

R&D and Intellectual Property Report 2007



Table of Contents

| TO OUR STAKEHOLDERS | 1 |
|------------------------------------------------------------------------------------|----|
| Hitachi Group Overview | 2 |
| I. Introduction | 4 |
| II. Hitachi Technology Management | 4 |
| 1. What Hitachi should be | 4 |
| 2. Technology management approach | 4 |
| 3. Technology management support system | 5 |
| III. Intellectual Property and R&D in Main Target Businesses | 7 |
| 1. Industry-leading disaster response system and improved durability elevators | 7 |
| 2. High-density 2.5-inch hard disk drive based on perpendicular magnetic recording | 8 |
| 3. IPS liquid crystal display (LCD) | 9 |
| IV. Research and Development | 11 |
| 1. R&D strategy | 11 |
| 2. Organization of R&D as a hub for the Hitachi Group | 12 |
| 3. Highly reliable, low-cost MONOZUKURI capability | 13 |
| 4. Serving a global market | 15 |
| V. Intellectual Property | 16 |
| 1. Intellectual property rights | 16 |
| 1.1. Basic policy in IP strategy | 16 |
| 1.2. Patent strategy | 17 |
| 1.3. Patent exploitation strategy | 19 |
| 1.4. Invention reward system | 20 |
| 1.5. Trade secret management | 20 |
| 2. Brand management | 21 |
| 2.1. External activities | 21 |
| 2.2. In-house activities | 24 |
| 2.3. Measures against counterfeit products | 25 |
| Reference 1. Group Companies listed in Japan-US Patent Data | 26 |
| Reference 2. Major External Awards & recognitions | 27 |

TO OUR STAKEHOLDERS

In November 2006, the Hitachi Group announced a new corporate strategy based on a basic policy of profit creation and a rigorous market-oriented approach to achieve a stable and high profit structure (with a consolidated operating margin of 5%) by FY 2009. Through this new strategy, Hitachi will work to meet the expectations of all stakeholders.

Four key initiatives have been identified in the new strategy: high-profitability through rigorous FIV*-based management; building a stable, high-profit structure; evolution of Group management for high profitability, and innovation through collaborative creation.

In 2010, the Hitachi Group will celebrate its 100th year since establishment. Over the past century, the Hitachi Group has grown under the corporate philosophy of "contributing to society through technology." As we face this important anniversary, Hitachi will strive to become a value-added company appreciated by its customers, shareholders and society, through full use of its collective strength based on innovations resulting from the broad technical knowledge and expertise of the Hitachi Group and the collective awareness towards change by each and every employee.

The R&D and Intellectual Property Report, in its fourth year, summarizes Hitachi's efforts in R&D needed to realize this high added-value, and Intellectual Property, which is the fruit of R&D.

We hope that this report will provide some insight into the Hitachi Group stance and initiatives in "R&D" and "Intellectual Property."

Thank you for your continuing support.

June 2007

Kazuo Furukawa President, Chief Exective Officer, and Director

 * FIV: Future Inspiration Value FIV Hitachi's internal economic value-added evaluation index in which the cost of capital is deducted from after-tax operating profit.
** <u>http://www.hitachi.co.jp/New/cnews/month/2006/11/1116/f_1116pre.pdf</u> http://www.hitachi.co.jp/New/cnews/month/2007/05/f_0528a.pdf

Hitachi Group Overview

Company Profile

Corporate Name: Hitachi, Ltd.

Incorporated: Incorporated February 1, 1920 (founded in 1910) Head Office:

1–6–6 Marunouchi, Chiyoda-ku, Tokyo 100-8280, Japan Representative:

Kazuo Furukawa, President and Chief Executive Officer

Hitachi Group Profile

Hitachi, Ltd. and the Hitachi Group make up a corporate group consisting of 1,100 companies, including 450 consolidated subsidiaries within Japan, and 484 overseas, and 79 affiliated companies in Japan that use the equity method and 86 outside Japan. In terms of business activities, there are seven business units, as indicated on Page 3, with revenues of about 10.2 trillion yen. The Group employs about 380,000 employees.



As of March 31, 2007

Capital Stock: 282,033 million yen

Number of employees (unconsolidated basis): 41,016 Number of employees (consolidated basis): 384,444 Number of consolidated subsidiaries:

934 (Japan: 450, outside Japan: 484) Number of affiliated companies that use the equity method: 165 companies (Japan: 79, outside Japan: 86) Period: Fiscal year ending March 31, 2007 (consolidated basis) Revenues:

10,247.9 billion yen (108% compared with the previous year) Operating income (loss):

182.5 billion yen (71% compared with the previous year) Capital investment:

1,048.5 billion yen (110% compared with the previous year) R&D expenditure:

412.5 billion yen (102% compared with the previous year) Overseas output as a percentage of consolidated net sales: 22%

> See Web site for economic performance reports. http://www.hitachi.co.jp/IR-e/index.html



Revenues by Industry Segment in Fiscal 2006 (billions of yen)



Total Sales by Industry: 11,796 billion yen Consolidated Net Sales: 10,247 billion yen

Financial Results (consolidated basis)



I. Introduction

The purpose of this report is to provide information about R&D and intellectual property (IP rights and brand), which are the main components of technology management for Hitachi, Ltd. and its affiliates.

This report covers the period from April 1, 2006 to March 31, 2007 (FY 2006), as well as new measures and organizational changes at the start of FY 2007.

II. Hitachi Technology Management

1. What Hitachi should be

We are at the dawn of a new era in which information can be transmitted anytime, anywhere, and between anyone. By making better use of information networks, the barriers among enterprises, communities, and individuals are being broken down to create new values that combine and converge in a new "ubiquitous information society." The Hitachi Group is creating value for this new society through a combination of expertise in various business areas and information technology, and thus contributing to the wealth of communities. The Hitachi business concept of "uVALUE" expresses our determination to create optimal value by combining business and information technology. The word "uVALUE" was originally coined by Hitachi to express the interconnection between business, life, and community. Creating value in the ubiquitous information society is Hitachi's way to bring value to customers. Hitachi will continually strive to create new value as the best solutions partner for customers.

Based on this concept, Hitachi will give full play to its true collective strengths to provide society and customers with new value and to continually breathe new life into succeeding generations of the corporate Group. Hitachi's motto of "Inspire the Next" will remain the Group's steadfast mission.

2. Technology management approach

To achieve a stable, high-profit business portfolio, Hitachi is building up the "Social Innovation Business," which relates to social, industrial, and life infrastructure systems that support our daily necessities. In addition, these businesses strengthen information infrastructure systems, create new lifeline solutions through combining infrastructure systems, and enable the creation of globally competitive products and services through concentrating high technology and expertise. In the "Infrastructure Technology and Products Business," Hitachi is maximizing synergies with the "Social Innovation Business" through high functional materials and other differentiated technologies. To ensure success, Hitachi is promoting research and development, intellectual property, and business as a triad of strategies based on the following approaches.

- Create Innovation on strong businesses that emphasize R&D investment.
- Globalize business activities through full emphasis on market-oriented approach in the world's growing social infrastructure markets.
- Capture synergies between businesses to create new value from the diverse management resources within the Group.



Figure 2.1 Collaborative Creation and Profits

3. Technology management support system

R&D within the Hitachi Group is supported by the corporate R&D Group of laboratories and the divisions within business groups and Group companies where products are developed directly. Some Group companies have their own independent research laboratory and structure. As of April 2007, the Group has a consolidated total of 5,951 people working in research and development. To strengthen collaboration between corporate R&D, and the R&D of business groups and Group companies, Hitachi is promoting the integrated management of common technologies.

The Intellectual Property Group is responsible for the acquisition of patent, design, and trademark rights, and the protection of copyrights and trade secrets. The IP Group works in close cooperation with R&D divisions and other related company offices. In particular, to ensure close cooperation with researchers in the acquisition of essential patent and design rights, the IP Group has five offices along with eight divisions that are categorized by technology field.

The Corporate Brand management positions the Hitachi brand, which is a common Group asset, as an important management resource to support competitive strength. Each business group and Group company has a brand manager who works closely with the Corporate Brand management to implement brand policies and promotional activities.

The Corporate Technology Office cooperates closely with business groups and Group companies to share technology information, to decide strategy for the entire Group, and to propose and develop activities that will promote synergies among Group businesses.

These organizations related to R&D and intellectual property are working together to actively promote the sharing of information (e.g., technology, intellectual property, market) and thereby create new value through the synergies of sharing.

-5-



Figure 2.2 Technology Management System (As of June 2007)

III. Intellectual Property and R&D in Main Target Businesses

Hitachi is strengthening advanced technology further and giving full play to collective Group strengths for creating products that can maintain the No. 1 or No. 2 market share in their respective segments. These efforts have contributed to solutions in the "Social Innovation Business" and "Infrastructure Technology / Products" (See in previous section) for both Japanese and overseas markets. Below are three examples of excellent product solutions.

1. Industry-leading disaster response system and improved durability elevators

The earthquake that struck northwestern Chiba Prefecture on July 23, 2005 registered a seismic intensity of five on the Japanese scale and caused about 64,000 elevators to temporarily stop operating in the Tokyo metropolitan area. In addition, there were 78 incidents of people trapped inside elevators and it took over 20 hours to restore all operations to normal. This earthquake immediately brought to the fore the question of elevator safety during a disaster. Related issues were also exposed such as (a) how to reduce the number of elevators that come to a stop during an earthquake, (b) how to prevent people from becoming trapped, (c) how to rescue people quickly, and (d) how to quickly restore elevator operations to normal.

In addition to these issues, as Japan becomes an aging society, people want elevators to be both safer and more convenient to use. To respond to all these needs, Hitachi has developed an elevator that has enhanced durability and incorporates a new wide-area disaster response system. The new elevator features a number of innovative improvements. The first improvement is an "automatic diagnostic and recovery system" that enables guick rescue and restoration to normal operations. The second improvement is a "wide-area disaster response and restoration support system" that uses remote monitoring to accurately assess on-site damage conditions. Remote monitoring avoids the use of phone lines that may become congested during an emergency, and enables instructions to be given over a network. The third improvement is an "earthquake control operation device" that automatically verifies safety and recovery conditions before restarting the elevator and sending occupants to safety to the nearest floor. This feature is designed to reduce the number of people who become trapped if the elevator stops between floors during an earthquake. The fourth improvement is an "earthquake control operation system with a long-period seismic sensor." The sensor is the first of its kind that can detect long-period seismic activity inside skyscrapers. The development of this industry-leading elevator with advanced emergency response and improved toughness together with Hitachi's support system will enable the time to total recovery to be reduced from 20 to within six hours.

Intellectual property activity related to these earthquake response technologies is based on a unified strategy of preservation and product development to promote patent creation and incubation. IP activities in this area have thus far resulted in 29 patent registrations and another 105 patent applications under examination.

Going forward, Hitachi will promote the security, safety, comfort, and convenience of the new elevator system and the benefits to society in disaster recovery and reduction of elevator entrapment. At the same time, these promotional activities will enhance the value of the Hitachi brand.

-7-



Figure 3.1 Earthquake Control Operation System with Long-Period Seismic Sensor

2. High-density 2.5-inch hard disk drive based on perpendicular magnetic recording

Last year marked the 50th anniversary of the commercialization of the first hard disk drives, which were initially applied as information storage peripherals for mainframe computers. Over the decades, manufacturers have consistently increased the capacity of hard disk drives while reducing their size. Drives today enjoy 10,000 times the capacity and 10 million times the recording density of their ancestors. In addition to use in computers, hard disk drives can now be found in TV recorders, car navigation systems, mobile audio players, and a host of other consumer electronics. The market for drives is expected to nearly double by the year 2010 with sales approaching 700 million units.

The rapid growth of the hard disk drive market can be attributed, along with the increase in digital data, to extremely high capacity coupled with relatively low price per bit. Hard disk drives command superior price competitiveness even compared with flash memory, whose price has been dropping dramatically.

Through the years, Hitachi has developed various innovative technologies to support ever greater disk capacities. These technologies include thin film magnetic heads in the 1980's and magnetic resistance type reading sensors in the 1990's. Over the past few years, however, developers have begun to see the physical limit in refinements to the longitudinal recording method used since the birth of the hard disk drive. Working under this limitation has thus made it increasingly difficult from a technological standpoint to expand capacity horizons further.

To overcome this physical barrier, Hitachi adopted a perpendicular magnetic recording (PMR) method. The PMR method was invented by Professor Shunichi Iwasaki of Tohoku University

(currently President, Tohoku Institute of Technology) in Japan in 1977. At the time it was an extraordinary landmark in the development of data recording technology. Now, after some 30 years of industry-academia-government cooperation, the method is being implemented in data storage products by several manufacturers. In May 2006, Hitachi began mass production of a 2.5-inch PMR hard disk drive. The most important factor on the road to commercialization has been to ensure product reliability. So Hitachi has worked closely with Hitachi Global Storage Technologies (Hitachi GST) to develop and introduce new technologies for components, devices, and manufacturing processes. The final product is the Travelstar 5K160, which has received high marks in reliability from PC manufacturers. In addition, this product has received the 49th Best Ten New Products Award (Nikkan Kogyo Shimbun Ltd.) and the 53rd Okochi Memorial Production Prize.

Intellectual property activity related to PMR technologies is based on a unified strategy of business and development to promote patent creation and incubation within a global R&D environment. As of the end of FY 2006, IP activities in this area have resulted in 112 Japanese and 100 overseas patent registrations, 275 Japanese and 240 overseas patent applications under examination (after laying open), and 50 50 Japanese and overseas patent applications under examination (before laying open). Going forward, Hitachi will spare no effort to further strengthen patent-related activity in this area.



Figure 3.2 Travelstar 5K160: 160 GB 2.5" Hard Disk Drive using PMR Technology

3. IPS liquid crystal display (LCD)

LCD panels are used in a wide range of products from large, flat panel televisions to mobile communication devices. In 2002, all departments related to the display business of Hitachi, Ltd. (such as planning, development, design, manufacturing, and sales) were spun off to form a separate company called Hitachi Displays, Ltd., a specialist in the manufacture of LCD panels. Hitachi Displays cooperates closely with IPS Alpha Technology, Ltd. (a specialist in large LCDs for flat-panel TVs) and other domestic and overseas affiliates to form a core of partners in charge of the LCD display business for the Hitachi Group.

LCD displays were originally used in watches, calculators, and other small electronic appliances. In the beginning, they were only used to display extremely simple alphanumeric characters. In the years that followed, innovation in LCD technology advanced to the point that LCD panels started to attract a lot of attention as a replacement for the age-old cathode-ray tube found in standard television sets. Today LCD panels are used in a wide variety of products.

In 1995, LCD panels received a big boost in usability with the development of in-plane switching (IPS) technology. IPS was a landmark innovation that swept away the notion that LCD panels only had a narrow viewing angle. IPS technology introduces a horizontal electric field in which liquid crystal molecule revolve in a plane parallel with the TFT substrate. The simple movement of these molecules achieves superior performance in terms of viewing angle, color reproduction, and response speed to halftones.

In 1996, Super TFT debuted as the first product by Hitachi to use IPS technology. The technology has since evolved into Super-IPS and Advanced-Super-IPS, each with even wider viewing angle.

In 2006, the technology reached new heights with the release of IPS-Pro, which combines a wide-viewing angle and a high-aperture ratio. IPS-Pro technology has a broad range of applications, from large LCD TV panels to mobile communication handsets. The excellent high-aperture ratio of IPS-Pro coupled with new image processing technology has led to the commercialization of many new products. One example is a thin IPS LCD module that is half the width (1.29 mm) of existing products. This is achieved by combining an extremely energy efficient and mobile IPS LCD panel, a thin backlight, and 0.2-mm thick glass. In response to the planned launch of new services for mobile phones (such as full browser view, map search, picture view, and 1Seg) in December 2006, Hitachi made possible released of a 2.9-inch wide, high definition (WVGA) IPS LCD.



Figure 3.3 2.9-Inch Wide IPS LCD

The objective of intellectual property activity related to IPS is to keep in sync with how the technology evolves and thereby be in a position to create and incubate strategic patents. As of the end of FY 2006, IP activity in this area has resulted in over 400 patent registrations (Japan and overseas) related to IPS technologies, and over 2,100 patent registrations (Japan and overseas) related to liquid crystal technologies. Going forward, Hitachi aims to increase the number of patent registrations even further and strengthen cooperation between R&D activities and patent activities.

Click on the link below to read more details about IPS technology. http://www.hitachi-displays.com/technology/2060974_17271.html

* IPS is a registered trademark of Hitachi Displays, Ltd.

IV. Research and Development

1. R&D strategy

The goal of Hitachi Group's R&D is (a) through "collaborative creation" and "technology," to provide customer satisfaction and to contribute to the peace and prosperity of society; (b) to stimulate new growth within the Group through innovative technologies, and (c) to initiate shifts in paradigm within society and industry through original approaches based on a firm grasp of trends in society. To lead the generation of innovation for high profitability, Hitachi is promoting an R&D structure to serve as a hub for the Hitachi Group, the enhancement of MONOZUKURI capability (e.g., improved reliability, cost reduction), and technology for a global market, as top priorities. (See Fig. 4.1)



Figure 4.1 R&D strategy to lead social innovation

Research and development expenditure for the entire Group in FY 2006 was 412.5 billion yen (4.0% of sales). A total of 430 billion yen is earmarked for FY 2007 (4.1% of sales). By business sector, information and telecommunication systems had the highest rate of expenditures at 6.4% of sales. (See Fig. 4.2)

R&D investment is being focused on strong businesses to facilitate early commercialization and to generate profits.



Figure 4.2 R&D Expenditure

2. Organization of R&D as a hub for the Hitachi Group

The R&D Group has six corporate research laboratories in Japan, with a total of approximately 3,000 employees, as well as oversease R&D facilities. (See Fig. 4.3)



Figure 4.3 R&D Organization

The corporate laboratories are positioned as a hub in the Hitachi Group network to strengthen Group-wide cooperation between the various R&D divisions. In 2006, as part of the initiative to establish a direct link between R&D capability and profit generation, over 300 research personnel were assigned to the business divisions to speed-up product development of flat panel TVs, hard disk drives, and other products.

"Group-wide technology platforms" were established as a means to bring together researchers from throughout the Group, as well as providing a structure enabling business divisions and customers to participate in research and technology development. The Inverter Innovation Center was established in April 2006, and together with the the Motor Innovation Center, established in 2005, have successfully deployed superior Group technologies over a wide range of business divisions (e.g., elevator, escalator, industrial machinery, railway, and automobile). Along with the seven other technology platforms, the nine Group-wide technology platforms promote convergence and enhancement of common core technologies, as well as contributing to human resource development within the entire Hitachi Group. (See Fig. 4.4)





The "Group Frontier & Platform Research" scheme was introduced in April 2004 to strengthen R&D in the entire Hitachi Group. Under this scheme, Hitachi, Ltd. and Hitachi Group companies fund R&D under the same conditions on an equal basis to promote the creation of new businesses for the Group as well as development of core platform technologies. Approximately 300 researchers in the R&D Group, are involved in this scheme.

Further, to promote the generation of innovation through collaborative creation and to decrease development time, Hitachi is strengthening cooperation between industry, academia, and government. As of 2006, the Hitachi has fomalized collaborative alliances with 14 universities, promoting large-scale joint research projects through matching of industry needs and the technological seeds from the university, as well as active exchange of personnel and human resource development.

In FY 2006, a 2.5-inch hard disk drive using perpendicular magnetic recording developed through research collaboration with Tohoku University was commercialized by Hitachi Global Storage Technologies. In addition, research collaboration with the University of Tokyo has resulted in the development of a noise prediction tool based on one-way coupled simulation of fluid dynamics, structural and acoustical analyses, which was effectively applied in the development of high-pressure turbo pumps.

3. Highly reliable, low-cost MONOZUKURI capability

To generate innovation for high profitability, the collective strength of the Hitachi Group is being brought together to fortify the Group's highly reliable and low cost MONOZUKURI capability. In September 2006, the Supervisory Office for MONOZUKURI was established as a corporate division to cooperate with the laboratories R&D in MONOZUKURI, reinforce quality assurance education and mechanisms, enhance risk response and project management capabilities, and extend activities to

increase reliability across the Hitachi Group.

Priority measures in the R&D Group are to fortify MONOZUKURI platform technologies, vertical collaboration within the Hitachi Group, and environmental preservation efforts. In FY 2006, a front-loading design system employing advanced simulation-based design and fast engineering, was developed to reduce development time and achieve a high level of reliability. (See Fig. 4.5)



Figure 4.5 Innovation of design process using advanced simulation technology

Development of technology to analyse a perpendicular magnetic recording hard disk drive in entirety, which contributed to its commercialization in May 2006, is one example of where simulation-based design has been applied in the development of core products. Further, an example of built-in reliability is the development of solder damage analysis technology for crack propagation analysis, which helped to realize a dramatic decrease in evaluation and assessment time (2 months \rightarrow 2 days) and contributed to increased profitability. (See Fig. 4.6)



Figure 4.6 Simulation-based design & verification Technology

4. Serving a global market

To establish an R&D organization capable of serving an expanding global market and forming strong alliances, Hitachi has been establishing overseas research bases in the U.S., Europe, China and Singapore since 1989. In China, to participate in the high-growth infrastructure market, Hitachi (China) Research and Development Corporation was established as an independient entity in October 2005, and in November 2006, a comprehensive partnership was formed with Tsing Hua University; strengthening R&D on ubiquitous information technologies.

R&D for next-generation hard disk drives and related new applications is being pursued at the Hitachi GST San Jose Research Center in the U.S. and the Hitachi Storage Mechanics Laboratory in Singapore. In Europe, research centers for automotive systems were established in Germany and France in 2005, to achieve an R&D structure integrally linked with Hitachi's European business strategy. (See Fig. 4.7)

In FY 2006, superior technology for the global market included motors and inverters for hybrid electric vehicles, and soft switching driver IC. In rail vehicles, key technology such as large-scale crash analysis, large-scale flow analysis, and internal and external noise assessment were developed for the CTRL*. These technologies are contributing to the globalization of Hitachi's social innovation business.

* CTRL: Channel Tunnel Rail Link; linking England to France through the Straits of Dover



Figure 4.7 Global R&D

V. Intellectual Property

1. Intellectual property rights

1.1. Basic policy in IP strategy

1.1.1. IP Group mission

The Intellectual Property Group aims to enhance corporate value based on the "creating intellectual property (IP) value." Towards this goal, Hitachi is striving to increase IP value through "build a world-class patent portfolio" and "strategic IP use."

1.1.2. Increasing IP value and patent exploitation contribution

Hitachi uses "IP value" and the "patent exploitation contribution" as an internal management indicator to assess patent activities. "IP value" assesses the current value of intellectual assets. By observing this index, it is possible to obtain a firm grasp of IP activities in each business sector and thereby improve performance.

The "patent exploitation contribution" assesses the contribution to business generated by the patent. In particular, it quantifies the effect of patent royalty income, cross-licensing, increased orders, and internal implementation. The "patent exploitation index" divides the "patent exploitation contribution " by IP-related expenditures to assess the patent contribution in relation to the amount of investment.

1.1.3. Strengthening global patent strategy

To promote the spread of new technologies and the expansion of markets, the Hitachi Group engages in international standardization activities. In addition to existing forums, Hitachi initiates the launch of new standards forums.

Within the Group, Hitachi promotes activities to strengthen IP capability. In 2006, Hitachi established the "Hitachi Group Patent Pool" for unified management related to (a) the invention-creation of Group-wide technologies, (b) patent applications, and (c) patent exploitation.

Going forward, Hitachi will expand these activities as Group management focuses on high profitability.

The Hitachi Group is currently making every effort to globalize its IP exploitation strategy. In particular, Hitachi is expanding patent exploitation activities beyond Japan, the U.S., Europe, and Korea to China and India.



1.2. Patent strategy

1.2.1. Building an internationally competitive patent portfolio

To support the globalization of Group businesses, Hitachi is making every effort to increase the number of overseas patent applications. Globalizing patent applications is a Group IP objective as Hitachi approaches its centennial in 2010. To achieve this objective, Hitachi is increasing patent application activities overseas. In particular, by 2010 the number of overseas applications of the Hitachi Group will surpass domestic applications. Each business that focuses on overseas markets will also intensify its overseas patent application activities.



Figure 5.2 Hitachi Group Domestic/Overseas Patent Applications

1.2.2. Patent portfolio

The Hitachi Group is keeping pace with its rivals in U.S. patent registrations. As a Group, Hitachi placed third in registrations in 2006 (See Fig. 5.3*). Hitachi expects to gain the top rank in the near future. Figure 5.1* and 5.4* show 2006 results for the Hitachi Group in number of (a) laid-open patents in Japan, (b) US patent registrations,(c) patents held in Japan, and (d) patents held in the U.S..

U.S. Patent Registrations in 2006

| Corporate Group | Number of Patents (Rank) | 2005 Rank |
|-----------------------------------|-----------------------------|-----------|
| IBM | 3,651 (1st) | 1st |
| Samsung | 2,803 (2nd) | 6th |
| Hitachi | 2,658 (3rd) | 2nd |
| Matsushita Electric Industrial | 2,530 (4th) | 5th |
| Canon | 2,418 (5th) | 3rd |

Maintain a high ranking on a consolidated basis in 2007 and beyond

Figure 5.3 US Patent Registrations (2006)

* Search system: IFIPAT/Questel-ORBIT (Prepared by IFI-CLAIMS) and MicroPatent

| | Laid-Open Patents | US Patent | Patents | Patents |
|--------|-------------------|---------------|----------------|----------------|
| | in Japan | Registrations | Held in Japan | Held in US |
| | (2006) | (2006) | (As of 2006/3) | (As of 2006/3) |
| Number | 11,569 | 2,658 | 35,239 | 22,067 |

Batant Bartfolia



Figure 5.4 Patent Portfolio (2006)

1.2.3. Strong patent portfolio activities

To achieve the domestic and overseas patent application targets for 2010, the Hitachi Group is pursuing much more than mere numbers. Hitachi wants to enhance the quality of its patent portfolio by acquiring intellectual property rights for strong technologies. Therefore, it is imperative to build patent portfolios that are internationally competitive. Towards that end, Hitachi is selecting themes for developing winning products and establishing strong intellectual property. In addition, each theme must have a clear patent application strategy. At the same time, the Group must strive to create strong, differentiated technologies and to increase global patent applications. An evaluation system to assess whether IP capability clears objectives and a feedback system to discuss evaluation results enable Hitachi to revise theme objectives and strategies as needed. In this way, Hitachi is building patent portfolios that can withstand international competition in 2010 and beyond.

To build an internationally competitive patent portfolio, Hitachi is promoting flagship patent activities "FS" for creating inventions and patent portfolio management activities "PPM" for nurturing patents. Figure 5.5 shows activity themes for 2006.

| Examples of themes for build — FS (creation), PPM (r | ding a powerful patent hurture) themes — |
|------------------------------------------------------------------------------------|---------------------------------------------|
| Theme | Business Segment |
| Storage systems (SAN/NAS storage solutions, high-density HDDs) | Information & Telecommunication Systems |
| Security systems (finger vein authentication systems, secure PCs, "µ-Chip"s) | Information & Telecommunication Systems |
| Electric powertrain systems | Power & Industrial Systems |
| Digital consumer electronics (Wooo) | Digital Media & Consumer Products |

Figure 5.5 Examples of themes for building a powerful patent portfolio

1.3. Patent exploitation strategy

In 1970, the Hitachi Group introduced the policy to open all patents for licensing. In 1994, the policy to close some patents for licensing was implemented. Today, Hitachi implements the policy of "strategic IP use" for benefiting Group businesses in multiple ways, not merely for the sake of increasing licensing income. In addition to "exclusive use," in which only the patentee has the right to use the patent, Hitachi implements restricted and other types of licensing for a few strategic partners. In the railway car sector, for example, Hitachi implements an exclusive use for patented friction stir welding (FSW) technology that has contributed to over 1,300 railway car orders as of June 2007.

The Hitachi Group also promotes activities to increase product orders. In particular, if a product is based on Hitachi-patented technology, this fact is published on the product Website or in newspaper advertisements.

Information is also distributed via brochures and pamphlets to promote the advantages of Hitachi patent superiority and technology compared to competitor products.



Figure 5.6 From Cross licensing to Strategic Exploitation

1.4. Invention reward system

1.4.1. New invention reward system

In April 2005 Hitachi revised its invention reward system in line with amendment of Article 35 of Japan's Patent Law (effective April 2005).

Inventors now receive rewards at various stages in a patent's lifecycle, including application stage, registration stage, and performance stage. Performance is linked to in-house patent use and royalty income from licensing. These revisions, especially the performance reward, mark a major improvement in the invention reward system. In particular, the revisions standardize the performance reward for contributions to royalty income. The revisions also improve evaluation objectivity related to contributions from in-house use and they improve the reward mechanism related to patents that contribute to business orders.

1.4.2. Invention reward committee

To improve the transparency and trustworthiness of the reward system and the amount of compensation, Hitachi established an invention reward committee to listen to the opinion of inventors and to respond to their concerns.

1.4.3. Invention information system

Hitachi implemented an "invention information system" to inspire innovation and to promote communication between inventors and business divisions that use their patents. Under this system, an inventor can request internal/external use information about his patent through a Web browser interface. The inventor can also use a web browser to view information about his patent performance rewards.

Going forward, Hitachi expects the invention reward system and related implementations to instill even a stronger spirit of invention in employees that will lead to new patents and contribute to business success.

1.5. Trade secret management

The Hitachi Group has been actively managing its trade secrets for a number of years. Upon amendments to the Unfair Competition Prevention Law in 1990, Hitachi felt it was time to strengthen protections for trade secrets, and established the "Hitachi trade secret management regulations" and the "trade secret handling rule for other companies." With the arrival of digital information and networks, Hitachi upgraded company regulations and the management system to handle trade secrets smoothly. To deal with personnel mobility and the risk of unintended technology information outflow from technology transfers to China and other regions, Hitachi is enforcing measures Group-wide based on the multi-disciplinary Trade Secret Management Committee. (Its chairman is vice president for R&D and the secretariat is the IP Law and Trademark Center of the Intellectual Property Group.) Below are the main measures examined and implemented in 2006:

- (1) Implement exhaustive measures to prevent the outflow of trade secrets through a "person." Measures to make confidentiality stricter include (a) professional confidentiality clauses in labor contracts, (b) collective labor agreements, (c) written pledges at the time of retirement, and (d) a cautionary notice (on a case by case basis) to a company that hires a former Hitachi employee.
- (2) To protect trade secrets for use by Group companies in China, prepare and expand the use of collective labor agreements, formal work regulations, trade secret management regulations, and educational materials.
- (3) To prevent technology information outflow through technology transfer to China, prepare and consistently implement an outflow protection checklist for business divisions.
- (4) Use an e-learning environment to implement trade secret management education activities for all employees.

2. Brand management

In a business environment that is attaching more importance to consolidated management, globalization, and intangible assets, the Hitachi Group has positioned the Hitachi brand, which is a common Group asset, as an important management resource to support competitive strength. To bolster brand strength, Hitachi has been promoting brand management since April 2004. The corporate statement "Inspire the Next" means to offer products, systems, and services that are sensitive to the needs of the times and thereby "breathe new life into the next era." "Inspire the Next" is a base upon which to give full play to the collective strengths of the Hitachi Group. Below is a description of the main brand management activities in 2006.

2.1. External activities

2.1.1. Global brand campaign

To expand Hitachi brand awareness and understanding to a global level, Hitachi is implementing continuous corporate advertising campaigns in North America, Europe, China, Asia, and Japan. The current campaign focuses on the diverse technologies and products made by Hitachi that benefit society. The advertising communicate a balance between global conformity on the one hand and local lifestyle on the other within the context of a competitive environment. In 2006, brand image campaigns in all regions adhered to the theme of striking a balance with globalization. In North America, the "Hitachi True Stories" campaign introduced how main customers use Hitachi products. In Europe, the spotlight was cast on Hitachi's cutting-edge technologies. China and Asia also had campaigns. And in Japan, the "tsukuro" campaign drew attention to the collective strengths of the Hitachi Group.



Hitachi True Stories (Medical Service)



Corporate Ad Campaign in China



"Tsukuro" Campaign (Landmine Clearing)

Figure 5.7 Overseas & Domestic Brand Campaigns

2.1.2. Strengthening web-based brand management

The Hitachi Group began to strengthen web-based brand management in 2003 on the basis the fact that the Web is an excellent media to harness diverse contact points in brand formation.

(1) Creating business opportunities through more visits to the Hitachi Website

Hitachi's websites in Japan and overseas are creating many opportunities for new business through (a) linking with brand campaigns, exhibitions, and other activities; (b) release of web portals for each country or region; (c) use of AdWords and other advertising solutions; and (d) renewal of website and product site. In 2006, visits to Hitachi's websites compared to the previous year increased by 47% in Japan and by 11% overseas.



Country Portals

(2) Strengthening website risk management

Website promotion has many benefits as well as increased exposure to risks. To maintain a safe website environment, Hitachi aggregates secure web servers externally in five locations. This configuration also achieves cost benefits. In March 2007, Hitachi completed the aggregation of 233 websites by Hitachi, Ltd. and 109 sites by 99 Group companies.

2.1.3. Improving brand value through environmental management activities

Some of the most important issues facing the Hitachi Group are "prevention of global warming" and "minimizing the use of resources and recycling." To address these issues, Hitachi is making full use of Group technologies at every stage, from development and design to manufacturing. These efforts are contributing to a lower environmental burden for the whole of Earth. The Hitachi Group's efforts to improve the environment are also important from a brand point of view, as shown in the following examples.

(1) Hitachi's eco-products and services

From the beginning, Hitachi has participated in major eco-products exhibitions in Japan and overseas to promote and display the Group's latest lineup of eco-products.

At the expo in Singapore in October 2006, Hitachi exhibited 19 different products including plasma televisions and a monorail system. Later in December at an expo in Tokyo, Hitachi displayed products and gave a well-received demonstration for children about Group environmental activities. HITACHI Inspire the Next



(2) Eco Rail Mark

In 2007, Hitachi, Ltd. and Hitachi Maxell, Ltd. obtained approval to use the Eco-Rail Mark to signify their new product transport model. The mark denotes an organization uses the railway system to move over 15% of its products and is thus working to reduce CO2 emissions and lower the environmental burden of the transportation system.

(3) Hitachi Eco Campaign

The Hitachi Eco Campaign, which ran from March 9 to April 16, 2007, introduced the latest household eco-appliances and promoted the Hitachi brand image further. The campaign had its own website. Visitors who responded to an eco-quiz on the latest products became eligible to enter a lottery where they could be given a chance to become a product monitor and experience firsthand the eco-features of Hitachi products. The simple and direct message helped customers to better understand how hard the Hitachi Group is working to preserve the environment. The campaign attracted a total of 39,115 visitors to the website.

2.1.4. Brand image activities targeted at the youth sector

Concerned over low brand awareness among young people, the Hitachi Group engaged in the following activities.

(1) Science and technology activities targeted at middle and high school students

The R&D Group promotes educational activities at research labs to nurture future researchers and to build closer bonds between Hitachi and young people.



Figure 5.11 Eco Rail Mark

The Hitachi Group has been participating in the "Science Spring Camp" sponsored by the Ministry of Education, Culture, Sports, Science and Technology. In 2003, Hitachi invited a total of 40 high school students to Group labs to experience technology in progress firsthand. In 2006, Hitachi introduced four themes centered on "cutting-edge technology in machinery products."

From 2005, Hitachi also started a "Science Seminar" for middle school students in Hitachinaka City under the auspices of the Board of Education. In 2006, Hitachi invited many students to a test laboratory to observe an experiment related to the manufacture of vacuum cleaners.

(2) Activities targeted at university students

The Hitachi Group has been working continuously since 2004 to improve the Hitachi brand image among university students. Specific activities include young Hitachi employees conducting company, business, and campus seminars for university students. The employees communicate to students the pride and passion they have for their work and the founding principle of "Inspire the Next." These activities contribute to the recruitment of superior talent and better relations with Hitachi stakeholders. In 2006, 2,000 employees were able to make direct contact with 100,000 students. The results of these activities become apparent in the Nihon Keizai Shimbun, Inc. Employment Ranking (2007/2) where Hitachi, Ltd is ranked seventh. In the Recruit Employment Ranking (2007/4), Hitachi is ranked fifth. These rankings show how popular Hitachi has become among students.

2.2. In-house activities

2.2.1. "Inspiration of the Year" award system

The "Inspiration of the Year" award system (linked with share price) honors employees and companies that contribute to greater brand value. A total of 131 award applications were submitted from Group companies in Japan and overseas. The selection process is based on inspection by top management and votes cast by 9,315 employees (6,929 in the previous year). Nine awards were given for Inspiration of the Year, including the Hitachi Pavilion at the 2005 World Exposition in Aichi, Japan, which was selected as the most popular exhibit by expo visitors. In addition, there were eight awards given for Brand Promotion, 11 awards for Brand Challenge, and three Special Awards for "Cultivating a Scientific Mind."

2.2.2. Domestic and overseas training tools

Improving brand value does not end with PR and advertising activities, each employee can be mobilized to achieve impressive results. Many educational activities are implemented to promote brand understanding among Hitachi Group employees. Each month approximately 20 general managers from Hitachi, Ltd. and Group companies participate in training courses to deepen their understanding of brand value through lectures and group discussions. The same type of training course is offered to overseas managers as well. For the approximately 100,000 Group employees overseas, Hitachi has prepared basic educational material on brand value, which has been introduced gradually since 2006. These training tools are contributing to greater awareness of the

Hitachi brand among Group employees.

2.3. Measures against counterfeit products

The Hitachi Group is taking the initiative to protect its brand name against counterfeit products (e.g., home appliances, automobile components, electronic components, and power tools) in China, other Asian countries, the Middle East, and Africa. Especially in regions where many counterfeit incidents occur, Hitachi cooperates with local affiliates and assiduously promotes effective measures to expose counterfeit activity with the aim of regaining the sales of authentic products.

(1) Cooperating with industrial organizations and other companies

In December 2004, Chinese authorities relaxed the criminal prosecution standard for intellectual property rights infringement. At the same time, authorities decreased the number of seizures as much as possible at the time of exposing infringers in a policy designed to avoid indictments. Because prevailing administrative punishment has a weak deterrent effect that leads to repeat offenses, Hitachi has a policy to cooperate with other companies to expose businesses that violate the rights of multiple brands and to seek criminal prosecution.

(2) Measures against international distribution of counterfeit products

Hitachi is pursuing measures aimed at both export destinations and exporting countries. Specific measures include (a) performing parallel inspections at export destinations and exporting countries, (b) cracking down on counterfeits at customs of export destinations, (c) uncovering counterfeits in the markets of each country, and (d) capturing a clear picture of counterfeit networks. To promote these measures, Hitachi is taking the initiative to cooperate with relevant authorities and to exchange information. Recently, the Internet has increasingly been used as a platform for illegal activities. To combat web-based infringements, Hitachi is vigorously promoting countermeasures within the context of new laws and regulations.

(3) Lobbying activities

Through industrial organizations, Hitachi engages in lobbying activities aimed at government agencies in countries and regions where many counterfeit incidents occur. In Hong Kong, for example, Hitachi filed a suit against a company that had illegally registered "HITATCHI" in Chinese characters and in English as a trade name. The court issued a registration cancellation order. However, under Hong Kong's company registration system, once a company has registered, the legal cancellation procedure is very difficult to complete. Shortly after thereafter, Hitachi, in cooperation with other companies, approached Japan's Ministry of Economy, Trade and Industry. The Japanese government then held talks with Hong Kong authorities in November 2005 and requested Hong Kong to revise its legal system and infringement management system.

Reference 1. Group Companies listed in Japan-US Patent Data

| Category | Company Name |
|-----------------------|----------------------------------------------------------------------------------|
| Information & | Alaxala Networks Corp., Hitachi Communications Technologies, Ltd., |
| Telecommunication | Hitachi Electronics Services Co., Ltd., Hitachi Government & Public |
| Systems | Corporation System Engineering, Ltd., Hitachi Information & Control |
| | Solutions, Ltd., Hitachi Information Systems, Ltd., Hitachi Information & |
| | Communication Engineering, Ltd., Hitachi-Omron Terminal Solutions Corp., |
| | Hitachi Software Engineering Co., Ltd., Hitachi Systems and Services, Ltd., |
| | Hitachi Consulting Co., Ltd., Hitachi Data Systems Holding Corp., Hitachi |
| | Global Storage Technologies |
| Electronic Devices | Akita Electronics Systems Co., Ltd., Hitachi Displays, Ltd., Hitachi |
| | High-Technologies Corporation, Hitachi Medical Corp., Hitachi High-tech |
| | Science Systems Corporation., Hitachi ULSI Systems Co., Ltd. |
| Power & Industrial | Babcock-Hitachi K.K., HCX Co., Ltd., Hitachi Building Systems Co., Ltd., |
| Systems | Hitachi Car Engineering Co., Ltd., Hitachi Construction Machinery Co., Ltd., |
| | Hitachi Engineering & Services Co., Ltd., Hitachi Industrial Equipment |
| | Systems Co., Ltd., Hitachi Plant Technologies, Ltd., Hitachi Kasado |
| | Mechanics Co., Ltd., Hitachi Mito Engineering Co., Ltd., Hitachi Via |
| | Mechanics, Ltd., Japan Servo Co., Ltd., Clarion Co., Ltd., Xanavi Informatics |
| | Co., Ltd., Hitachi Mobile Co., Ltd. |
| Digital Media & | Fujitsu-Hitachi Plasma Display, Ltd., Hitachi Advanced Digital, Inc., Hitachi |
| Consumer Products | Appliances, Inc., Hitachi LG Data Storage, Inc., Hitachi Lighting, Ltd., Hitachi |
| | Maxell, Ltd., Hitachi Media Electronics Co., Ltd., Hitachi Taga Technology, |
| | Ltd. |
| High Functional | Hitachi Cable, Ltd., Hitachi Chemical Co., Ltd., Hitachi Metals, Ltd., Hitachi |
| Materials & | Metals Techno, Ltd., Hitachi Powdered Metals Co., Ltd., Hitachi Tool |
| Components | Engineering, Ltd., NEOMAX Co., Ltd., Shin-Kobe Electric Machinery Co., |
| | Ltd. |
| Logistics, Services & | Hitachi Transport System, Ltd., Hitachi America, Ltd |
| Others | |
| Financial Services | Hitachi Capital Corp. |

As of March 31, 2007 (53 Group Companies)

[Reorganization of companies on April 1, 2007]

- On April 1, 2007, Hitachi High-Tech Science Systems Corporation was absorbed by and merged with (simplified merger) Hitachi High-Technologies Corporation.
- On April 1, 2007, NEOMAX Co., Ltd. was absorbed by and merged with Hitachi Metals, Ltd., which became the name of the surviving company.
- On April 1, 2007, Hitachi Plant Technologies, Ltd. transferred its automotive maintenance business, repair equipment design business, manufacturing business, and maintenance business to Hitachi Kasado Mechanics Co., Ltd. On the same day, Hitachi Kasado Mechanics changed its corporate name to Hitachi Transportation Technologies, Ltd.

Reference 2. Major External Awards & recognitions

O62nd IEEJ Academic Promotion Award (Institute of Electrical Engineers of Japan)

• IEEJ Technical Development Award: Development of low-pressure analysis system for expanding the use of photovoltaic generation

Hitachi Ltd. and Tohoku-Electric Power Co., Inc. (awarded jointly)

○2006, Minister of MEXT Award (Ministry of Education, Culture, Sports, Science and Technology (MEXT))

- Science & Technology Award (Development Division): Development of wireless recognition IC tag technology based on super-small chip Hitachi, Ltd.
- Science & Technology Award (Development Division): Development of dedicated processor for graphics processing
 Hitophi Ltd

Hitachi, Ltd.

O38th Ichimura Prizes in Industry (The New Technology Development Foundation)

Meritorious Achievement Prize: For pioneering R&D on finger vein authentication technology and its applications

Hitachi Ltd. and Kyoto University (awarded jointly)

○33rd Environmental Award - Minister of Environment Prize (Hitachi Environment Foundation and Nikkan Kogyo Shimbun, Ltd.)

Development of PCB online monitor

Hitachi, Ltd., Hitachi High-Tech Control Systems Corporation, National Institute for Environmental Studies (NIES) (awarded jointly)

- \bigcirc 2006 National Commendation for Invention (Japan Institute of Invention and Innovation (JIII))
 - Invention Award: Asynchronous remote copying Hitachi, Ltd.

○49th Best Ten New Products Award (Nikkan Kogyo Shimbun Ltd.)

• High density 2.5" HDD equipment using perpendicular magnetic recording technology Hitachi Ltd. and Hitachi Global Storage Technologies, Ltd. (awarded jointly)

O53rd Okochi Memorial Award (Okochi Memorial Foundation)

Okochi Memorial Production Prize: Product development of perpendicular magnetic recording hard disk drive

Hitachi Ltd. and Hitachi Global Storage Technologies, Ltd. (awarded jointly)

○2006 JSME Award (Japan Society of Mechanical Engineers)

JSME Medal for New Technology: Active flying-height control of magnetic head slider using MEMS thermal actuator

Hitachi Ltd. and Hitachi Global Storage Technologies, Ltd. (awarded jointly)

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For Inquiries:

Hitachi, Ltd. Intellectual Property Group

1-6-1 Marunouchi, Chiyoda-ku, Tokyo-to 100-8220, Japan (12th Floor, Marunouchi Center Bldg.) Tel: 03-3258-1111 (Representative)

Fax: 03-3214-3110

E-mail: chizai.hokoku.py@hitachi.com

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