VOICE

We talked with Tamio Otani, Executive Managing Director of Hitachi Via Mechanics, Ltd., about the company's partnership with THK.

Learning from each other—the ideal partnership

Hitachi Via Mechanics, Ltd.

Founded in 1968 as a member of the Hitachi Group, Hitachi Via Mechanics has been making important contributions to industry through its manufacturing, marketing, and service activities in three areas: printed wiring board manufacturing systems and maskless direct exposure systems, which are foundation technologies for the state-of-the-art electronics equipment industry; factory automation equipment and systems for a broad range of machining and flexible manufacturing tasks; and arc welding and cutting systems that are indispensable to industry. In printed wiring board drilling machines, the company's main product area, Hitachi Via Mechanics commands more than 85% of the Japanese market, which is evidence of the high level of customer support and confidence the company has attained. The word "via" is Latin for "road." In the printed circuit board industry the "through holes" connecting printed wiring patterns on the top and bottom surfaces of a printed circuit board are called "via holes."

Tell us about Hitachi Via Mechanics' business.

Forty years have passed since we introduced our first printed wired board drilling machines in 1968. In the mid-70s we attracted attention when we were the first to provide a z-axis, which up to then had been moved up and down by a hydro-pneumatic cylinder, equipped with a rotary motor and ball screw. This machine could deliver 70 to 80 hits with a dual-axis machine controlled by servo technology*. Nowadays, 6-axis machines are becoming the mainstream, and we have delivered roughly 17,000 units of these worldwide. Our share of the global market is said to be more than 55%.

At first, most printed wired board drilling machines were xy-table constructions. This means that they had only one table that moved forward and backward (the x-axis) and to the right and left (y-axis). Our machines, however, were split-axis-type machines, where the head and the column were each equipped with a separate table. This construction was adopted because unlike conventional machine tools, the horizontal movement (xy-axis) of a printed wired board drilling machine has to come to a complete stop before holes are drilled with the vertical movement (z-axis). The argument over the relative merits of these different construction concepts continued for a long time, but ultimately all the printed wired board drilling machines around the world changed to our split-axis design. The fact is that the foundation for our success was provided by THK products.

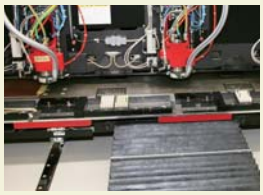
Tell us about your relationship with THK.

The early 80s was an era of 4-axis printed wired board drilling machines. At that time, we used to use a horseshoe-shaped ball guide as guide for the drive axis. Later, in an effort to increase the productivity of general-purpose machines, we began developing 6-axis machines. The table, which is 2 meters wide for 4-axis machines, had to be made as wide as 3 meters for a 6-axis machine, although it was made of thin board. To check the vertical and horizontal thermal deformation of the table and minimize horizontal skewing, it was essential to use the linear motion guides being developed at that time.

We were already using linear guides from another manufacturer in heavy machines that required high precision, but I was assigned the important task of selecting a better manufacturer to supply us with higher-priced guides for use in general-purpose machines.

At that time, there were two competing linear motion guide designs: a circular-arc type, made by THK, and a gothic-arch type, made by another manufacturer**. I held meetings with the design engineers time and again, but I remember that I was at a loss over which to choose, because there were no clear differences. In the end, we produced two prototypes and equipped each with a different set of guides, but the trial runs still did not reveal which guides were better. When the time came to make a decision, I realized that our company's split-axis construction needed to evenly expand and contract to the right and left direction using the center as a reference. At that time, our company's machine tools for mass production were not capable of producing mounting surfaces with the accuracy required by other manufacturers of linear motion guides. But using one side of the board-type table as reference and leaving the other side free was out of the question. Using the center as a reference and allowing even thermal deformation of the table to the right and left appeared to exert more stress than the guide could withstand over an extended period of use. Under those circumstances, THK's linear motion guide was the perfect match. In addition, I thought we needed a linear motion guide that would not be affected by the harsh environment of flying glass and copper and aluminum dust. I became convinced that THK's linear motion guides were the right choice.

Later, the table became even larger, and now it's around 4-meters wide. Without THK's support, I don't think it would have been possible to design a table supported on four LM Guides without encountering major problems. Today every hole-drilling machine maker around the world has adopted the split-axis construction, putting an end to the long battle with xy-table construction.



△ LM Guide installed under a table

What do you expect from THK in the future?

As an engineer, I don't want junior designers to think that the parts that have always been used are necessarily the best. "Look around, all over the world" is my advice. And if you find something good, don't use it right away, but first go to your current supplier, show them the difference, and urge them to bring their product up to par. If your current supplier gives up, then change to the new supplier. This is true partnership, I think.

What I admire about the people I deal with at THK is that they listen to the customer's needs with keen interest and do everything in their power to satisfy the customer with regard to performance, cost, delivery lead times, and other requirements. That's why THK has earned my respect in the nearly 20 years I have been dealing with them.

At first, the smallest holes our hole-drilling machines could drill were 0.3 to 0.5 millimeters in diameter. Now we can drill holes 0.075 millimeters in diameter, and in the near future we will probably see 0.050 millimeter holes drilled at mass-production pace. The hole drilling speed has also increased drastically. A 4-axis machine used to be able to drill 1,200 holes per minute at 150 hits in two stacked boards, but with a 6-axis machine the performance has jumped to 9,000 holes per minute at 500 hits in three stacked boards. I take pride in the fact that these technological advances have made it possible to manufacture amazingly lightweight, thin, and compact electronic devices, like mobile phones and personal computers, with dramatically improved energy efficiency. Such products have contributed to advances in society. This is also true for THK, I believe. Looking ahead, I hope that our partnership will grow even stronger and that we will continue to learn from each other.

* Servo technology: A technology that automatically controls position, orientation, and other parameters

** Circular-arc and gothic-arch design: In the circular-arc design, the groove cross-section consists of one circle, and the ball has contact at two points. In the gothic-arch design, there are two circles and the ball has contact at four points.