

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)

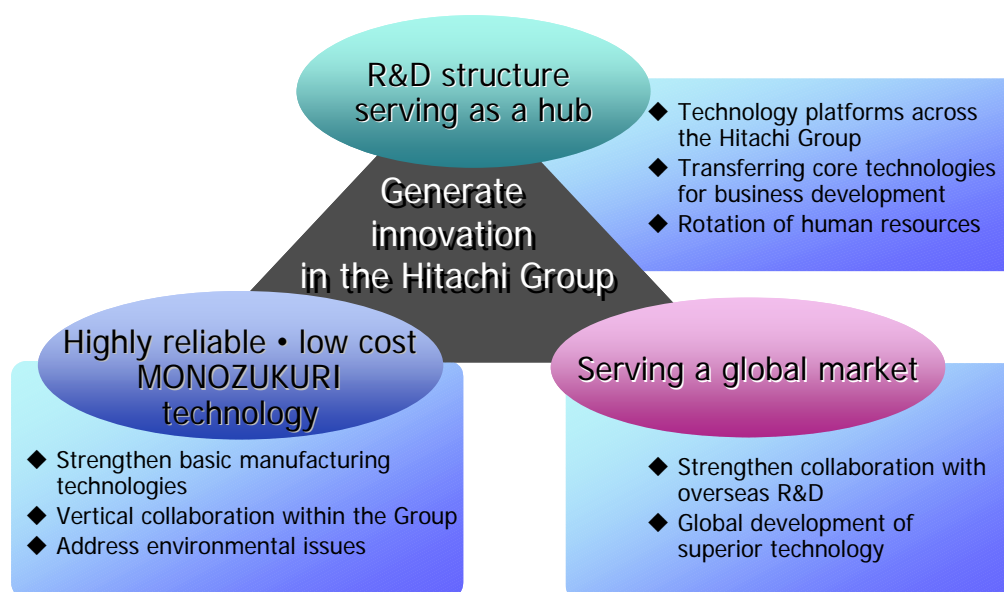


Figure 4.1 R&D strategy to lead social innovation

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.

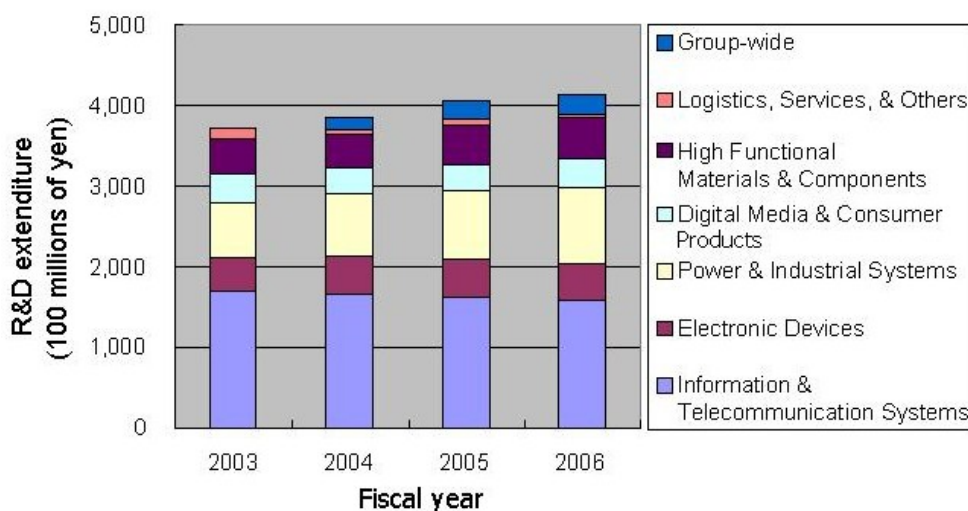


Figure 4.2 R&D Expenditure

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 overseas R&D facilities. (See Fig. 4.3)

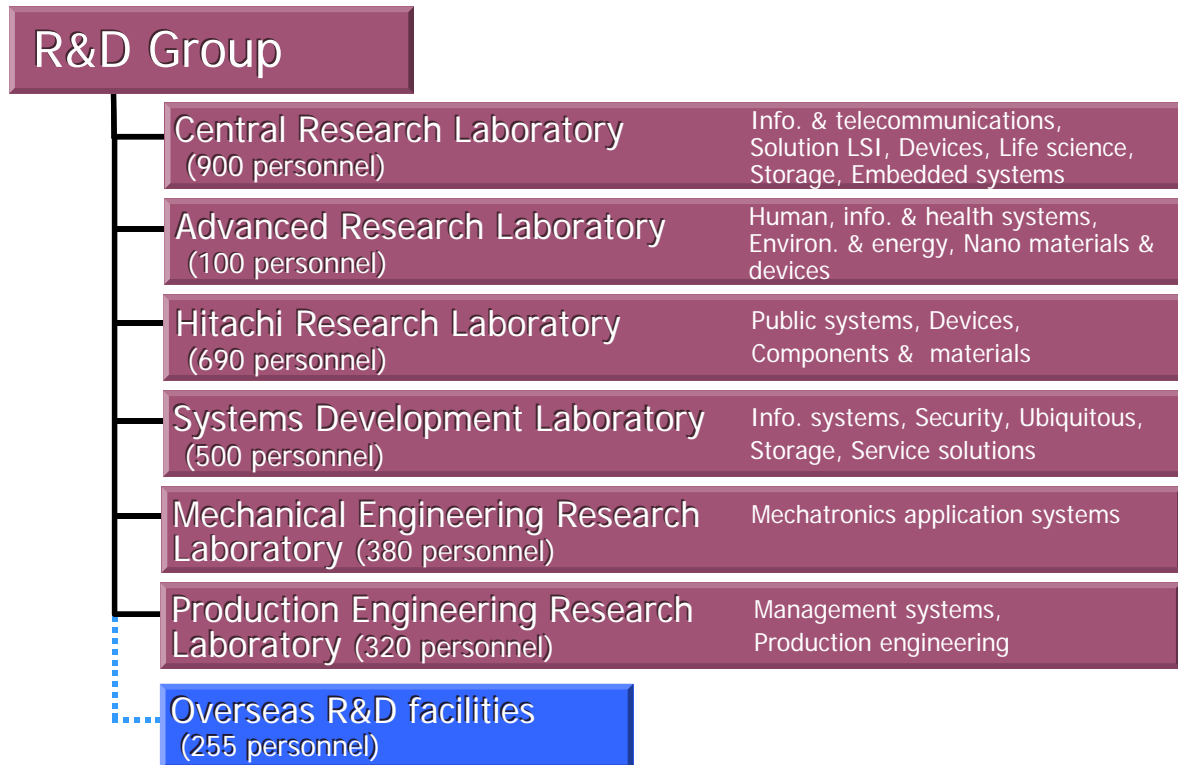


Figure 4.3 R&D Organization

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)

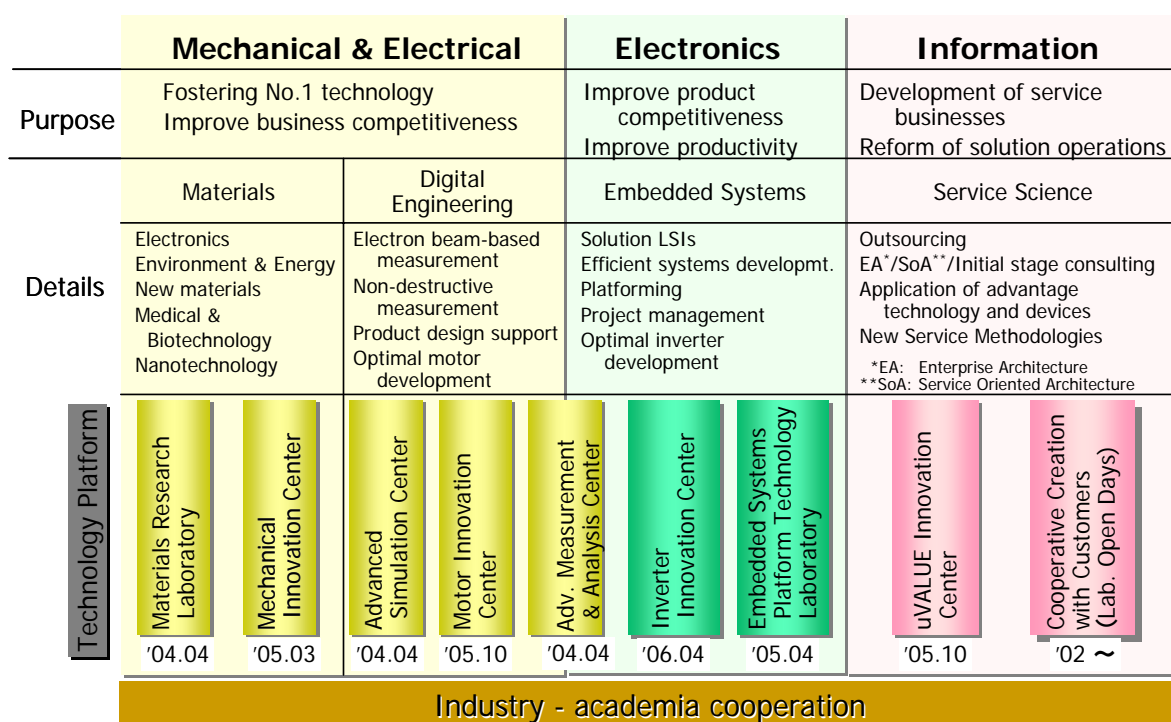


Figure 4.4 Technology platforms across the Hitachi Group

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 formalized 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)

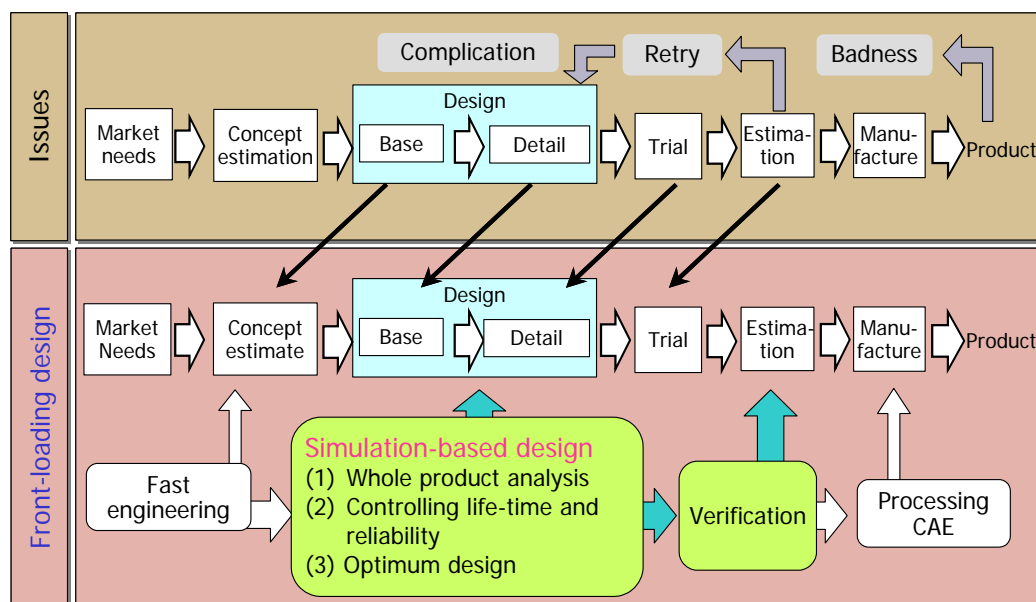


Figure 4.5 Innovation of design process using advanced simulation technology

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 assesment time (2 months → 2 days) and contributed to increased profitability. (See Fig. 4.6)

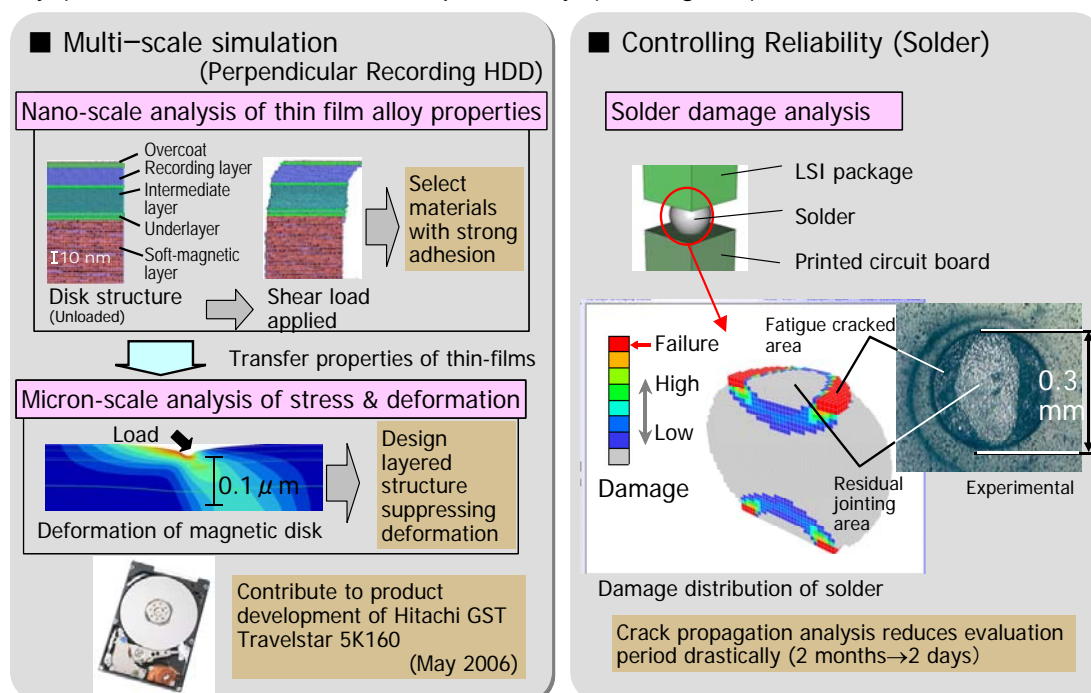


Figure 4.6 Simulation-based design & verification Technology

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 independent 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

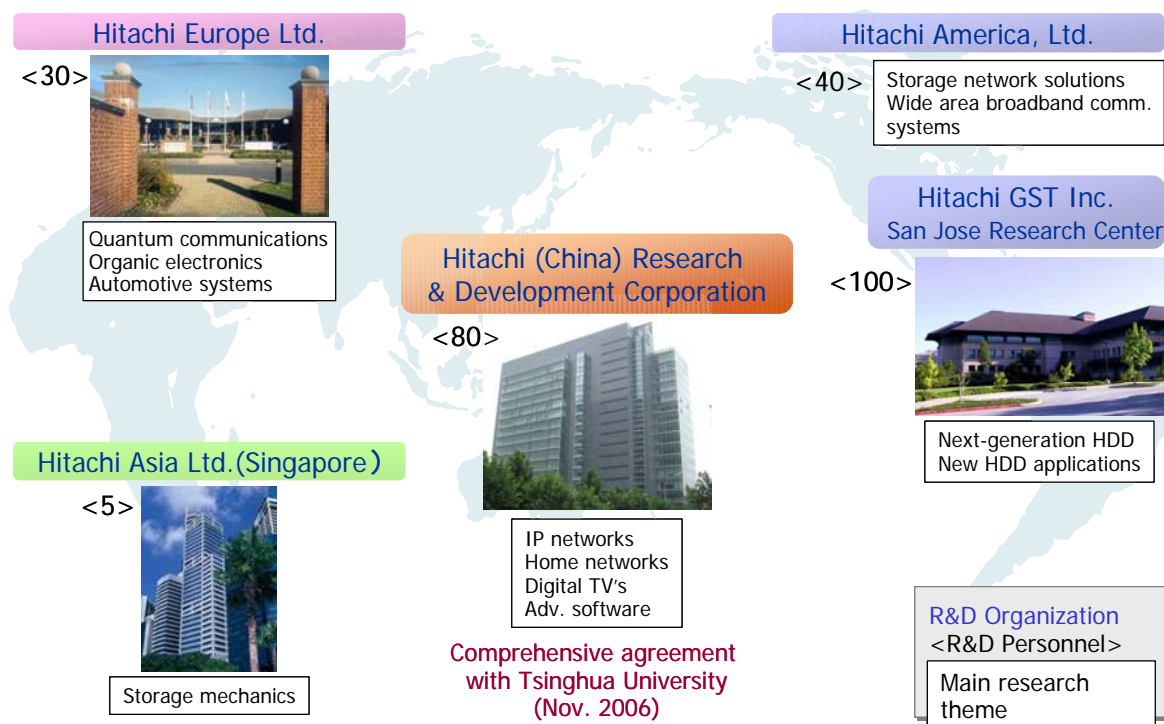


Figure 4.7 Global R&D