Company-Wide Strategic Research and Division-Based Product Development and Improvements Form the Two Pillars of R&D

Guided by its founding spirit, "Be ahead of the times through endless creativity, inquisitiveness and pursuit of improvement," Toyota Industries undertakes Company-wide strategic R&D aimed not just at improving short-term business results but also at achieving sustainable growth over the long term. At the same time, each business division actively carries out R&D activities that are important for ensuring that the Toyota Industries Group maintains its competitive advantage.

Toyota Industries' R&D can be broadly divided into the two categories of product development and improvements performed independently within each business division in addition to R&D undertaken mainly by the Research & Development Center. The latter is carried out from the perspective of Company-wide management strategy.

Toyota Industries operates in an extensive range of business spheres, and each of the Company's divisions has its own distinctive technological strengths, core technologies and market characteristics. Accordingly, to efficiently develop products tailored to customer needs, it is imperative that technical development sections of each division play a leading role in product improvement, technology development and applied research. As such, these technical development sections maintain their own experiment equipment and research laboratories and proactively undertake technology development activities in cooperation with manufacturing divisions based on product development plans.

The Research & Development Center within the Corporate Center (corporate headquarters) engages in R&D in technology fields such as materials fields that serve as a common foundation for all divisions in addition to undertaking R&D in new domains. The Research & Development Center is also working to further strengthen and enhance the efficiency of our Company-wide R&D structure, promote lateral transfers of technologies among different divisions and investigate new technology development themes. Concurrently, the center deploys the accumulated technologies and know-how of each business division in a continuous search for and creation of new products and services that will form the pillars of our future business. Depending on specific research themes, the center also promotes joint research in collaboration with Toyota Central Research & Development Laboratories, Inc., an R&D facility of the Toyota Group that engages in basic research, as well as with universities and other outside R&D institutions.

Our "e-Lab" IT research laboratory within the Information System Development Department undertakes IT-related R&D. This laboratory is making progress in research on digital simulation technologies for shortening product development times and reducing lead-times from development to production and shipping. Moreover, "e-Lab" is building an infrastructure and systems for allowing each business division to undertake joint development with overseas bases.

Toyota Industries actively promotes in-house manufacturing of essential processing and assembly equipment. The Machinery & Tools Sub-Division develops and manufactures specialized manufacturing equipment for the Compressor Division, Engine Division, Toyota Material Handling Company and affiliates. Manufacturing such equipment internally yields a host of advantages, which include speedy development and manufacturing through cooperation among development and design departments as well as the rapid launch of production lines. Toyota Industries' outstanding manufacturing equipment also contributes to the Toyota Industries Group's manufacturing, serving as a source of competitiveness for each business and protecting against any outflow of proprietary production know-how. We are also utilizing our strength in creating manufacturing equipment for the quick start-up of operations at overseas production bases while striving to nurture personnel with expertise in such equipment, as we aim to further raise the production technology capabilities of the Toyota Industries Group.

In fiscal 2007, R&D expenses increased 10.9% from the previous fiscal year to ¥34.5 billion. By segment, R&D expenses amounted to ¥16.2 billion in the Automobile Segment, ¥15.7 billion in the Materials Handling Equipment Segment, ¥0.8 billion in the Textile Machinery Segment and ¥1.6 billion in the Others Segment.

NC machine tool for aluminum parts

Circuit board inspection system with high-resolution line scan camera

Materials Handling Equipment

New GENEO

In September 2006, Toyota Industries commenced domestic sales of 1- to 3.5-ton internal combustion lift trucks (sold as the GENEO in Japan, 8-Series in North America and International, and the Toyota Tonero in Europe) after a full model change. The 1- to 3.5-ton class internal combustion lift trucks represent the largest market for lift trucks,

accounting for approximately 50% of the entire Japanese lift truck market, and are used by a wide variety of customers primarily in the transport and warehouse industries. To address the needs of this market, Toyota Industries developed the new GENEO to attain an even higher level of performance and functionality in the areas of safety, environmental features and ease of operation.

Development of Hybrid Systems for Lift Trucks

Heightened global environmental awareness coupled with persistently high crude oil prices has spurred a rapidly rising market need for improved fuel economy. Paralleling this development, there are high hopes that hybrid technologies will enable significant increases in fuel economy for internal combustion lift trucks.

Utilizing the Toyota Group's hybrid technologies and components, Toyota Industries is developing highly efficient hybrid systems for lift trucks that offer superior reliability, durability and cost performance. Our new hybrid concept model maintains the same performance as conventional internal combustion lift trucks while significantly raising fuel economy and achieving a balance between high environmental performance and cost efficiency. We will continue pursuing the development of new technologies for the commercialization of hybrid lift trucks.

Textile Machinery

LWT710 Water-Jet Loom

Toyota Industries launched the new LWT710 water-jet loom, which features a newly developed nozzle pump and a short stroke for achieving high versatility and weaving high-quality textiles. Moreover, the LWT710 shares a common frame with the world's top-selling JAT710 air-jet loom, thereby enabling high-speed, low-vibration weaving of all types of textiles. The use of a common frame also permits a significant increase in the use of common spare parts.

Automobile (Car Electronics)

Development of Air-Cooled DC-DC Converter

Toyota Industries has developed an air-cooled DC-DC converter for hybrid vehicles. This converter is an essential component for down-converting the high voltage of the main battery—the drive source for hybrid vehicles—to the lower voltage needed for operating lights, audio systems and other in-car devices. Incorporating Toyota Industries' independently developed IC, the new DC-DC converter enables a more than 20% reduction in the number of components. Unlike the conventional water-cooling method, an air-cooled converter affords greater freedom for positioning within the vehicle. Our new DC-DC converters are fitted on the Camry Hybrid that Toyota Motor Corporation began selling in North America in May 2006.