



WHITE PAPER



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Five Reasons to Use Low-Frequency-Vibration (LFV)

What is Low-Frequency-Vibration (LFV) Turning?

The traditional computer-numeric-controlled (CNC) cutting process for metals on a lathe involves a continuous cut, where the cutting tool is engaged with the working material from beginning to end. LFV

turning is a new take on this process, continuously removing and reapplying the cutting tool from the working materials. It seems like a simple change, but it's a real innovation. Here are five reasons you should adopt this technique in your manufacturing process.

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Want to see how it works?

1 – It Doesn't Take Much to Implement LFV Turning

LFV requires use of a Citizen Cincom Swiss Lathe, as this is a technology developed and patented by Citizen for its own exclusive use. It's based on a change in how the CNC machine handles the material. Instead of applying a single consistent cut, removing a constant amount of material with each rotation, LFV turning brings the cutting tool into and out of the material based on rotational relationships. It can be turned on, off and changed mid cut as well! Interpolate over different axes, and use as unconventionally as your imagination will allow.

It is a program code that you can use and tune to your specific application!

2 – Reduce the Heat

One of a metal shop's worst enemy – heat. Overheating of the cutting tool can be a big problem and can cause issues with tool life and tolerances. Any time you cut metal, it will generate heat, and a single continuous cut keeps the cutting tool on the metal without a break with the heat continuing to build. When you use LFV

turning, the cutting tool is removed from the metal called "air cuts," allowing a brief moment for the cutting tool to cool down without stopping the process. This allows a slight cooling by giving the process a bit of "space" and then proceeding. This helps stabilize the overall process for wear and process capability on tolerances.

3 – Reduce Waste Material Complications

Chips and spiraling materials can interfere with cutting, often requiring the process to stop or risk actual damage to the machine, part or both. This becomes a significant headache primarily when chips and spiraling material build up around the cutting tool. This "bird nesting" can become a major headache for manufacturer caused by having to stop a machine, clean out the work envelope and then continue.

Each time the cutting tool is removed from the material in an air cut, all previously removed material is entirely cut off from the working material. These frequent air cuts prevent chips and spiral entanglement. This allows the machining process to continue uninterrupted, and provide more productivity as opposed to the old method of clearing chips and

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losing valuable production time. This can be applied to turning, drilling, grooving, parting off, and more! Any point in your process where chips take over is where **LFV** comes to the rescue.

4 – Improve the Lifetime of your Cutting Tool

The heat generated and the consistent exposure to the working material wears on your cutting tool, requiring replacement when it gets too worn to prevent breakage or chips caused by a ragged edge.

Using **LFV** doesn't mean you are free from wear and tear on your cutting tool, but it will reduce the frequency you have to replace them. This can add up with a manufacturing process where these tools are frequently in use.

5 – Reduce Power Consumption

Another often-overlooked cost in production is the electricity used to keep these machines running. Power consumption increases the longer a cutting tool is applied to the material, as the friction slows the lathe turning, and it has to work harder to keep it rotating at speed.

By constantly removing and reapplying the cutting tool to the working material, you give the lathe a brief moment without resistance to maintain speed and increase the moment of inertia. When the cutting tool is reapplied, the lathe moves at the desired rate without needing the additional energy to maintain that speed. This may seem like an unintended consequence, but just like one-pedal driving in an EV, every bit helps!

Want to implement **LFV** in your manufacturing process? Millennium Machinery can help. We have been at the forefront of this technology since its inception and have the ability to show you how it can be applied to your part on our floor at any time!

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