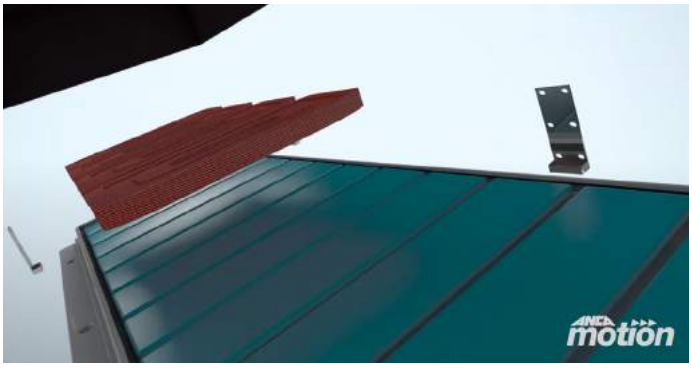
How A Tool Producer Keeps Its Edge

For Machine Tools

10% cycle time reduction, 4 times better surface quality

Myles Tool Company, Sanborn, NY, since 1977 has specialized in producing standard and special carbide cutting tools for the aerospace, automotive and medical sectors. A one-stop shop for standard tools, regrinds, and special tools made to customer requirements, Myles has grown by investing in new machines and high quality equipment.



Looking at how an ANCA MX7 Linear CNC tool grinder helped reduce cycle times. Video courtesy ANCA Motion.
www.ancamotion.com/LinX---The-Evolution-Of-The-Linear-Motor-Video

Looking for a way to reduce grinding cycle times and improve cutting tool quality in order to satisfy customer requirements, Myles most recently invested in an ANCA MX7 Linear CNC tool grinder with linear motors. Over the years the company purchased a total of 13 ANCA CNC tool and cutter grinding machines. Seven of these machines are the MX7 model.

Joe Adams, plant manager of the grinding shop at Myles Tool, is very knowledgeable in cutting tool design and production. He knows the process and the machines in detail.

The ANCA MX7 Linear CNC tool and cutter grinder improved flute surface finish from 0.8 Ra to 0.2 Ra. Images courtesy ANCA.

"We were looking for capacity and an ability to produce a polished finish on the flutes of one of our aluminium tools," Joe said. "The MX7 Linear CNC grinder was delivered a few months ago and has been producing tools of exceptional quality to tight dimensional tolerances without any problems since its first day of operation. Normally, I prefer not to buy first-generation machines, but after talking to ANCA and seeing the machine in operation, I was confident it would grind to the finishes I was looking for."

Asked about any differences he has noted between the MX7 ballscrew and linear motor machine, Joe commented, "When using the same grinding wheels, tool file, feeds and speeds, the surface finish is better on a tool ground on the MX7 Linear when compared to the tools ground on an MX7 ballscrew machine."

Joe believes the MX7 Linear machine is superior to a machine driven by a ballscrew, "because you do not have to deal with wear, backlash and the transition is smoother. Ball screw wear is a big factor to us because we run a 24/7 operation. We cannot have any failures or unacceptable parts."

The flute face from a tool ground on the MX7 ballscrew machine can be as low as 0.8 Ra (roughness average), but the flute face measured on a tool ground on the MX7 Linear measures even lower at 0.2 Ra.

"We are seeing much better finishes with the linear motor machine than we could achieve with the ball screw machines, especially for our aluminium tools," Joe said. The product is an end mill range with variable helix and variable index, two- and three-flute. Joe added a secondary fluting operation to polish the flutes for improved chip flow using an 800-grit wheel.

Range of carbide tools by Myles Tool.

This final grinding pass, although an added move, adds no time to the cycle.

There is actually a reduction in cycle time of up to 10 percent when grinding on the MX7 Linear machine. Joe noted, “The reduction in cycle time from the MX7 Linear machine—for batches of up to 5,000 pieces—is a significant saving in cycle time for the company, allowing us to deliver high quality tools in minimum time.”

Myles has found a few advantages to the ANCA Linear compared to ballscrews or linear motors.

Flatbed style linear motors used in grinding machines typically have a back-iron in their magnetic circuit increases the down-forces and creates cogging. Cogging results in reduced surface finish quality. This tremendous down-force on the bearings can cause components to wear faster, decreasing efficiency.

The LinX® Linear Motor’s even force over entire stroke provides unprecedented motion performance, and because of its direct drive nature the motor can track motion commands more accurately and repetitively to achieve better surface finish. In addition to the improved surface finish, the LinX® Linear Motor also enhances the cycle time due to its higher acceleration and faster traverse speed.

The linear motor is very compact under the way cover and a voids ball screw stick-slip and wear issues while providing 10 percent faster cycle times.

The key is the LinX® cylindrical design. The LinX® Linear Motor consists of a shaft containing magnets and a forcer containing wound copper coils. The symmetric design results in zero attractive forces between the forcer and shaft, greatly reducing the loading requirement on support bearings. The thermal barrier design separates and removes heat from the motor, eradicating thermal growth for the machine.

So ANCA Linear machines don’t require a dedicated chiller, reducing power and floor space requirements. The traditional flatbed linear motor typically requires a separate chiller for thermal stability.

The MX7 Linear at Myles Tool uses the same coolant system and chiller as the MX7 ballscrew machines. No special modifications were needed to the coolant system or the chiller unit to accommodate the MX7 Linear machine, Joe said. “We have had no thermal concerns with the MX7 Linear. And the polymer concrete base on ANCA machines contributes significantly to the thermal stability of the machine.”

ANCA Motion’s LinX® linear motor, an energy, space efficient innovation in drives well suited to precision machining applications.

With LinX®’s simple construction, non-critical air gap and no physical contact between shaft and forcer, machine manufacturers can greatly simplify installation, reduce maintenance and extend machine life. The LinX®’s design allows it to easily replace ball screws in existing machines.

Due to its simple construction, only one or two supports are required at the shaft ends depending on its orientation. Not only has the axis installation time been reduced by more than 200 percent when compared to ball screws, but the installation of LinX® motors is much safer than flatbed linear motors.

In Myles’ experience, the LinX® Linear Motor provided improved performance at lower cost with excellent efficiency when compared to ball screws and flatbed linear motors.

The standalone thermal stability, high speed and acceleration, zero down forces and the ability to achieve IP69K protection make LinX® an ideal solution for precision machine tool motion.

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