



Machining

Where to Look for Machining Vibration

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Machine-tool runout stems from multiple causes, including fixturing, toolholders, cutting tools, machine tools themselves and unexpected intermittent sources. All these problems diminish surface finish, tool life and part tolerance. Finding the source of runout takes an open mind and methodical investigation.

When customers ask Rego-Fix to help them track down runout issues, they begin with the pull stud on any steep taper machine or system. Improper torque on the pull stud can deform the taper, make the toolholder too big at the bottom of the spindle and allow the top of the holder to move during use. This movement creates high levels of TIR, fretting and increased vibration in the cut. Fortunately, this source of runout is easy to correct when you follow proper torque guidelines.

Once they verify proper pull stud implementation, they look at tool holder cleanliness. If a small chip or some dried coolant remains inside the holder, these contaminants can prevent machines from reaching proper tolerances. After each cut, operators who spend a few minutes to clean tapers, collets and the rest of the assembly can achieve much better repeatability and process accuracies.

If these two corrections don't resolve the problem, Rego-Fix looks further at the tool holding assembly itself, with a visual inspection of mating surfaces. Dents, rust, scars or anything that can make the surface irregular and raised: All these conditions call for replacement or reconditioning. They also examine the fixturing that shops use to secure today's complex workpieces, especially on multi-axis equipment, where a poorly held part can vibrate and magnify problems with workpiece quality and tool life.

Proper machine installation also is critical on today's high-speed machine tools. The sophistication of current spindle designs mean that you no longer can walk up to a piece of equipment, place your palm on its sheet metal and feel vibration, but inadequate machine installation can destabilize the cutting process. The concrete under the machine is essential to damping vibration from nearby sources – some intermittent – so it doesn't affect the cut. Rego-Fix has seen instances in which the lack of proper footings caused production problems when a shop vehicle drove past and immediately disrupted the surface finish on a part. Likewise, correct spacing between machines can eliminate any chance for vibration to transfer among them.

But none of these important criteria can make up for poor-quality tool holding, or tool holders that shops continue to use past their effective lifespans. One of the biggest problems with shrink-fit tool holding, for instance, is that constant heating/cooling cycles cause their metal to anneal, which alters

the crystalline structure. That release of material stress triggers a host of problems with TIR and clamping force. Now the toolholder may not be able to release the tool, or it no longer clamps down hard enough to hold the tool securely. It's impossible to predict when these holders will develop bad runout, but it always shows up eventually. All these problems mean that shops with shrink-fit toolholders face a constant cycle of replacement, especially on sizes below 0.5" diameter tooling.

REGO-FIX has developed powRgrip to solve these stability and vibration problems, and make the process of tool holder assembly fast and easy at the same time. When shops try powRgrip, they first notice increased tool life, which is an immediate result of tool holding security. As they experiment with speeding up the cut, they quickly discover that they can ramp up their productivity and make many more parts in the same amount of time. Likewise, powRgrip's 10-second press-in cycle eliminates a big source of down time, transforming tool setting into a push-button process without the wait for heat-shrink systems to cool. They also offer a written warranty that covers the lifecycle of their product for five years and 20,000 cycles, so customers know that they stand behind their results.

When REGO-FIX introduced powRgrip at IMTS in 2002, their booth was mobbed with shop owners who wanted to see it for themselves and experience how easy and fast it was. They continue to see that interest and excitement wherever they demonstrate powRgrip, and in the shops that discover for themselves how much it can revolutionize their productivity. Used properly, it will outlast other systems and produce superior results, both in reduced TIR and in superior clamping force.

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