What is causing scrap parts or mishaps that might be damaging tooling or machinery? Training ensures competency of workers, which in turn helps them do their jobs better, faster and safer.”

Tip 4: Don’t Forget About Cycle Time

Many companies calculate cycle time by dividing the amount of machining time by the number of parts made, which is an average. But is that precise enough information? Automating data collection at each machine to get more accurate cycle time information can help.

“One second of saved cycle time will total 16.6 minutes of saved production time in one thousand cycles ... If but four seconds can be saved per cycle in a one thousand piece order, over one hour of production time can be saved,” *notes* Lynch in an article on rapid time. “And if this four seconds can be saved without spending money by simply formatting your programs efficiently, all the better.”

When you really understand the interplay between machine throughput and material—the right tooling matters. As noted in the article “*Get Lean: Choose Better Tools, Compress Time, Deliver On Time*,” there are more opportunities to gain efficiencies by saving time at the machine level than most operators may realize.

A plant and operations manager may be too focused on what it takes to make a job profitable at 20

seconds, for example, but can it handle more? Often, that option is never even explored. At some point, unintentionally, “that morphs into how fast the machinists should run the part,” says Adam Moran, vice president at Vorne Industries, in the article “*How to Slash Cycle Times When Cutting Metal.*”

“But when we actually go and look at how fast the part can run, we might find that we can do it in 12 seconds relatively easily,” says Moran.

And there is a distinct advantage in 5-axis CNC machines: It often means you can use the same tool for a range of cuts—so there is less tool changeover and more efficiency as a workpiece rotates tangentially to the cutting tool. It also allows for shorter tool lengths.

“Because you can access five sides of a part, 5-axis also allows you to shorten your tool lengths,” **says** Jacob Leighton, CNC shop supervisor of Leighton Machine & Tool. “This makes for a more rigid tool, which allows you to run faster and achieve better surface finishes.”



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