Unrivaled Technology Amazes Global Top Brands

– Developer of World's 1st Fully Automatic Knitting Machine –

Interviewer: Okabe Hiroshi

A decade ago, a technology developed in Japan astonished officials of the world's name brands like Hermes, Louis Vuitton and Gucci. They praised it as "a magic of the Orient." Knit products are usually made by cutting out knit cloth in patterns and then sewing them. The technology eliminates the "cutting" and "sewing" process and produces garments of complicated designs in a fully automatic operation. The technology, unrivaled in the world, was developed by Shima Masahiro, the founder and president of Shima Seiki Mfg., Ltd., who has continued efforts to improve a glove-knitting machine over half a century. Shima's business philosophy is to continue development with the spirit of "ever onward" in an effort to produce "people-friendly" goods. In this interview, Shima discusses how to nurture technology and raise corporate value while responding to questions about the company's intellectual property (IP) strategy.

Starting Point: "User-Friendly to the Environment and People"

Shima Seiki's head office cum plant is located in Wakayama City. The plant produces fully automatic, seamless flat-knitting machines, which the company calls *wholegarment* knitting machines. The computer-controlled knitting machine, 3-4m in width, automatically knits up colorful strings of yarn. A cardigan just knit up has not only buttonholes but pockets and pocket covers. In 1995, Shima Seiki put its wholegarment knitting machine on show at an international textile machine fair for the first time. What kind of imagination prompted you to develop a fully automatic, seamless knitting technology?

Shima: My main theme was being friendly to the Earth, and friendly to people. Conventional garments were all produced by making cloth, cutting it in patterns, and knitting them. Such a process leaves a large amount of wasted cloth and yarn. Manpower is also required for knitting work. The apparel

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industry used to be called a typically labor-intensive one. And production shifted to locations with low laber costs. I came up with the idea of developing a process that would never produce waste. There was no need to consider labor costs. I thought low-cost production in consuming regions must be possible. In other words, I had the idea of trying to break away from the conventional labor-intensive industry.

Shima Seiki says its wholegarment knitting machines could save the wool from 48 sheep in the production of 1,000 woolen garments, compared with production through the conventional cutting-and-knitting process. The amount of wool that can be saved would be enormous because of the huge global output of woolens and the large amounts of energy required for production. How user-friendly is the wholegarment technology in specific terms?

Shima: You can easily understand it if you wear a cardigan produced by the wholegarment technology. It is very light because there are no seams. It is also kind to the skin. It is very suitable for people with fragile skin and prevents bed-ridden people from developing bedsores. Seamlessness smoothens mobility and is good for sportswear. Wholegarment products are user-friendly clothing with a universal design.

Production in Consuming Areas Possible

Many Japanese corporations have shifted their production bases abroad in pursuit of low labor costs, particularly in China. Domestically, the hollowing out of production has become a matter of concern. This

Photo: Kyodo News

Shima's fully automatic, seamless flat-knitting machines called wholegarment knitting machines

tendency has especially been strong among labor-intensive apparel makers. Shima Seiki's wholegarment technology no longer needs the process of knitting, the main element of intensive labor, and may exert a major impact on the apparel industry.

Shima: Wholegarment products are light and produce wonderful silhouettes. Products knit out of fine yarn can form beautiful drapes that look as if they are waving in the wind. Many consumers think of knitwear as autumn or winter goods, like sweaters. But we can now offer knit products as materials for spring dresses that will form beautiful drapes. We are going to propose aggressively to Japanese apparel makers that they can produce such highly value-added products domestically. Paris was once called the world's fashion center. And many high-level haute couture houses were flourishing there. But France has finally seen a decline in domestic production. Only brand names have survived there. The development of the wholegarment machines has paved the way for makers to produce in Japan and Europe.

Out of every 100 consumers, 80% may be satisfied with ready-made products, but the remaining 20% will be dissatisfied, saying the clothes do not fit them or they dislike the colors or designs. Products made by wholegarment machines fit those consumers best. This technology enables manufacturers to produce in small lots to cope with consumer needs, while prices can be held down because there remain only a few unsold items. Unlike mass production in such low-cost countries as China, our technology offers makers a chance to produce in developed countries.

Shima Seiki has established its own design office and organized fashion shows – a unique practice for a knitting machine maker – in order to strengthen its planning and proposing capabilities in business deals with apparel makers. The company has developed a program that makes full use of computer graphics to display simulated knit product images with authentic-looking texture upon the input of such data as the variety of yarn, knit patterns and designs, without actually producing knit goods. The company uses the system to offer manufacturers product proposals.

Observe Before Taking Action

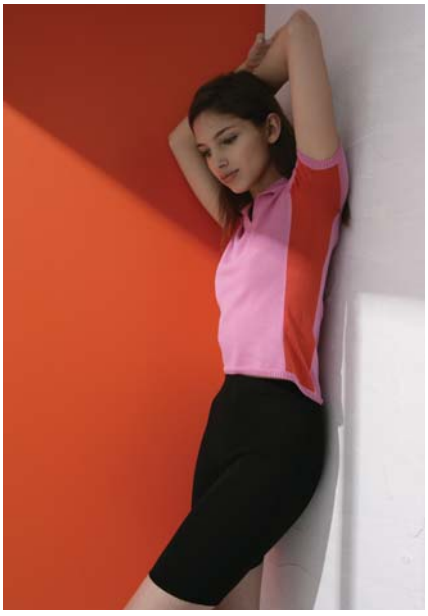
You acquired about 200 patents by the age of 18, and have remained enthusiastic about inventions. What kind of intention did you have about inventions? What kind of ingenuity do you have to make his spirit and passion take root in your corporation, Shima Seiki?

Shima: I have been engaged in the development of glove-knitting machines for more than 50 years. The most important part of our hands are the fingertips. With the conventional machine-knitting technology, it was impossible to round off glove fingertips which remained square-shaped. Manpower was necessary to make the fingertips round. But it was time-consuming. In addition, there were a number of labor accidents involving workers' fingertips being sucked into the machines in the process of putting the finishing touches after square-shaped glove fingertips were manually rounded off. I did make every effort to produce gloves which would not be caught up in machines so easily and which also make it easy for workers to take their hands off gloves when they got caught up in machines. I think my starting point was always to be friendly to people.

When I was a junior high school pupil, I was curious about the mechanism of the revolving wheels of a steam locomotive. So, one day I went to a railway station, and the station attendant there did not say, "Stay away. It's dangerous." He did not turn me away. But he did not explain the mechanism behind the wheels' motion. "Then, you should better observe fully with your own eyes," he told me instead. He allowed me to approach the steam locomotive. What is most important in technological development is to confirm by yourself when you harbor a question, as I did. I have always applied this philosophy in contacts with my staff. "Man is but a reed, the most feeble thing in nature, but he is a thinking reed." (As French philosopher and scientist Blaise

Photos: Shima Seiki Mfg., Ltd.





Models sport knit wear produced with Shima Seiki machines

Pascal put it,) what is new can be brought about after thinking continuously and by making creative efforts. I have always told employees to contribute to society through their work.

Don't Sell Patented Products for High Prices

The Ministry of Economy, Trade and Industry (METI) awarded Shima Seiki the minister's 2006 prize for IP achievements. The ministry praised Shima Seiki's creative technology and the high level of its patent-acquisition ratio, or the proportion of acquisitions to applications, 80-90% within Japan. In addition, the ministry gave high marks to Shima Seiki's high ratio of overseas patent applications to domestic applications, highly rating the company's global IP strategy. What do you, as an inventor, think about the relations between patents and actual business activities?

Shima: We are trying to offer our patented products to customers at the lowest prices possible. Many people are inclined to set high prices for their patented products. Our corporate customers would be happy to be able to acquire our patented new technologies for fair prices. I think this would eventually lead to consumer satisfaction. Customers would only be offended if the prices of patented products were too high. It is our consistent philosophy since the founding of the company to develop the technologies needed by customers, offer them at fair prices to be welcomed by them, and to go onto the next stage of development. We must contribute to society through our work.

What matters is how to do our work in order to meet the needs of the times. Our company tackled the automation technology from the late 1950s to the early 1970s to promote the development of flat-knitting machines for gloves and other knit products. From the late 1960s to the early 1980s, the use of computers in production facilities became a major theme. The textile industry was required to produce a wide variety of products in small quantities after the global oil crises of the 1970s pushed it into a depression. In those days, we came up with the concept that led to today's wholegarment technology. I think it was thanks to such technological capabilities that Shima Seiki could compete with leading European makers in the global market.

IP Closely Linked to Manufacturing

The government aims at making Japan an IP-oriented country and is promoting comprehensive policies to achieve the target. How do you view those government policies?

Shima: This country is poor in natural resources, so we need to use an inexhaustible resource – creativity – in manufacturing. IP can be created only at the frontline field of manufacturing. Either design or new technology can be born only at manufacturing sites. New business opportunities can then emerge. I think Japan's IP strategy forms the core of manufacturing. It is fine for the gov-

ernment to make all-out efforts to strengthen its IP strategy and to shorten, for example, patent examination periods.

The government is trying to promote the transfer to businesses of university-held technologies via a separate transfer organization in order to strengthen the industry-academia alliance. Notably, state-run universities which have turned into independent administrative institutions are making efforts to promote collaboration with the private sector. How does industry regard those moves?

Shima: Partnership with universities will be more and more important from now. I suppose that it would be attractive, even from a management point of view, for small and medium-sized companies, which are relatively weak in the technological field, to take in university-developed technologies. However, to speak of my own experiences, universities and frontline business corporations differ in the sense of speed and cost. Universities conduct their R&D in the absence of a time limit or deadline. I think universities should make better use of their advantage of no short-term time restrictions to promote basic research which the private sector cannot challenge easily. What is important, I believe, is to create a mechanism that will make universities complement the private sector in basic research.

No Single Person Can Do Corporate Research

Chemical maker Nichia Corp. has reached a court-mediated settlement with its former employee, Nakamura Shuji, currently professor at the University of California, Santa Barbara, who sought remuneration for his role in developing Nichia's blue light-emitting diode (LED) technology. The Tokyo District Court had ordered Nichia to pay ¥20 billion to Nakamura. Under the settlement negotiated at the Tokyo High Court, Nichia agreed to pay him ¥840 million. This was one of a series of lawsuits involving corporate researchers seeking large remuneration for their major inventions that led to a boost in corporate earnings. Corporations have increased rewards to researchers or offered better working conditions for them. But there still remains a large perception gap between corporations and their hired researchers over remuneration.

Shima: Many years ago, we created rules to have invention-boosted corporate earnings reflected in employees' paychecks and also established a mechanism to treat an inventor as the leader of a development team. But what is important is the developer's mental attitude. There are many cases of corporate inventions that are the results of cooperation among many people and of suggestions from colleagues at the scenes of corporate R&D. There are few cases of inventions based on a single developer's ideas alone. When I come up with an idea, I visit the frontline scene and give advice to researchers. In some cases, employees are successful in achieving actual development with such advice. Employees can find something to live for in such a way of working. I suspect such a peculiar case (as Nichia's) emerged after an invention was given a low inhouse rating and was eventually ignored in the company.

What is your management principle to keep Shima Seiki a technological development-oriented firm?

Shima: I always tell newly recruited employees that they can only work for 10,000 more days. People absolutely differ in their ways of living depending on whether they are aware of the length of their working life or not. Something can be created if people maintain the spirit of "ever onward" to try to achieve some progress every day. People can produce nothing even in 10,000 days if they do not try to achieve progress every day. JS

Okabe Hiroshi is a business news editor at Kyodo News.