

ANCA Motion LinX® Linear Motor Offers Machine Manufacturers a Sharp Edge

Breakthrough innovation, ANCA Motion's cylindrical LinX® Linear Motor.

ANCA Machine Tools (hereafter referred to as AMT) celebrated its 40th anniversary of operation at year-end 2014. Founded by Pat Boland and Pat McCluskey 40 years ago in Melbourne, AMT has grown into a truly global organisation with manufacturing sites and branch offices all around the world. Today, AMT is a market leader in quality CNC grinding machines. AMT's success is a result of its continuous development of cutting-edge technology and a focus on innovation. Continuing in that tradition, AMT has launched a number of new machines in 2014, aiming at strengthening the value proposition they offer to the customers. Significant inclusion to their range are the FX Linear and MX Linear machines. Both machines are powered by LinX® Linear Motor (International Patent Pending) developed by ANCA Motion, a sister company of AMT.

Figure 1 – ANCA Motion's LinX® Linear Motor

Prior to FX Linear and MX Linear machines, AMT had been a silent observer on linear motor technology for many years. "AMT was aware of the benefits that can be brought by linear motors. Over time the ball screws can wear even on the best machines and you have to consider backlash and the loss of preload." Simon Richardson, AMT MX platform product manager said, "When installing and aligning a ball screw on a machine, tighter tolerances are required over the entire length of the ball screw when compared to fitment of linear motors."

Figure 2 – AMT's FX Linear and MX Linear Machines

However, AMT has resisted using linear motors for quite a long time. Philip Wysocki, Electrical systems engineer in AMT said, "The traditional linear motor is flat in construction, which creates a lot of issues when implementing these motors on machines." Machines with flatbed linear motors typically require a separate chiller for thermal stability, and the attractive force between coil and magnet bed creates tremendous downforces on the bearings, making everything wear faster and hence decreasing efficiency. In addition, flatbed style linear motors used in grinding machines typically have a back-iron in their magnetic circuit which further increases the downforces and creates cogging.

Figure 3 - ANCA Motion's LinX® Linear Motor

It's until the arrival of a breakthrough innovation, ANCA Motion's cylindrical LinX® Linear Motor, AMT believes that they saw a technology they felt confident to adopt into their tool grinding machines. LinX® Linear Motor overcomes all the problems related to flatbed linear motor and delivers superior performance thanks to its state-of-art cylindrical design.

ANCA Motion's 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. "Thanks to its excellent standalone thermal stability, AMT's machines don't require a dedicated chiller for the LinX® Linear Motor! This is a huge advantage over competitor's flatbed motor based machines, significantly reducing the power usage and space occupation," said Simon.

With LinX®'s simple construction, non-critical air gap with 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 and makes

the machine design a lot easier. "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 significantly reduced by more than 200% when compared to ball screws, but the installation of LinX® motors is much safer than flatbed linear motors," Philip continued.

Figure 4 – Surface finish under high magnification microscope

The ironless design of ANCA Motion's LinX® Linear Motor and even force over entire stroke bring out 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. Simon added, "With LinX® Linear Motor, we don't need to worry about cogging, backlash or reversal error. The tool's surface finish ground by a LinX® powered machine is significantly better than the result from a best performance ball screw machine. You can see the tangible difference easily. This is just unbelievable when you are talking about microns!" 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.

Overall, ANCA Motion's innovative LinX® Linear Motor provides 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 machine tools.

After the launch of FX Linear and MX Linear machines, LinX® powered machines have been installed at various regions all around the world. AMT customers are very satisfied with the performance of these machines. ANCA Motion, as a designer and manufacturer of flexible motion control systems, will continue to deliver innovative products to support their customers' on-going success.

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