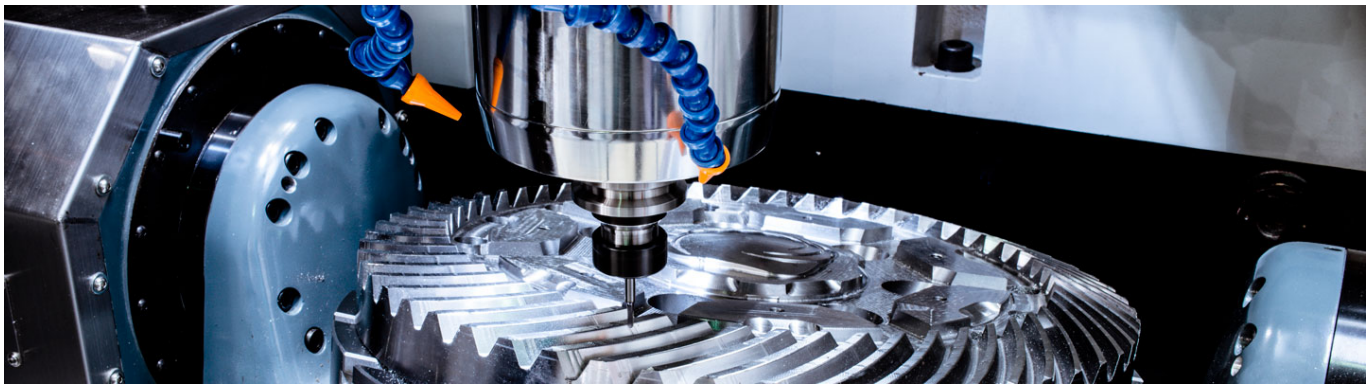

Machining

How Do I Avoid Costly Spindle Repairs? Increase Machine Uptime With These Three Steps

Roland Jones | Dec 22, 2020

Machine tool spindles are among the most critical pieces of equipment in your shop. It's why you want to keep them running without breakdowns for as long as possible. Here are three areas to focus on to ensure you don't get saddled with costly spindle repairs and unnecessary downtime.

Machine tool spindles are a vital part of any machine shop setup and determine the quality of the parts you produce. They're also integral to your machine shop's overall productivity and efficiency.

Unfortunately, machine tool spindles are also prone to damage. As spindles have become more advanced, incorporating more complex features and working at higher speeds, they have also become more expensive to repair. One unforeseen crash or a programming mistake and you could be facing weeks of downtime and a costly repair bill.

> **"Invest in a tool balancer, which can cost far less than replacing a worn or damaged spindle, especially when you consider the potential for weeks of downtime."**

So what can be done to alleviate the most common causes of spindle failures? A recent ***Better MRO article on CNC machine spindle maintenance*** highlights three distinct categories for spindle care:

- Regular preventive maintenance
- Avoiding crashes
- Preventing tool imbalance

By adhering to several "best practices" for each of these three categories, and by incorporating some technological innovations, users can prolong the life of their spindles, the article notes.

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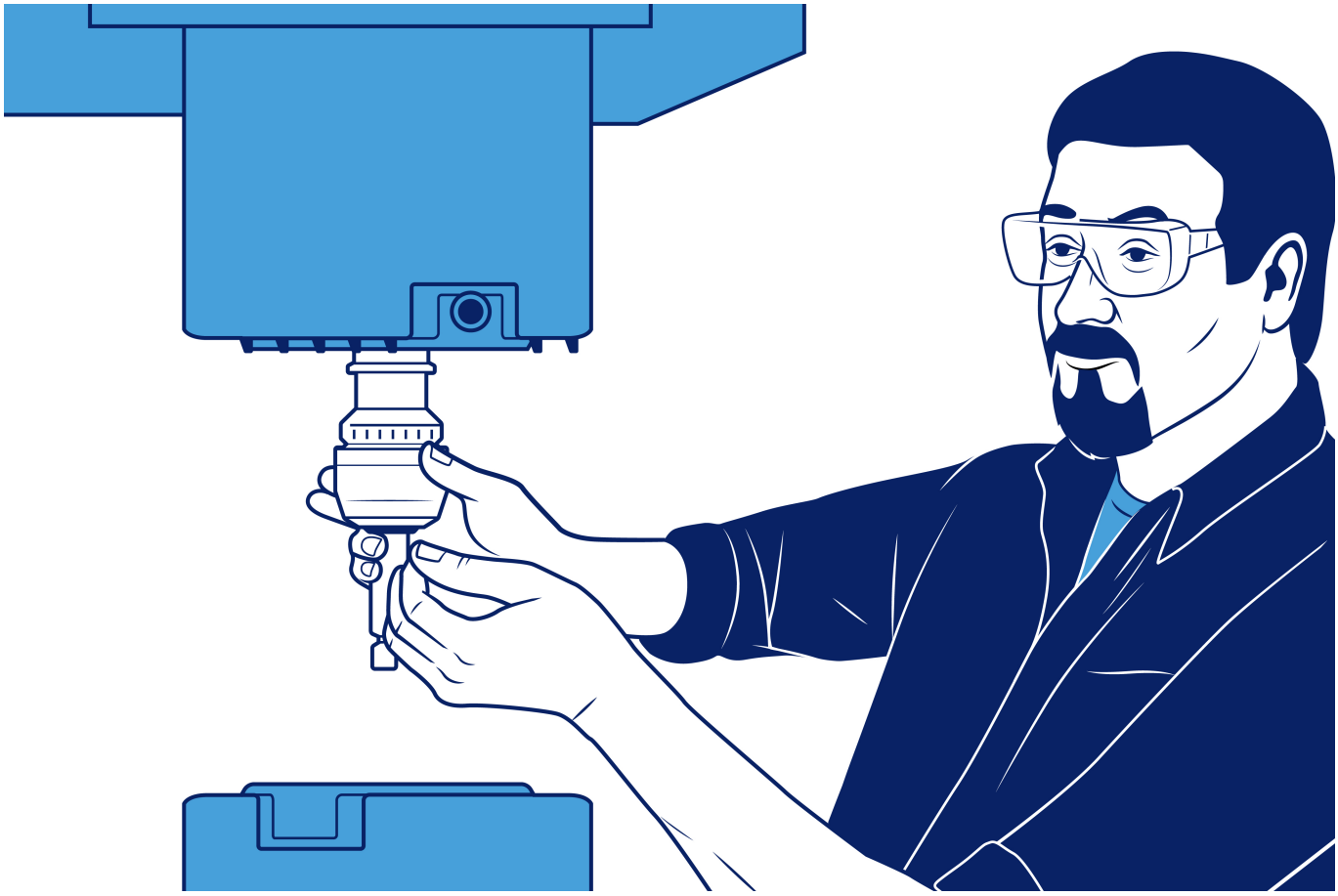
The upsides of good spindle maintenance include increased machine uptime, lower spindle maintenance costs and improved part quality.

In this first article in a series offering practical answers to common machining questions, here are three areas to focus on to keep your spindle repair-free for as long as possible.

1: Regular Preventive Maintenance



Scheduling preventive maintenance can help prolong the life of a spindle.

Just like a car owner, you don't have to be an expert about everything that goes on under the hood of your vehicle. But you shouldn't simply drive it without understanding its basic features.

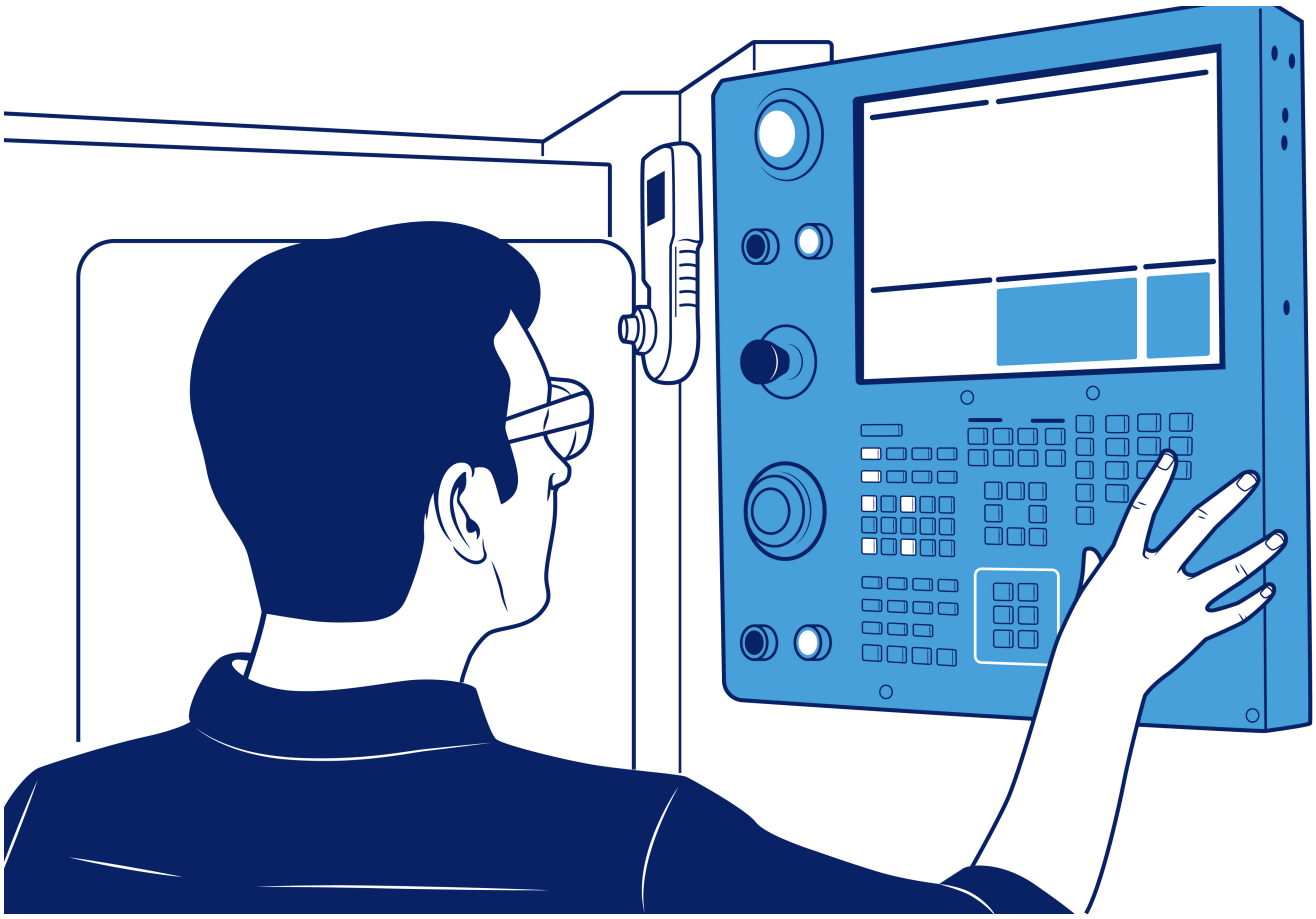
It's the same with your CNC machine and spindle. Including small checks and scheduling preventive maintenance can help prolong the life of a spindle and increase productivity.

Here are some preventive maintenance tips to consider:

- On machines with through-spindle coolant, routine inspection of the O-ring or seal located at the toolholder/coolant tube interface is necessary to avoid contamination of the spindle cartridge from high-pressure cutting fluids.
- Change filters regularly to avoid contamination from chips or coolant, and keep the compressed air feeding the machine clean.
- Make sure cutting fluids are clean and turn off coolant during tool changes to keep toolholders clean and well maintained.
- Avoid nicked, corroded or worn toolholders, as any damage to the taper (or flange face, in the case of dual-contact toolholders) will soon transfer to the spindle.
- Invest in high-quality toolholders and steer clear of the "lowest cost provider" whenever possible.
- Ensure proper spindle lubrication, and make sure equipment such as a chiller is in good working order.

Read more: Your CNC Machine Spindle Maintenance: Here's How You Can Optimize Its Life Span

2: Avoiding Crashes



Avoid crashes by using a "safe start" block of code.

A large portion of spindle failures happen because of a collision between the spindle and the workpiece or the surrounding components. They can happen due to programming mistakes or a misaligned tool, and they will usually lead to spindle damage and require a costly repair.

But there are steps you can take to minimize the likelihood of a crash:

- Stay within the machine tool builder's load recommendations and avoid crashes by using a "safe start" block of code, eliminating the chance that an operator will restart a program in the wrong position after an in-process part measurement or cutting tool replacement.
- Consider investing in toolpath simulation software, or spend time walking through new part programs one block at a time.
- Recognize that crashes do not have to be catastrophic to cause spindle damage. Even stalling a spindle creates excessive bearing loads, and a "gentle" crash can create small dents in bearing surfaces that will accelerate spindle degradation.
- Those in the market for a new machine could look for features like ***Makino's Health Maximizer***, which uses sensors in critical machine systems—including the spindle—to gather data about machine performance and alert the user to potential problems.

Read more: How to Ring-Test, Mount, Balance and Store Your Grinding Wheels

3: Preventing Tool Imbalance

A tool balancer can cost far less than replacing a worn or damaged spindle.

Another reason for premature spindle failure is tool imbalance, ***according to Haimer USA***. Balanced tool assemblies save time, reduce costs and increase tool life.

Here's what you can do to alleviate the problem:

- Invest in a tool balancer, which can cost far less than replacing a worn or damaged spindle, especially when you consider the potential for weeks of downtime.
- Balance the complete toolholder assembly—the cutting tool, the toolholder and the retention knob as a single unit—for any spindle speeds greater than 8,000 rpm. It's a must for 12,000 rpm and higher.
- Don't use overly long tools. They can exert enough radial force to cause "seal pickup," where the rotating spindle shaft bends sufficiently that it interferes with nearby stationary areas. Use a bending moment diagram for the spindle to understand maximum length values for a given cutting tool and machining variables.

Read more: How Tool Balancing Boosts Tool Life and Productivity

Additional reporting for this article came from ***Your CNC Machine Spindle Maintenance: Here's How You Can Optimize Its Life Span***

What questions do you have about machining that you'd like us to tackle in future articles? Let us know in the comments section below.