

The Pen Is Mightier than the Mouse – on Displays

Interviewer: Takamasu Kanji



THE Wacom brand swept Hollywood as a computer graphics (CG) production tool, to hold 70% of the world market. Since the sale of its first computer-aided design (CAD) product in 1984, the company has grown through specialization in electronic pens for computer data input. From movies, animation, desktop publishing (DTP) and games to automobiles and architecture, the range of pen tablet utilization has continually widened, and is now spreading to general households as a communications tool. While the keyboard and the mouse have long been the premier devices for inputting data into computers, Wacom aims to utilize electronic pen input technology to convert the man-machine interface into a human interface that will allow the full expression of human sensitivities. We interviewed Yamada Masahiko, the President and CEO of Wacom, one of the few companies in the Japanese computer industry to successfully establish a global operation.

What kind of products did you make at first?

Yamada: Wacom started as a venture business in 1983 with an engineer researching electronic processing of photo-type setting. We developed a CAD device using a pen-based solution and its software in the following year, and put them on the market.

CAD was still in its initial stages in the early 1980s. At that time, it was known as the name of “digitizer” in the computer industry, and 24 or 25 companies around the world were engaged in its development. Although our company was a late entrant and small in scale, we recognized the potential for the electronic pen and sensor board input system based on electromagnetic induction phenomena from an early date, and decided to concentrate our development efforts in hand-drawn CG production on the assumption that it would help people input data more freely. We eventually came up with the concept of “graphic tablets.”

After placing your focus on CG, what kind of growth did you see?

Yamada: The term “CG” did not exist at the time. People were excited at super-computer testing in which a 3D image of a ball bounced on a screen at a university research lab. The images were still in black-and-white.

We developed the Electro-Magnetic



Resonance (EMR) sent and position technology to perform data input. At the SIGGRAPH 1987, we demonstrated the system of hand-drawing pictures with a computer. Everyone thought it was interesting, but they said the technology was not practical because no software was available. So we created simple CG software, and took it to trade fairs in North America, and to 50 or 60 software development companies, including Adobe, Corel and Alias.

Can you explain the EMR sent and position technology that you developed in simple terms?

Yamada: Electromagnetic induction phenomena, in which changes in a magnetic field cause an electric current to flow, have been known for a long time, dating back to Michael Faraday in the United Kingdom around the middle of the 19th century, and its principles have been applied in the development of power generators and motors. In regard to its application to pen tablets, the current is run through wires embedded in a grid pattern inside the sensor board. This generates a magnetic field and when a pen containing a coil and condenser is brought near this tablet, the energy resonates with a tank circuit in the pen. When the current in the tablet is switched off, the energy in the pen’s resonance circuit is transmitted to the sensor board. This is called electromagnetic resonance.

The current is switched on and off 50 times per second. The sensor records the characteristic changes in the pen’s magnetic field, and the movement of the pen on the tablet is drawn on the display. In essence, the tablet and the pen are playing signal catch with each other. Because the sensor is capable of catching the subtleties in the pen’s pressure and its angle, you can draw thin and thick strokes typical of handwriting, and even the splotching of ink. This means that the old analog technique can be recreated using digital technology. If the “eraser” on the pen bottom is brought in contact with the tablet, the previously drawn strokes can be easily erased. I

think this is an elegant technology. We have obtained some fairly comprehensive patents for this technology.

Which company was your first customer for the pen?

Yamada: It was Disney's first CG animation movie, *Beauty and the Beast*, in 1991, which brought our product's wider adoption. The quality of this film was broadly recognized, and soon many film production companies and animation production companies in Hollywood started to adopt our product. Disney is still our largest user even today.

Adobe, Alias, Corel and other software makers developed excellent software for application in various fields, and the electronic pen's application has spread broadly into the game and other CG production sectors. Lately, its use has spread to the industrial sector, including automobiles, fashion and architectural designs, and even to the advertising industry.

When President Bill Clinton signed the Telecommunications Act of 1996, he used one of our pens. It was the basic law for the Internet era that was just starting, and the use of an electronic

pen was widely seen as a symbolic event. Our affiliate company in the United States got a sudden call from the White House, and its publicity contributed greatly to our company's fortunes.

What kind of technical improvements did you make?

Yamada: The first generation pen had a built-in battery that made it big and bulky, but we were able to get rid of the battery, making it nearly as easy to use as an ordinary pen. We inserted a chip into the pen that controls the thickness and color of the line, and also developed a small pen for mobile equipment. We are currently in the fifth generation.

What kind of advantages does the pen have as an input tool?

Yamada: CG industry professionals at movie production sites, for example, keep four or five pens set in various stroke thicknesses and colors at hand, and switch rapidly from one to another as they sketch the images onto the tablets as they pop into their heads. This situation is just like that of the artistic painter who keeps a lot of brushes on hand when

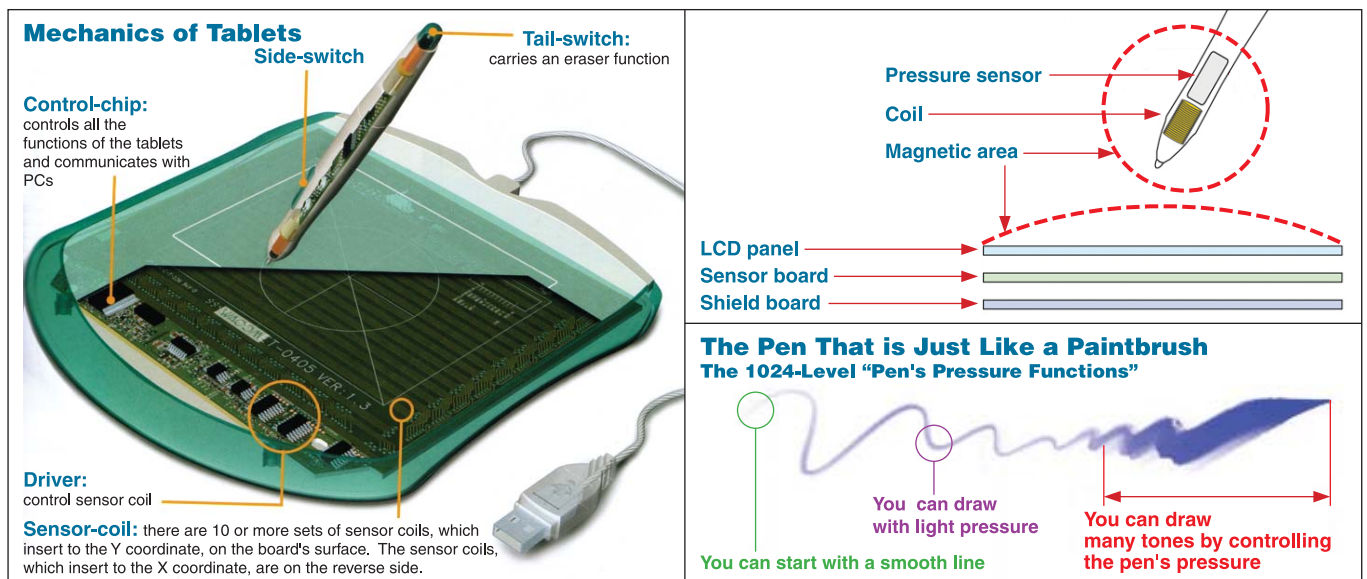
working on a canvas. CG designers are afraid that the ideas might disappear while they change the pen's setting each time. They are probably not even completely aware that they are using electronic pens. The pens are tools for expressing the designers' sensibilities.

What is more convenient than writing on paper is the ease of making corrections. Since lines can be erased merely by reversing the pen and touching the tablet, there is no messing up the paper or ripping it up and throwing it away.

Another major benefit is that the hand-written document can be transmitted without any other changes in format.

What kind of developments have you made as PC functions have improved?

Yamada: At first, Mac power users started to use our pens to draw computer graphics. Later, with improvements in computer performance and the advent of the Internet, our user base expanded to include individual and freelance designers. The spread of Windows, the appearance and price-reduction of digital cameras and broadband have boosted the market for our products to general users.



Source : Wacom Co., Ltd.

How are general users utilizing your products?

Yamada: At present, nearly all of our general users are young people. In Japan, in particular, people in their teens and 20s are using the pens to draw illustrations and *manga*. One site that displays illustrations has had more than one million hits; you can receive five or six comments one minute after the image is uploaded.

There are also people using the pens to make adjustments to photographs taken with digital cameras. Sending out images with attached comments is also popular. I think such uses are still in their infancy and will surely expand in the future.

What kind of uses are there besides CG creation?

Yamada: An area showing recent expansion is medical sites. Medical charts, CT scan images and MRI images are shown on a display, and instructions for the affected parts or treatment methods can be handwritten on top of them, and then saved on a computer. Such methods can increase persuasiveness when explaining situations to patients, and 130 large hospitals in Japan have already introduced the system.

In conferences and lectures, electronic pens are used to write freely on top of

explanatory material created on Power Point, which is far easier to understand than merely showing a graphic, and allows the most important points to be emphasized. The minutes of meetings can be taken down in exactly the same way as on paper, and can be sent by e-mail with far less trouble and much more quickly than by fax or scanning them into a computer for transmission.

In Japan, the use of pen tablets is beginning to appear in supplementary after-school courses. Teachers and students can go on the Internet to talk about questions in real time, and the teachers can visibly point out where the students have made mistakes in their homework, or where they did particularly well.

Japan's police and firefighters are also using the electronic pens at sites when responding to emergency calls. They can take down handwritten notes of the situation at the accident locale, and send them to a nearby patrol car or fire station.

As you can see, demand for the electronic pen as a communication tool is expanding fast. There may even be some uses of the pen out there that we are not yet aware of, and surely new uses will appear in other fields that we have not even imagined.

Elsewhere, in the security area, signatures using electronic pens can accurately record information such as pen pressure or writing habits, and should therefore be an effective method for the prevention of forgery in biometrics. Recently, we

teamed up with Shachihata, a major stamp manufacturer, to develop an electronic stamp, and we expect that it will be powerfully effective when used in combination with signatures and PIN numbers.

Can you explain the market composition and business developments?

Yamada: Our sales in FY 2004 reached ¥17.6 billion (\$150 million), of which 70% was generated in foreign markets. Expansion in the Asian market has been very rapid recently. In 2003, we were listed on the JASDAQ Securities Exchange. Presently, we have 450 employees, with 100% wholly owned overseas subsidiaries in Vancouver (the US state of Washington), Krefeld (Germany), Cambridge (the United Kingdom), Beijing (China), Seoul (South Korea), and North Ryde (Australia). We have been targeting overseas markets since the mid-1980s, and in every location we have been blessed with software and hardware partners of long standing.

Whenever we set up an affiliate company, we send out people from Japan, but as soon as the firm is operating smoothly, we turn over all operations to local people. It is our basic policy to put local people in charge of the market in their regions. Of course, we are in daily contact by telephone conference or by using pen tablets. Four times a year, we have the heads of the affiliate companies come to Tokyo to meet everybody face-to-face, and to determine budgets, business policy and other strategies.

What sort of system do you use for technology development?

Yamada: We conducted all the software development ourselves in Japan at the beginning, and 130 of our then total 200 employees were engaged in technology development. Today, the head office in Japan concentrates on the core hardware and medical software development, with software development for professional use in movies and animation production in the United States,



Photo : Wacom Co., Ltd.

and development of software for mobile devices such as cell phones in the United Kingdom. Out of a total of 450 employees, the number of staff engaged mainly in development is about 70. For equipment manufacture, about 90% is consigned to partner companies in China and Taiwan.

What is your product sales ratio?

Yamada: A general overview of the ratio would put products for professionals at 30%, products for general users, 20%, LCD tablets, 20%, and OEM sales of pen tablets as components, 20%. In the future, we expect to see more companies moving into the mobile device and LCD tablet sectors, which would lead to an expansion in component sales.

There are already 37 models of LCD tablets with sensor boards mounted on the back of a liquid crystal display sold by 17 different companies, with China's Lenovo the most recent company to decide on mass production. We manufacture sensor boards designed to match the display sizes used by the various companies. Since the next Windows operating system Vista, slated to go on sale in 2006, will carry an LCD tablet function, we can expect that electronic pen input will become common even on the desktop.

In cell phones, PDAs and other mobile devices, the pen input function can surely no longer be ignored. For example, memos could be attached to photos taken with a cell phone and then sent by e-mail, or games could be downloaded and pens used to play them, all ideas that should be obvious. Pen input is particularly convenient for such small displays. We have already developed a pen with a compact built-in chip for cell phone use.

Do you think your products have already achieved a global standard for pen input?

Yamada: No, not yet. We are working toward a unified technology where Wacom pens can be used to write text

and draw pictures and then sent, on every possible kind of display device, from the desktop to mobiles, which would surely be a de facto global standard.

After you joined the company, what sort of things did you handle?

Yamada: I studied at Tohoku University in Japan, majoring in resource engineering. I studied crystal analysis using lasers. Partway through school, I spent several years at the University of Munich in Germany where, rather than concentrating on studies, I tried a lot of different things and made a lot of friends. That experience was probably the reason I was ordered to set up branches overseas. At the time, our company did not even have a typewriter. I studied business from the ground up, and set up affiliate companies in Germany first, and then the United States. With that history, I was able to meet some marvelous software developers and manufacturers, and all of them have become long-time acquaintances.

What kind of company do you want to have in the future?

Yamada: I think that most people do not want to handle a computer per se – what they want is to use the computer as a tool to express something. Therefore, I think that PCs will be increasingly recognized as stationery tools. The pen input method, as an interface between the computer and people, has greatly expanded the possibility of the keyboard and mouse, and simplified the expression of people's sensitivities.

We will be thrilled if in the future the people of the world would feel the advent of the electronic pen was a good thing. We are moving closer to that goal by trying to achieve harmony between technology and people's sensitivities. After all, the "wa" in Wacom means "harmony" in Japanese. **JS**

Takamasu Kanji is an editor and biographer. He is also a senior advisor to the foreign editor of the New York Times.

Photos : Wacom Co., Ltd.

