White Paper

Taiwan's Open Architecture Machine Tools Rise Up for Industry 4.0 Opportunity

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Whether it is manufacturing, export or usage, Taiwan's machine tools are ranked among the top five in the world. The precision engineering industry in Taiwan has been one of the primary strengths in manufacturing, while the machine tool industry has faced a host of challenges. As Taiwanese machine tool manufacturers have mainly focused on mid-range to low-end machine tools, China has steadily caught up in the low-end market. Meanwhile, in the high-end segment, Japanese machine tools have gained a hefty boost in sales due to the depreciation of Japanese currency. The mid-end segment in between, has seen a slow decline. In this M-shaped machine tool industry, Taiwanese manufacturers face stiff competition from both sides. With Industry 4.0 well under its way, open architecture machine control will become a transformation opportunity for Taiwanese manufacturers.

Intelligent controller is one of the key components in machine tools. In the past, Taiwanese manufacturers lacked controller technology and relied on German and Japanese imports. Being competitors with Taiwan, German and Japan have remained reluctant to export its high-end controllers, resulting in Taiwanese manufacturers having to focus on the mid to lower-end markets.

However, NEXCOM's General Manager of the Industrial Computing Solutions Business Unit, Joe Lin, points out that traditional machine tools used a closed architecture and the control programs lacked flexibility, which were insufficient for sustained use. In Industry 4.0, machine tools need to move to an open architecture using PC-based controllers in order to create a smart factory with build-to-order, high-mix/low-volume, collaborative

and unmanned manufacturing capabilities. Designing PC-based controllers to provide these abilities will be key for Taiwanese manufacturers to reach the next transformation milestone.

Open Architecture CNC and Cloud Computing: Flexibly Respond to Wide Range of Orders

PC-based open architecture machine tools not only can identify incoming production work orders, it can also automatically determine the product attributes and download the related software through cloud technology, and then create the relevant operations for order picking and production. Similarly, when a new and different order arrives, machine tools can use this production mode to create the required operations for the order, fulfilling the Industry 4.0 vision of smart factories.

If Taiwanese manufacturers were to adopt an open architecture machine tool, establish the ability to design PC-based controllers and produce intelligent machines such as CNC (Computerized Numerical Control) machines and intelligent robots before Industry 4.0, Taiwanese manufacturers can secure a niche in the market. In doing so, Taiwanese manufacturers can emerge from the shadows of foreign competition and regain control of the market.

In light of this, NEXCOM has, on one hand, actively brought European technology to the development of open architecture CNC controllers. On the other hand, NEXCOM, with its extensive experience in developing fanless computers, has set up another two
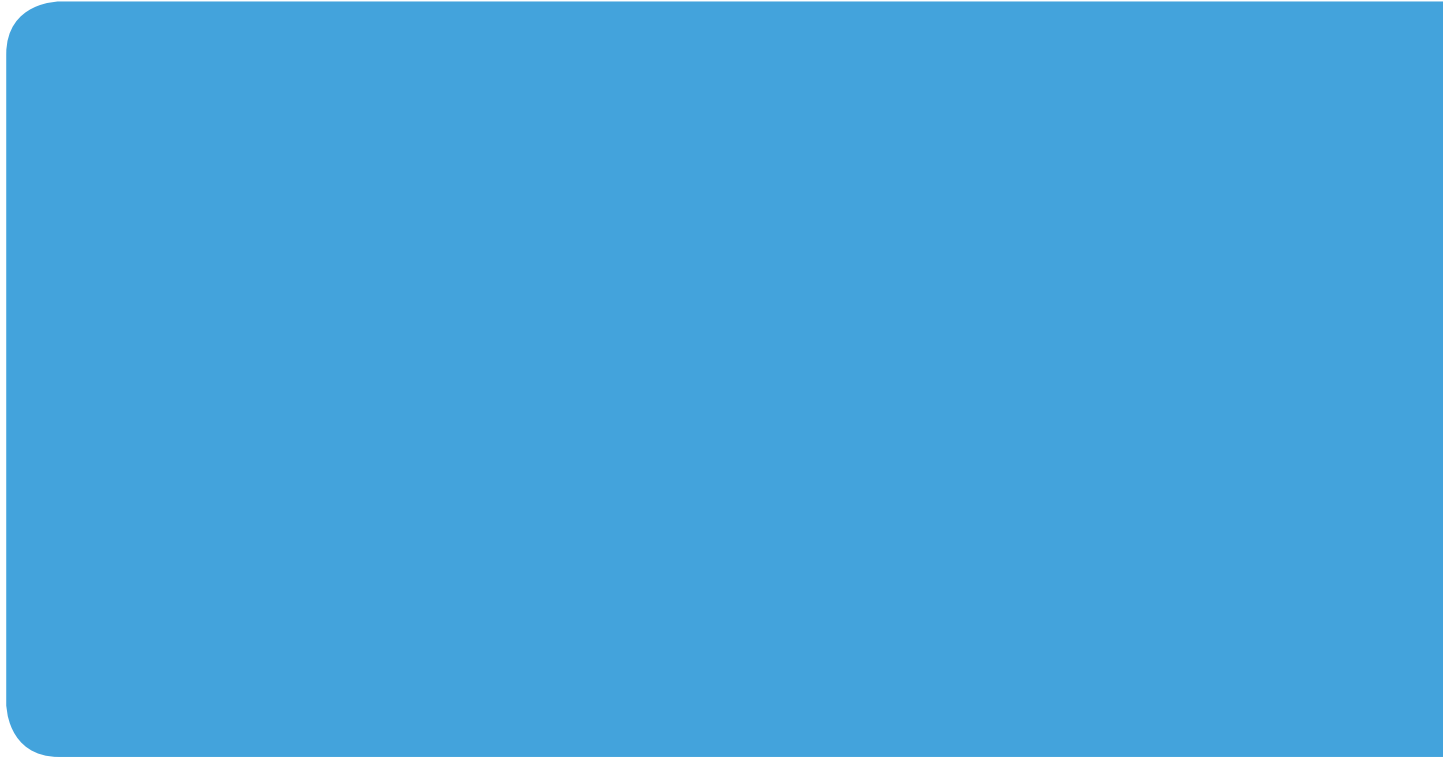
teams of selected professionals, Embedded Pro and Automation Pro, that will transform the invested technologies into solutions that match customers' needs. Furthermore, NEXCOM also has successful cases in implementing robotic arms and CNC machines in the domestic market.

Lin also revealed some insight into NEXCOM's plans, stating, "Overall, there will be two types of solution. One is open architecture CNC controller solution, which includes solutions suitable for 3-axis and 5-axis machine tools, both support single and multiple tasks. The other is open architecture robot controller solution, which includes solutions for different robotic systems such as serial, parallel, SCARA (Selective Compliance Assembly Robot Arm) robots and many others."

Lin further states, "The most common feature that these solutions share is the use of open architecture, which enables the flexibility to adapt to different sizing or parameter variations of different machines, allowing customers to produce unique CNC systems or robots with ease."

Overall, to achieve Industry 4.0 based production requires smart factories, smart machines and smart products working together seamlessly. Open architecture CNC controllers with cloud capabilities can provide control of machines, connect to the internet, link to other factories and enable remote management. It will undoubtedly become the key component of this value chain. This window of opportunity not only allows Taiwanese manufacturers to break away from the chains of traditional CNC architecture, but also encourages the transformation of Taiwan's machine tool industry.

About NEXCOM

Founded in 1992, NEXCOM has five business units which focus on vertical markets across industrial computer, in-vehicle computer, multimedia, network and communication, and intelligent digital security industries. NEXCOM serves its customers worldwide through its subsidiaries in seven major industrial countries. NEXCOM gains stronghold in vertical markets with its industry-leading products including the rugged fanless computer NISE series, the in-vehicle computer VTC series, the network and security appliance NSA series and the digital signage player NDiS series. www.nexcom.com