



Machining

How to Slash Cycle Times When Cutting Metal

Bill Leventon | Dec 08, 2017

What You Need to Know:

A willingness to change and to use equipment to the full extent of its capabilities can help metalworking shops slash cycle times. Data can help.

One way to boost overall equipment effectiveness is by using Short Interval Control, a process for realizing production improvements during factory-floor shifts.

A focus on individual tool costs inhibits many shops from using tools that are actually more productive and will save on costs over the long haul and improve cycle time.

To overcome fears, consider training that will show machinists how to use today's tools to improve cycle time.

Does cycle time in machine and cutting operations have machinists scratching their heads for new solutions? Here's a primer on how to take advantage of lean manufacturing techniques, new tools and optimal cutting methods.

It should come as little to no surprise to medium- and large-sized metalworking operations that they can cut cycle time by implementing well-known but somewhat complex improvement processes such as lean manufacturing.

Smaller shops may be less familiar with lean manufacturing methods and practices but also are looking for ways to get the most out of their cutting machines.

Whether a large enterprise or a small business, management wants to keep production output high to meet the market demand of customers—and remain competitive.

The good news, experts find, is that nearly all metalworking shops can learn to slash cycle times in a relatively simple fashion, requiring nothing more than a willingness to change and to use equipment to the full extent of its capabilities. Before manufacturers can address cycle times, however, they may need accurate data—and not just narrowly focused calculations.

Whatever the improvement methodology, be it Six Sigma principles or an Excel spreadsheet, "all require a foundation of accurate information to be successful," says Adam Moran, vice president at Vorne Industries of Itasca, Illinois, which develops productivity products for manufacturers.

“You have to know what is actually occurring to identify the cause of impediments,” Moran says.

This is often not the case, however, when it comes to cycle time. Many companies calculate this crucial value by simply dividing the amount of machining time by the number of parts made. “That will give them an average cycle time, but their actual cycle times are unknown to them,” Moran says.

As a result, they can’t identify times when they might be running much slower than that average, which in turn makes it more difficult to understand and eliminate the underlying causes.

Companies might want to consider automating data collection at each machine to get more precise cycle time information that they can dissect, Moran advises. Manufacturers that automate the process use a number of technologies to measure actual cycle times based on machine inputs and outputs. New equipment often includes software that can read cycle times directly from machines and provide various reports.

Some metalworking shops, however, may not have a need for complex automated software and can use more manual methods to capture key information that will help isolate problem areas. It might be something as simple as asking the machine operator to record failures—such as defective parts, changeover times and unplanned machine stops—on a spreadsheet, and assigning a reason code to each one. At the end of each week, the results can be collated and analyzed, and then investigated in more detail.



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Improving OEE Effectiveness With Short Interval Control

Cycle time reductions can be achieved by employing systems that focus on measuring overall equipment effectiveness, Moran says. Expressed as a percentage between 0 and 100, **OEE encompasses** three factors: availability, quality and performance. Performance takes into account anything that causes the manufacturing process to run at less than the maximum possible speed, including slow cycles.

One way to boost OEE is by using a technique called Short Interval Control. The SIC process can help machining teams realize production improvements during factory-floor shifts, Moran says. Using SIC, it’s possible to divide a shift into shorter time intervals, during which floor personnel use data to identify and implement process improvements.

To reduce cycle times in metal machining, for example, organizations often use SIC to determine proper tools and tooling maintenance for particular jobs, he says.

Sometimes, an easy path to cutting cycle time starts by asking why the team is running machines at a certain rate, which often is significantly slower than the machines can run.

In some cases, the management team might have calculated a cycle time at which the company will make a profit on a job—say 20 seconds, for example. At some point, not purposefully, “that morphs into how fast the machinists *should* run the part,” Moran says. “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.”

Getting Started: Calculators to Help Gather Data Points

If your shop is relatively small, automating software for each machine might seem like overkill—at least initially.

If so, consider ways for your machinists to gather data at specified times during their shifts. Then, managers can collate and look for patterns.

We have a couple of calculators that you can tap to help with your data gathering efforts and analytics. Check out both our *Productivity Calculator* and also our *Machining Calculator*.

The Productivity Calculator can help you look for potential opportunities for improving cycle time for cutting, as well as across a variety of other tooling processes. The Machining Calculator provides one-stop shopping for the most commonly used machining calculations.

Machine Cycle Time Strategies

When it comes to reducing machining cycle times, manufacturers can achieve a significant return by simply switching from a single-turret lathe to a dual-turret lathe, says Wade Anderson, a product specialist for Okuma America of Charlotte, North Carolina, a computer numerical control machine toolmaker.

With a dual-turret lathe, “you can get two tools into the cut or two different operations going at one time, so you are doubling up your processes,” Anderson explains. While achieving a 50 percent cycle time reduction is unlikely, “you can see a 40 percent reduction on average for most applications,” he says.

So what explains the continued popularity of the single-turret lathe? Buyers focused on upfront machine cost rather than return on investment, Anderson answers. In addition, he says, the dual-turret lathe is a bit trickier to set up and its technology “a little more intimidating” than its single-turret counterpart.

Machining cycle times also get a significant boost when equipment is used the way its designers intended.

For instance, make sure your machines are loaded up to 100 percent of the specified spindle load, advises John Winter, a product manager for Sandvik Coromant, of Fair Lawn, New Jersey, which supplies tools and services to the metal-cutting industry.

“A lot of customers figure that if they run their machine at 80 percent load it will last longer,” Winter says. But, he points out, modern machines are designed to run at 100 percent load, or even above that for short periods of time, without incurring damage. Running them at reduced loads will not necessarily lengthen their life cycle.

“Make sure your speeds and feeds are at the optimum level for that particular grade or geometry. That will give you the best machining time.”

John Winter

Product Manager, Sandvik Coromant

Faster Rates and Deeper Cuts

In addition, the latest grades and geometries let modern tooling run faster than earlier versions, which would seem to be an advantage. But sometimes, these faster rates make machinists uncomfortable, he says. He advises operators to resist the urge to slow down because they're having chip-control problems, or if something in the machine sounds funny or they think that slower rates are easier on the tooling.

“Make sure your speeds and feeds are at the optimum level for that particular grade or geometry,” Winter says. “That will give you the best machining time.”

That's also true for maximizing the depth of cut for inserts. Nevertheless, some shops will do multiple passes at half the depth of cut an insert can handle, needlessly slowing machining operations, he says.

To help overcome cutting-depth concerns, manufacturers might want to consider training options. At Sandvik Coromant, training focuses on proper tooling use and applies to competitors' products as well as the company's own offerings, Winter says. By increasing knowledge among its machinists, a shop floor can often decrease cycle times.

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