

Mitsui Seiki's world revolves around precision, customers

By Joseph F. McKenna

Inside the conference room of Aikoku Alpha Corporation, senior managing director Masaaki Kanamaru presents his visitors with the company's pedigree as a pioneer in five-axis machining. "We introduced the first Japanese-made five-axis machine in 1975," Kanamaru notes proudly.

For the slight-built, smiling boss of the Aero and Precision Division – at this moment the embodiment of Aikoku Alpha – the pride is understandable. Though Kanamaru politely notes that the Japanese manufacturer is not as big as others in the market, he nonetheless serves up a corporate history freighted with achievements, from the developing of tight-tolerance cold-formed parts to the taking of top supplier honors from such corporations as General Motors and Eclipse Aviation. At Aikoku Alpha, precision translates into success.

Such precision has a pedigree as well. In this case, a measure of Aikoku Alpha's skill as a machine builder can be traced to Tokyo-based Mitsui Seiki Kogyo Co. Ltd., the maker of jig boring machines – the so-called "mother machines" from which other tool builders beget critical precision parts. As it is in thoroughbred racing, so it is in machine tool building: the bloodline means everything. Aikoku Alpha's Kanamaru seems to appreciate that fact. "I think we are using about 20 Mitsui machines," he says.

Lauding the Mitsui Seiki machines for their high accuracy, exceptional rigidity, and long life, Kanamaru endorses them before a handful of foreign journalists and two of Mitsui Seiki's top executives. "Mitsui machines are very good for making aircraft engines," he tells them.

But Kanamaru's praise comes with a shading of qualification. It's still business hours at the Aikoku Alpha near Nagoya,

and it's time for Mitsui Seiki customer Kanamaru to slip in a comment or two about future desired machine features and current pricing. He punctuates those comments with the slightest, if slyest, smile for the benefit of Koichi Iwakura, Mitsui Seiki's senior executive managing director, and Scott Walker, president of Mitsui Seiki USA.

As Kanamaru speaks, Walker never loses the twinkle in his eye. Nor does



Mitsui Seiki President Tadayuki Abe says: 'The direction is to build machines and processes to allow throughput without human intervention. What this means is the machine and process must be eight times tighter than the part-print requirements.'

Walker lose sight of the fact that Aikoku Alpha is happy with its current stable of Mitsui Seikis, including a 27-year-old machine refitted with a rotary table to give it five-axis capabilities for turning out impellers.

A few minutes later, while touring the Aikoku Alpha production floor, Walker smiles broadly at a fellow visitor. "Welcome to my world," he says.

Without question, the world according to Mitsui Seiki is one that revolves

around the highest-precision machines and the even higher demands of customers. A member of the Mitsui Group – the largest commercial entity in Japan – Mitsui Seiki Kogyo is nearing its 80th year with a world-wide reputation synonymous with accuracy and a marketplace clamoring for its machining centers, CNC thread-grinding machines, and jig boring and jig grinding machines.

"Precision machining of components has typically been labor-intensive. It requires machining, measuring, and machining and measuring again and again," according to Mitsui Seiki President Tadayuki Abe. "The direction is to build machines and processes to allow throughput without human intervention. What this means is the machine and process must be eight times tighter than the part-print requirements. This is driving the precision work today for us. So machine accuracy, less part handling, predictable tool wear, and predictable process are the benchmarks."

In today's \$60 billion world market of machine tools, Mitsui Seiki lays claim to the highest-tech niche. "You can only make the machine tool as accurate as the machine tool it comes off," explains Walker, who has been part of the Mitsui Seiki team since 1991. "We supply machine tools to the machine tool builders. Looking at applications today, 50 percent or more [of Mitsui Seiki's business] is in aerospace and 30 percent is with Tier I suppliers to aerospace. Aerospace is strong right now because aerospace is the cat's meow in the marketplace. Two percent of the total machine tool market is us. That's where we fit."

Mitsui Seiki's is a pricey niche, too. "If you were to buy a horizontal machining center with a 24" table on it,

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production strategies

you'd pay about \$175,000. It's in the commodity range," Walker tells *Tooling & Production*. "You'd spend about \$500,000 in the higher-accuracy range. Not everybody has to buy [the latter], but that's our customer base."

Machining gospel

The return on the investment for machines at the top of that price pyramid is well worth it, insists Walker, a third-generation "machine tool guy" who enthusiastically preaches the trinitarian machining gospel of volumetric accuracy, thermal stability, and structural robustness.

For Walker, volumetric accuracy means that "anywhere I move inside the cube of the machine, I am able to achieve a specific dimensional positioning capability."

"A lot of people talk about repeatability and positioning, but that's only a small piece of the puzzle when it comes to volumetric accuracy. What people look for in very-high-end machine tools is very precise volumetric capabilities. If I'm going to take a part and bore a hole through that part and I look at the cylindricality of that hole, I have a theoretical center of the circle of that hole, and I

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slice that circle a thousand times over so much distance — true positioning is the dot locations of that particular bore location."

In addition, high-end machine tools boast exceptional thermal stability, Walker continues. That's critical, he ex-

plains, "because when you heat one meter of cast iron one degree, it grows one thousandth. One thousandth is 25 microns. You need to control to a half-thousandths or better when the machine is warmed up and running, so you need good thermal stability, good fit in the structure.

"You also need robustness," says Walker, who briefly hand-scraped ways in his early days in the world of machine tools. "In building the machine tool in the jig mill environment, when I put the tool tip to the metal, the whole thing bends. You can't get away from this. If you lean against the Empire State Building, the whole thing bends. It's physics. What you want is for the machine to bend to a position while it's machining and then, after it's done machining, to bend back to its natural state. Then the next time it's engaged in machining, it bends to the same location. That's robustness. That's stiffness. That's the characteristic of being able to develop a process that allows a tool tip [to do] the same thing every time."

While there's certainly nothing wrong with commodity machines, Walker says, "they're working at 100-micron true position. The people who build high-end

What's new in Mitsui Seiki's world



Mitsui Seiki's latest five-axis vertical CNC machining center, Vertex 550-5X boasts a new "cube in a cube" casting design, which provides an ultra rigid machine structure. Another new feature is a unique gear-drive system for the A and C rotary axes, which provides high-speed radial performance (A – 30rpm; C- 50rpm), and overall drive-system stiffness. In addition, the trunnion-tilt axis, A, has an ample dual-side support construction bolstering rigidity even more. On the Vertex, the linear axes move the spindle only. The motion of the workpiece is by the rotary axes only, offering improved control of machine dynamics. Specifications of the Vertex 550-5X include a compact footprint of about 7ft wide by 11ft long (2,000x3,300mm). The X, Y, Z-axes work envelope is 21.6"x23.6"x17.7" (550x600x450mm). All three move quickly at 1,890ipm. With the A and C rotary and tilt axes, the Vertex 550-5X provides a total of five integrated axes of motion for virtually one setup machining of complex workpieces requiring maximum rigidity and accuracy. Prismatic parts in the aerospace, automotive, medical, dental, and mold and die industries are considered ideal for this machine.

tools, like Mitsui Seiki, are working at something close to 12 microns.”

History of precision

“The pursuit of perfection” has been a prominent theme at Mitsui Seiki Kogyo since the company began producing measuring instruments back in 1928.

According to the company’s history, Mitsui Seiki helped to spark “a fledgling machine tool industry in Japan” when it developed the first medium-size jig boring machine in 1935.

In 2001, the corporation opened its state-of-the-art manufacturing facility in Kawjima. A marvel of environmental control, this world-class factory is truly the place a “mother machine” could love, with cement pilings that touch down to the earth’s bedrock and temperature and humidity controls

that ensure the utmost accuracy for each machine built on the premises.

During a recent interview at the factory with Abe, Iwakura, and Takahi

Terasawa, who directs the Machine Tool Division, *Tooling & Production* asked about Mitsui Seiki’s creating the optimal balance between supply capacity and market demand. Here is the response:

“Many of the components that are related to machine tools are purchased. Supply side is very important. During the last recession many of the suppliers went out of business; and when the business ramped up to record levels, many builders could not find out-source suppliers. Previously, machine tool builders farmed out several functions to reduce costs; but when the supply was not there, they brought back this work inside their respective companies. Mitsui Seiki sees this because the orders we are receiving for ball screw grinders and jig borer machines from machine tool

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Japanese businesses such as Mitsui Seiki Kogyo still greatly value the personal as well as the corporate connections in transacting business. At a formal dinner in Atami, Mitsui Seiki executive Koichi Iwakura acts as a host to visiting foreign business journalists, including *T&P*'s Joe McKenna.



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Bullet Train pace agrees with Mitsui's U.S. CEO

Only one thing seems to move faster than Scott Walker in Japan – that's the country's world-renowned Bullet Train.

Strap-hanging on a Tokyo intra-urban train with the 56-year-old CEO of Mitsui Seiki USA proves to be the best way to capture the thoughts of the peripatetic machine tool boss, now making his third roundtrip to Mitsui Seiki's headquarters in the past 30 days.



Scott Walker stands near the Buddhist shrine on the top of Mitsui Seiki's HQ.

As we roll down the track during the morning rush hour, Walker remarks to his traveling companions that long-distance travel has become a given in the world of global manufacturing. "I've flown to Japan just for a meeting, then turned right around to get back to the United States," Walker says matter-of-factly.

"I work 70 hours a week," he adds. "I have to, and so do the people who work with me. Manufacturing is a 24/7 business."

The pace of being an executive in a hard-charging envi-



An original Scott Walker painting can be found in the Tokyo lobby of Mitsui Seiki.

ronment doesn't manifest itself negatively in Walker's demeanor. The bespectacled, mustachioed Walker accents his understated, very Japanese business suit with an easy-going charm – a bilingual charm that he demonstrates when he facetiously switches conversations between an American visitor and a native Japanese passenger on the train.

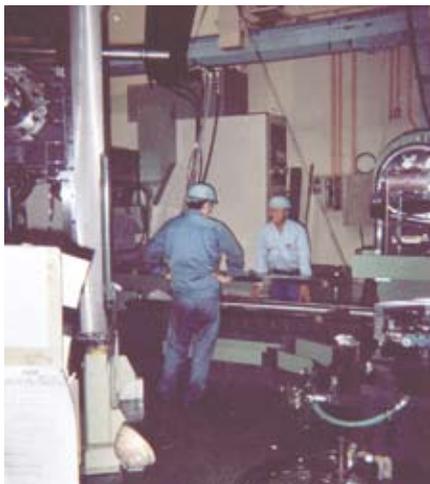
Industry insiders have observed that Walker is the ideal person for the Mitsui Seiki USA job. Colleagues agree. "Scott is Japanese in his way of thinking, and I am American in mine," says Masato (Mark) Yamaguchi, assistant general manager of Overseas Operation, Machine Tool Division for Mitsui Seiki Kogyo Co. Ltd.

That noted, it's important to point out that Walker delivers his point of view on the business to colleagues in a straightforward manner and backs it up with 30-plus years of experience not only at Mitsui Seiki but also at Okuma and Pratt & Whitney. "That's why they have me," says Walker, who holds engineering degrees from the Wentworth Institute/Massachusetts Institute of Technology and an MBA from the Rensselaer Polytechnical Institute.

As if the academic and business credentials aren't impressive enough, Walker can also lay claim to being a polymath among machine tool executives. He is a certified scuba instructor, a professional songwriter and musician, and a professional painter whose work is on permanent display in a New York gallery. His current passion is the shaping of his vineyard in Massachusetts' Berkshire Mountains.

You can find a painting of that vineyard in the lobby of Mitsui Seiki in Tokyo. Not surprisingly, it's an original Walker. – *Joseph F. McKenna*

builders and their subsidiaries are increasing. These are the necessary basic machines required for machining machine tool parts. This was being farmed out in the past.”



As far as machine tool output is concerned, the executives report that Mitsui Seiki is ‘experiencing some of the biggest backlog in our history because of the demand for our type of equipment. However, these facilities can quickly be “turned off” and we can reduce the expensive floor space if needed. Also, we are not planning to dramatically increase our employment but are becoming more efficient. Our goal is to increase our output 30 percent without increasing our employment levels. This allows us to survive when the market retracts.’

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Independent of fluctuating markets, of course, is Mitsui Seiki’s continuing commitment to the customer. “The No. 1 goal is customer satisfaction,” Abe declares. “While we don’t cultivate any particular market, we must respond accordingly to every particular market.”

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