

Technology

Avoiding Unplanned Downtime: 3 Ways Technology Can Help

Kip Hanson | May 04, 2021

With unplanned downtime costing industrial manufacturers billions every year, the technology that can help you avoid or manage machine failure is a must.

Unplanned downtime is a significant business risk.

Studies by the consulting and advisory firm Deloitte suggest that *unplanned factory downtime costs industrial manufacturers more than \$50 billion annually.*

Because of this, it only makes sense that shops would do everything they can to avoid surprises such as seized spindle bearings, malfunctioning controllers and servomotors that no longer turn. The good news: Avoiding such unpleasanties is not all that difficult.

You likely already know that greater spindle life in machining centers is achieved by using high-quality, well-maintained tooling and balanced toolholder assemblies. Avoid extreme tool lengths to minimize radial forces on spindle bearings, check drawbar strength on a regular basis using a commercially available gauge, and wipe down locating surfaces when changing tools.

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Graham Immerman
MachineMetrics

Similar recommendations exist for CNC lathes and indeed any machine tool, all of which will enjoy longer life through the implementation of a robust preventive maintenance program, one that includes basic housekeeping items like regular machine cleaning and lubrication, monitoring of cutting fluids, and routine inspection of axial motion via a ball-bar device or equivalent, addressing potential problems before they can start. That said, modern technology offers machine tool owners and operators some valuable weapons in the war against unplanned machine downtime, starting with monitoring.

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Harnessing the Power

Graham Immerman, vice president of marketing at MachineMetrics, will tell you that practically all CNC equipment today comes equipped with sensors that generate valuable information on machine status, operating temperatures, spindle and servo power draw, alarm codes, and so on, all of which are viewable from a smartphone, tablet, PC or desktop computer. It's his team's job to give shops the software tools needed to gather this information and then harness it for a) greater productivity, and b) the elimination of this article's focus: unplanned downtime.

"There are literally hundreds of ways to reduce machine downtime, and the first step in doing so is having the data needed for better decision-making," Immerman says. "With this in mind, one of the first questions any shop should ask is, 'What kind of downtime are you trying to avoid?' We have customers come to us all the time for help with predicting machine failure, and while this is certainly something we can assist them with, it might not provide the greatest return on investment."

In one example, Immerman notes that the production of poor-quality parts ultimately leads to rework, requiring impromptu schedule changes. This might not fall cleanly into the "unplanned downtime" bucket but is every bit as disruptive and costly. So is over or underestimating cycle times when quoting a job. The first of these will lead to excess capacity, or gaps in the production schedule that might not get filled, while the latter causes the same problem as the rework scenario just described (that is, too much work and not enough hours in which to complete it); though the cause of downtime in each instance is different than having a busted machine tool, the results are no less harmful.

"Too often the data needed to quote a job comes from the ERP system, a spreadsheet, or even an educated guess, none of which might be accurate," Immerman says. "That's why shops must gather as much information as possible from their production floor assets. Not only does this help identify potential problems that directly lead to machine downtime, but just as importantly, it helps to reveal hidden capacity. Oftentimes, the best way to reduce downtime is by optimizing processes and developing accurate job standards. I know of one customer who reduced their annual downtime by \$4.5 million just by understanding how long it actually takes to set up a machine."



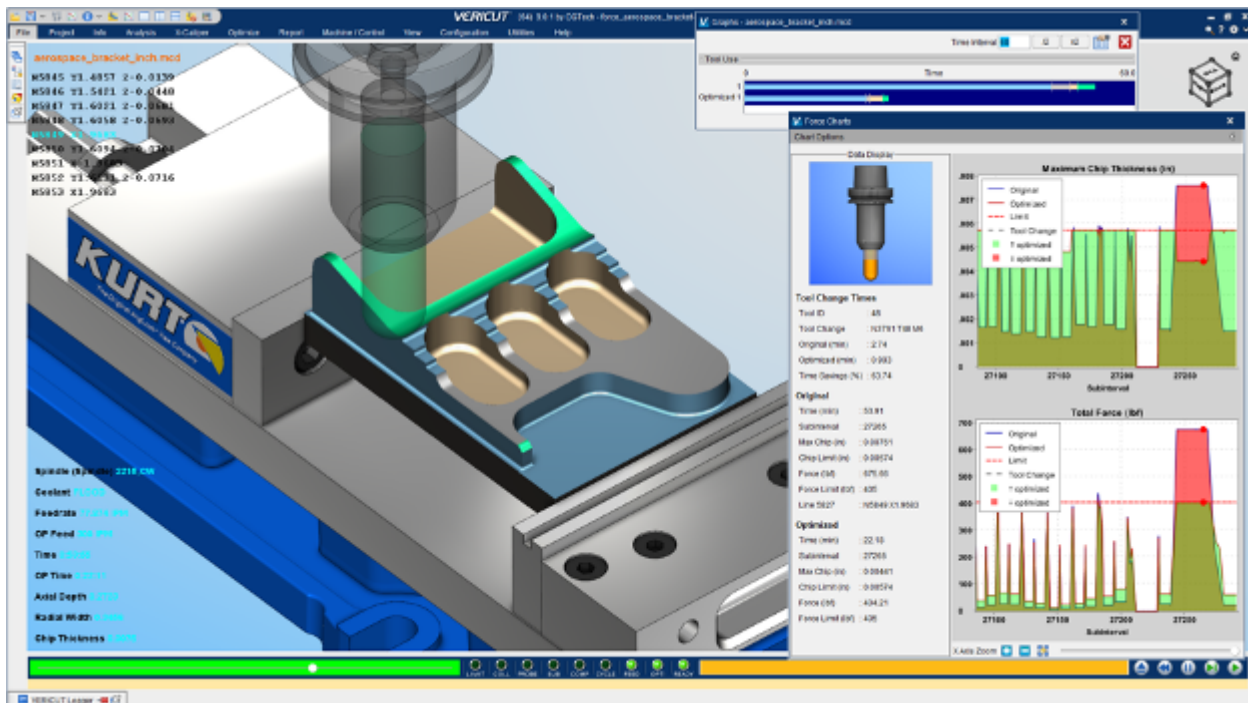
By using tools such as MachineMetrics' industrial IoT platform, manufacturers can continuously collect, analyze and act on machine tool status and production information, making unscheduled downtime a thing of the past (image courtesy of MachineMetrics).

Avoiding the Crash

It's painful to contemplate, but the most unpleasant cause of unplanned downtime is a crashed machine tool. That's according to Gene Granata, Vericut product specialist at CGTech, who adds that crashes are easily avoidable with toolpath simulation and optimization software. Because these systems can replicate the entire machine tool environment—from the largest sheet metal panel to the smallest screw and everything in between—they give users the opportunity to test CNC programs outside the machine, in a virtual world where crashes are nothing more than bright red colors and some scolding text, thus eliminating the nail-biting, ride the e-stop method of program prove-out prevalent in far too many shops. And since toolpath simulation software reads the actual G-code used by the CNC machine tool, it's also possible to identify time-wasting errors in the post-processor, again, in a safe and virtual environment.

Aside from his desire to eliminate the pain and downtime of machine crashes, Granata is onboard with what Zimmermann said earlier about machine optimization. To this end, he points to the company's Force software, which he says optimizes toolpaths based on what each cutting tool and the machine tool are capable of, given the workpiece material and cutting tools being used.

"Every cutting tool manufacturer out there will tell you their tools can be pushed harder when machining conditions are correct for the tool, and optimization is the best way to achieve that," he says. "Force calculates ideal feed rates for each cutting tool that promote true constant chip thickness for machining, while simultaneously limiting excessive machining forces and keeping spindle power at safe levels. This results in significantly shorter cycle times, higher-quality machined parts, substantially greater tool and CNC machine life, and far fewer of the surprises that cause unexpected downtime."



Toolpath simulation and optimization software not only eliminates the chance of a crash leading to days or even weeks of unplanned downtime, but also serves to reduce setup and cycle times alike (image courtesy of CGTech).

Read more: Good Vibrations: How to Optimize Your Machine Setups to Minimize Chatter

Ditching the Paper

At the end of the day, learning how to reduce unexpected downtime is largely about making manufacturing operations more predictable and efficient. Ryan Zimmermann, director of business development for Visual Knowledge Share (VKS) Ltd., suggests that one of the best ways to accomplish this is with digital work instructions. First developed by a 50-year-old sheet metal fabrication shop in Montreal, VKS gives manufacturers the ability to easily push text, photos, videos, audio recordings and whatever other media is needed to convey meaningful instructions to the shop floor.

It goes one step further, however, by also collecting operator inputs and KPI-related data in real time, increasing the visibility of waste while providing opportunities for continuous improvement.

“The everyday manufacturer faces a multitude of challenges, but some of the more consistent ones revolve around the lack of a skilled workforce, tribal knowledge loss and a competitive marketplace,” Zimmermann says. “When a company relies too heavily on their senior operators, they inevitably open themselves up to a high risk of productivity loss and process failures. By standardizing best practices in a digital, paper-free format, companies can ensure that their ‘knowledge capital’ is successfully retained, making it easier to onboard and integrate new employees within their shop. As with the other solutions discussed here, clear standards and guidelines can help optimize setup processes and maintenance activities, helping to increase machine tool availability and decrease downtime.”



Eliminating unscheduled downtime from the production floor comes from removing waste and inefficiency. Digital work instructions go a long way toward supporting this initiative (image courtesy of VKS).

How are you managing to avoid unplanned downtime in your shop? Share your thoughts and insights in the comments below.

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