

Topics

TM Series Tabletop Microscopes: Creating a New Market, Initiatives for Social Responsibility

—Advancing Electron Microscopes with Improved Usability and Accessibility—

INTRODUCTION

RELEASED in 2005, the TM series of tabletop electron microscopes manufactured and marketed by Hitachi High-Technologies Corporation are designed to combine the resolution of an electron microscope with the ease-of-use of an optical microscope. Since the TM series models have few installation environment restrictions and are easy to handle they are in widespread use among new electron microscope users such as private-sector companies, universities, government offices, and science museums. Sales have exceeded 3,300 units (as of January 2016).

With their compact size and simple operation, the TM series models are being brought to various events and sites such as science museums, elementary schools, and junior high schools, giving children the chance to experience the micro-world. Seeing the micro-world for the first time gives children the chance to become interested in science, helping foster the next generation of scientists who will further the advance of science and technology in the future.

This article describes the development concept of the TM series, how the series is creating a new market, and how the Hitachi High-Tech Group is using the series in its corporate social responsibility (CSR) activities.

TM SERIES DEVELOPMENT CONCEPT

The development concept of the TM series was to create a series of cutting-edge microscopes enabling easier operation and greater accessibility. The series went on sale in April 2005 (see Fig. 1).

Electron microscopes have come into widespread use, being used as a tool for applications such as research and development (R&D) and product quality control in various fields. However, restrictions on electron microscope installation environments previously made it impossible to install them in school science labs or corporate offices. Samples also had to be placed in a vacuum, requiring sample preprocessing that demanded time and experience.

However, around 1991, Hitachi High-Technologies added a variable pressure scanning electron microscope (SEM) to its SEM lineup. This SEM model enabled observations with a sample chamber pressure ranging from a few pascals to about 260 pascals, enabling observation of samples containing moisture or oil and dramatically increasing the number of SEM users. Inspired to give more people the chance to experience the micro-world, Hitachi High-Technologies started developing SEM models with simple, easy operation. Eventually the company developed the TM series, a lineup of tabletop electron microscopes that can be easily installed even in school classrooms. TM series models can be operated just by connecting them to a standard 3-socket 100-volt alternating current (AC) wall outlet, and eliminate the need for time-consuming sample preprocessing. They also provide a carefully selected lineup of functions for observation, resulting in most operations being automated. These features let even first-time users operate TM series models as easily as a digital camera, enabling operation by children and adults alike regardless of experience.



Fig. 1—TM3030Plus Tabletop Microscope.
The TM3030Plus is a tabletop-sized electron microscope, giving it few restrictions on installation locations.

HOW THE TM SERIES IS CREATING A NEW MARKET

When first released, the TM series models were simply instruments for observing enlarged images of sample surfaces. But as sales increased, users began asking for features such as the ability to observe samples being cooled, or to analyze sample compositions. To meet these needs, optional features were added such as a cool stage enabling sample cooling and an X-ray analysis unit. The ease-of-use of the TM series resulted in increasing use for quality control on manufacturing sites that had previously used visual inspection or optical microscopes for this purpose. And, with its easy operation and lack of installation environment restrictions, the TM series is being used by elementary schools, junior high schools, and other educational institutions, as well as facilities such as natural history museums, science museums, and theme parks.

Since TM series models are compact and lightweight (model TM3030 weighs about 63 kg), they can easily be brought to a variety of event sites. Naturally, they can be brought to elementary schools or junior high schools, and they are being used in science guest lectures provided through CSR activities by various groups. These initiatives are letting a greater number of people experience the micro-world through electron microscopes.

The next chapter discusses how Hitachi High-Technologies is using the TM series in its CSR activities.

USING THE TM SERIES IN INITIATIVES SUPPORTING CSR ACTIVITIES

To support the activities of organizations that actively plan and organize original educational programs designed to familiarize children with science, the Hitachi High-Tech Group has been lending TM series models since the series was first released. To give preschoolers and students opportunities to experience

the micro-world, the Group has recently been actively participating in several events organized by science and technology institutes, such as the Hitachi Science Seminar on Electron Microscopy, and the Concours of Schoolchildren's Inventions, along with the Nippon Cultural Broadcasting radio program Masaki Omura's Science Kids. Hitachi employees are also engaging in CSR activities tied to local communities by visiting elementary schools and junior high schools to provide guest lectures using TM series models (see Fig. 2).

These activities are not limited to Japan, and are also being actively implemented in the USA. Hitachi High Technologies America, Inc. (HTA) is helping promote the STEM field education being advanced by President Obama (STEM stands for science, technology, engineering, and mathematics). STEM field education is being emphasized as a way to train the human resources needed by science and technologies fields, and the key to making the USA stronger as a nation. HTA is an active participant in events organized by schools and science museums, routinely bringing the TM series to sites to give visitors hands-on experience of the micro-world and the equipment. From September 2011 to December



Fig. 2—Science Museum Electron Microscope Event. Hitachi High-Tech Group provided assistance for an exhibition held at the Hamagin Space Science Center that introduced children to the micro-world by demonstrating how microscopes magnify small objects.

2015, HTA took part in over 500 educational support activities throughout the USA.

The Hitachi High-Tech Group will continue to use the TM series in educational support activities throughout the world, helping the advancement of science and technology.

CONCLUSIONS

This article has described the development concept of the TM series, how it is creating a new market, and how the Hitachi High-Tech Group is using it in its CSR activities.

The Hitachi High-Tech Group will continue to provide opportunities to experience the micro-world, letting more children become inspired by the wonders of science, and helping instill an interest in science and technology. It will continue to meet the responsibilities we have as a corporate citizen by making ongoing contributions that draw on the business characteristics of the Hitachi High-Tech Group.

REFERENCE

- (1) S. Ara et al., "Support for Use of Tabletop Microscopes in Science Education," *Hitachi Review* **62**, pp. 437–443 (Oct. 2013).

ABOUT THE AUTHORS



Masahiko Ajima

Electron Microscope Systems Design 2nd Department, Science Systems Product Division, Science & Medical Systems Business Group, Hitachi High-Technologies Corporation. He is currently engaged in the design and development of W-SEMs.



Daihei Terada

CSR Promotion Group, CSR & Corporate Communications Department, CSR Division, Hitachi High-Technologies Corporation. He is currently engaged in CSR work (support for science education) aimed at preventing the drift of students away from science and technology.



Robert J. Gordon

Hitachi High Technologies America, Inc. He is currently engaged in the marketing of tabletop microscopes in the USA, Africa, and the state of Israel.