

# Tiny Company Stuns the World with Unique Technology

## – Customers Include NASA –

Interviewer: Takamasu Kanji

Nakamura Yoshikazu, who has loved making anything by himself since his childhood, built a house all by himself at the age of 16. It was one year after he graduated from a junior high school. The house was built with materials procured at no cost – ranging from pillars to wall clay – and could be used for residence for as long as 40 years, he says.

Nakamura was hired through family connection by the Mitaka astronomical observatory (the predecessor to the National Astronomical Observatory of Japan), for which his father had served. He touched clocks and astronomic telescopes there. Nakamura was later hired by a telescope maker before establishing his own firm at the age of 35. He has since developed a variety of optical precision instruments such as telescopes, measuring equipment for satellites, floor stands for neurosurgical microscopes, and precision measurement equipment. A certain kind of special mechanism is installed in each of the products, says Nakamura, an active engineer still at the age of 75. He speaks of various topics in an interview conducted in the company's brand-new building, completed in October 2006.



## Backstreet Factory Aids Space Shuttle

Mitaka Kohki became well known after the company supplied NASA (the National Aeronautics and Space Administration) with a monitoring camera system for space shuttle craft in 1978. How did you get involved in NASA's space program? (Photo 1)

Nakamura: We filed a bid for a NASA tender along with two major Japanese companies. NASA adopted our product after a full year of tests on prototype products offered by the three bidders. It might be a surprise to Japanese society because our company was a dwarf compared with the two rivals. But we had accumulated expertise on various devices and instruments used in space from the early stage of Japan's rocket development initiated by Mr. Itokawa Hideo (Japan's pioneer in rocket engineering) at the University of Tokyo. NASA demanded



Photo: Takamasu Kanji

Mitaka Kohki Co. Chairman Nakamura Yoshikazu poses at a company plant: Maintaining passion for manufacturing

equipment capable of functioning in a severe environment at minus 150 C. Tests showed only our product resumed functioning at minus 160 C after ceasing functioning at minus 170 C. I hear our rival products stopped functioning at minus 120 C and failed to resume functioning after resetting the temperature condition.

**What made Mitaka Kohki differ from the rivals?**

Nakamura: The biggest difference was that we made the shaft of our camera-driving device taper down to a point. Both competitors used an even-shaped shaft. Our expertise is not the type of information that can be pulled out of textbooks. As you know, any metal can bloat or shrink upon temperature changes. We had foreseen that the shaft's joint would stop working as the temperature goes down because different metals bloat or shrink at different rates. So we had the shaft shape taper down. This is one of what I say are special gimmicks. Besides, I added a self-destructing device to the system so as not to damage the spacecraft itself in the event of trouble.

## Challenge to New Frontiers

Mitaka Kohki later began to produce floor stands for neurosurgical microscopes. This means the company branched out into a fairly different business field. How and why did you begin production of medical equipment? (Photo 2)

Nakamura: Very minute work is conducted during neurosurgical or any other present-day surgical operations.



Photo 1 Photo: Mitaka Kohki  
Mitaka Kohki's special video camera mounted on the space shuttle Columbia

Photo 2



Mitaka Kohki develops the world's first overhead microsurgical stand that can be positioned over a surgeon from behind.

For example, surgeons sew up blood vessels while watching the patient's diseased part through a microscope. We first received an inquiry from a neurosurgical doctor at Kyoto University, who said Japan's reliance on foreign models for microscope-mounted surgical apparatus might jeopardize the situation here in the event of import stoppage caused by an international contingency. This prompted us to launch development of microscope floor stands. Then, in 1986, the president of Leica Camera AG of Switzerland visited our company and proposed to jointly develop a microscope for neurosurgical operations.

We created sufficient space to give surgeon a free hand while hanging microscope overhead from behind. And we developed a system under which a microscopic focus lock was maintained while the microscope moved in a circular manner from the point of support. Bleeding is unavoidable during a minute manual surgery that uses a microscope. Our product made it possible to cope with such an event quickly and resume a surgical operation.

We began marketing our first product two years later in 1988. The model was named the Space Pointer Cygnus after the Cygnus constellation. The floor stand looks like a swan, doesn't it? The product drew major attention. We entrusted its global sales to Leica Microsystems.

### But you had never entered an operating room by that time, right?

**Nakamura:** Of course, the medical equipment field was an unknown one for me. But by then I had accumulated expertise on how to operate astronomical telescopes easily and smoothly or how to lock the camera focus. I asked Kyoto University surgeons to allow me to observe surgical operations in detail and worked out solutions to various problems. My most basic philosophy in manufacturing is to make products needed by people. This is the most important point. If we make products that will remove inconveniences or respond to desires, they will be sold. It will then become a business.

### The floor stand is a large device. What is the current level of production?

**Nakamura:** Currently, annual sales stand at around 250 units. Most of them are for export to the United States and Europe. We have captured a 70% market share in the United States. But we have shipped only less than 10 units to the Japanese market.

### Why are the Japanese sales so small?

**Nakamura:** I think the Japanese people tend to have much trust in big manufacturers. State-run and public hospitals have set requirements about the level of capitalization for companies bidding for their equipment. A small maker like us cannot tender bids for procurements of high-priced equipment. This also may be one of the reasons.

Europeans and Americans see no problems in the size of producers. They would appreciate our products correctly once briefed on their unique technical details. Leica has put the corporate logo of Leica Mitaka in the products.

## Craftsmanship and R&D

**I hear another Mitaka Kohki mainstay product is a laser-probe measurement device. For what purpose is this device used? (Photo 3)**

Photo 3

Photos: Mitaka Kohki



This laser-probe measurement device directly measures such instruments as liquid crystal display patterns and aspheric-surface mirrors.

**Nakamura:** This is to make a 3D measurement, using laser beams, of the surface shapes of a variety of lenses or chips finely processed with laser beams. We began mass-producing the device in 1996. In the early stage of production, one glassmaker filed an inquiry with us if the device could confirm a lens 0.1 mm in diameter truly matches the size. The manufacturer said the lens was necessary to converge beams after they reach each cable end at the point of connection with a fiberglass cable repeater. This is just an example and you need a precision measurement instrument to confirm if the shape or size of any precision product matches a designed level.

The principle is to detect differences of the focus by sensor and thus check the shape by emitting laser beams through a lens to the surface of the test object, with laser beams moving around the object. The auto-focus device is capable of making a 3D measurement. The latest model is capable of measuring with the precision of one-10th of a micrometer, or of the nanometer level. We have sold the laser-probe measurement device to many Japanese electronic and precision instrument producers. But shipment is restricted to Japanese manufacturers.

### Why is the shipment restricted?

**Nakamura:** I think if we exported the device abroad, Japan's manufacturing capabilities would be damaged. Domestic makers continue to compete

severely in R&D among themselves. One rival manufacturer went so far as to have its employees lurk in a car in our neighborhood to check visitors to our company and thus identify which competitor visited us. The competition is that severe.

## Contrived Employment Test

**What is the corporate structure of Mitaka Kohki that builds a number of such sophisticated precision machines?**

**Nakamura:** I established this company in 1966 after working for several firms. The company's workforce currently stands at 40. I am asked often why my company can do business with such a small number of workers. We will continue sticking to our original policy of avoiding outsourcing as much as possible and making our products carefully through our own efforts. I am afraid we might be unable to make high-quality products effectively if the size of our workforce expanded from the current level. I and my younger brother Katsushige, who is the president of the company, are in charge of R&D of new products.

**I hear Mitaka Kohki conducts unique employment exams under its own original policy. What kind of recruitment test is it?**

**Nakamura:** I never pay respect to academic records. In addition to a simple written test, applicants are asked to depict a ball because manual dexterity is required for manufacturing. Then they are asked to assemble model aircraft. Moreover, a fish meal is always served at lunch. I think an observation of each applicant's way of assembling and eating makes you find out if applicants are fit for manufacturing and if they can consider by themselves.

## A Turn to Manufacture and Future

**Do you love manufacturing by nature?**

**Nakamura:** My father was a janitor at the University of Tokyo. He took the charge of purchasing land when the university's astronomical observatory was to move to Mitaka, western Tokyo. There was some trouble with farmers there in talks to purchase their farmland. In my childhood, I stayed at home almost every day because I was bullied outside. And I produced various things at home. My father urged me to perform domestic chores and gave me many duties at home. I did my homework from a junior high school in the absence of my father. My father was really a maverick those days. But I have never hated my father for not allowing me to receive higher education. I would rather thank him for helping me turn to manufacturing.

After graduating junior high school, I worked on a farm for a while and then was hired at the Tokyo astronomical observatory. I engaged in the maintenance work of clocks and telescopes there for five years. I got on the right side of observatory staff. At one time, I wanted to know the mechanism of the oscillator of a quartz clock that measures the Japanese standard time. I got down 30 meters underground and opened the core box of the instrument. I was really chewed out at that time. But the observatory astronomers gave me many lessons. After I launched my own business, many of them visited my office, which turned into a kind of "salon." I think those ties with the excellent scholars are my precious property that cannot be replaced by anything.

The staff very kindly taught me anything if I posed questions to perform my duties. But I quit the

observatory because my pay would not go up due to my lowest-level academic career. I could not take care of my six brothers and sisters with such a small paycheck. So I got a job at a telescope maker.

I was 35 years old when I set up this company on my own. All of my three younger brothers and one of the younger sisters helped me. Among four sons of my father, I am the eldest. The second-eldest brother has already passed away. Katsushige, the fourth-eldest brother, is the president of the company, and the third-eldest brother serves as a senior managing director. I have remained unmarried and have no direct family members. But I have got along with my siblings happily.

**I hear Emperor Akihito visited your plant.**

**Nakamura:** In April 2006 the emperor visited the company that was housed in the previous shabby head office building. The emperor actually took a look through a neurosurgical microscope and posed a number of questions on how to operate the machine.

**Which path are you planning to follow in the future?**

**Nakamura:** I have joined a government-sponsored project to produce methanol from coal and natural gas by gathering sunlight. I have also taken part in another project to use sunlight to desalinate seawater. In both projects, lenses and light reflectors are the key elemental technologies in gathering sunlight efficiently. I think we need to promote over a very long term these two projects that would help preserve the global environment. **JS**

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