

1 Important CSR Issues

Contribute to the World through Technology

The importance to our company

In accordance with our Medium Term Plan which started in fiscal 2015, we are focusing on the three key markets of automotive, ICT and industrial equipment & energy, taking advantage of our proprietary technology development capabilities to open up new business opportunities and realize monozukuri reform. The overall aim is to offer products that make a meaningful contribution to society while also resulting in a sustainable improvement of corporate value.

Expectations by stakeholders

Responding to climate change by harnessing TDK's core technologies, in particular energy conservation and renewable energy, promote the development of new technologies and the spread of products that help to bring about a low-carbon society.



Basic policy

Contribute to the world through technology is a key concern for TDK. Toward this end, we are focusing on innovative technology development in our three key markets of automotive, ICT and industrial equipment & energy, helping to save, store, and reuse energy and solve other pressing issues that modern society is facing. Furthermore, the pursuit of "zero defect quality" based on superior technological competence and realized through a unified production process that extends from the raw materials to the final product will continue unchanged also in future. Providing high quality products and services is our way of striving for the advancement of humankind.

Main Achievements in Fiscal 2015

Research and development costs

TDK firmly believes that creating new products in a timely manner creates value for society and also contributes to corporate value earnings. Continued research and development efforts directed at the creation of attractive and innovative products are the very key to our company's existence. As we move into the future, technological innovation in our three key markets is a top priority, and we will continue to make R&D investments targeted at bringing forth new products of value.

84.9
billion yen

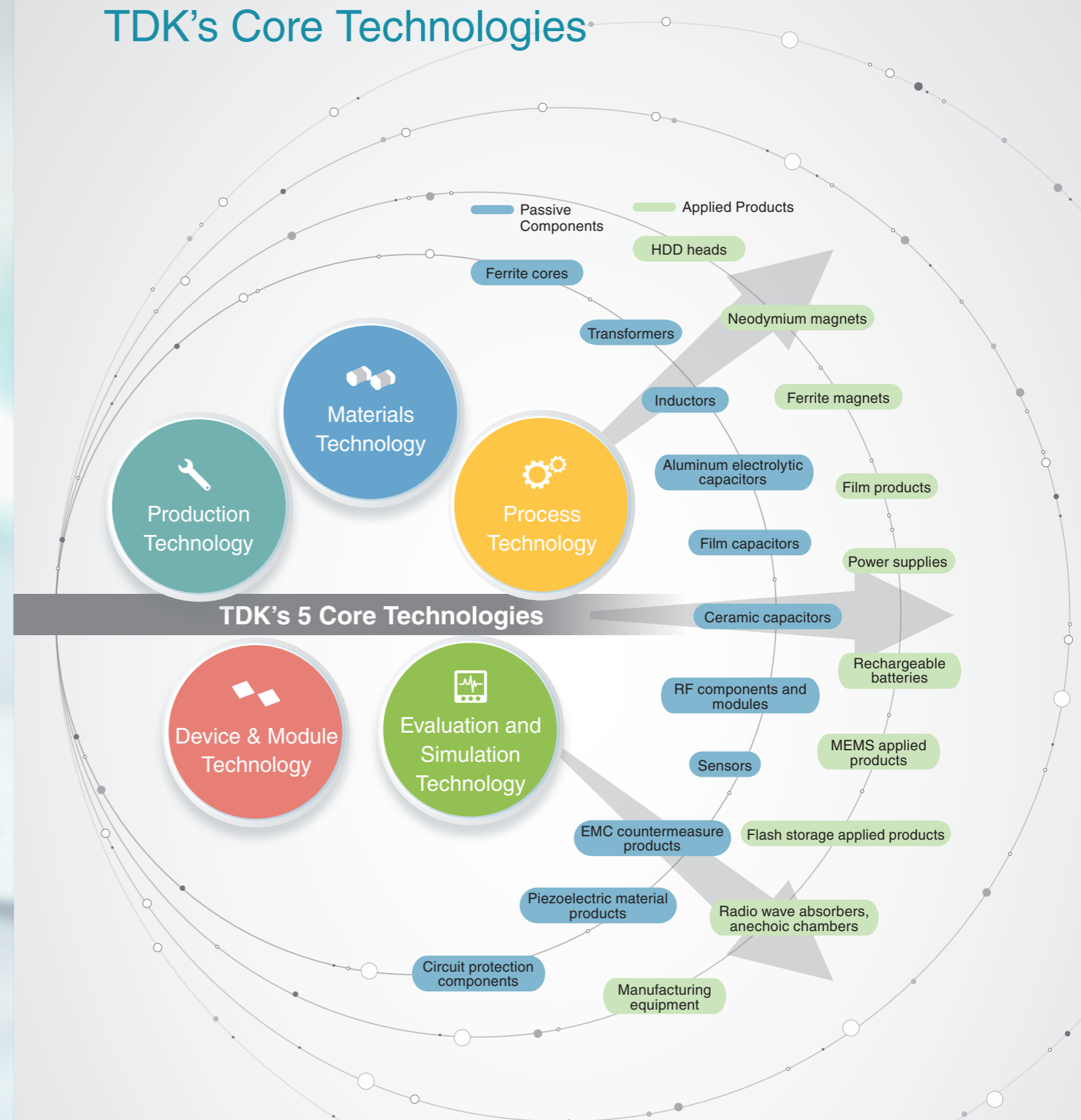
92.1
%

Sales ratio for our three key markets: automotive, ICT and industrial equipment & energy*

To help us overcome the challenges of the current competitive environment, we at TDK have conducted reviews and revisions of our entire business portfolio over the past few years, implementing structural reforms including the optimization of our manufacturing sites. Because we have made a certain level of progress on these initiatives, we have now concluded large-scale structural reforms. By focusing our business resources on our three key markets of ICT, automotive, and industrial equipment & energy, as well as our five priority segments as of fiscal 2014, we secure growth and make the shift to a balanced profit structure where we can boost profits in each segment.

* Includes HDD heads and suspensions

TDK's Core Technologies



TDK's starting point was the magnetic material ferrite. Over the years, we have developed superior competence in five core technologies that sustain our range of sophisticated and industry-leading products: materials technology, process technology, evaluation & simulation technology, device & module technology, and production technology. This has resulted in an ongoing succession of outstanding products. TDK is making full use of its worldwide network linking Japan, China, other Asian countries, Europe, and the U.S. Specific priority operation fields have been defined for each region, enabling us to pursue R&D at the cutting edge of technology in order to anticipate and meet highly sophisticated demands. While further deepening and nurturing our core competencies, TDK is driving progress and pursuing next-generation technology targets in areas such as magnetic sensors utilizing TMR elements developed for HDD heads, wireless power transfer systems for charging without cables, powerful next-generation magnets, and ultra-compact low-profile SESUB modules with chips embedded in the substrate.

ICT Network

Dr. Oliver Dernovsek (right)

Head of Multilayer Business Unit
Piezo and Protection Devices BG

Monika Haindl (left)

Engineer in PPD's Corporate R&D team
Piezo and Protection Devices BG

High-performance and extremely sensitive chips and LEDs used in smartphones, for example, need effective protection against electrostatic impulses that can occur when you touch a key, the USB or audio jack, or even the metal casing. The challenge is to engineer a protection component that is tiny and thin enough to fit in a highly integrated device like a smartphone and yet able to absorb up to 25 kV. This led us to focus our attention on developing a new ceramic material and tailored processes for the smallest case sizes. It took an interdisciplinary R&D team of material, process, and product development engineers and operators, working closely with product marketing managers, to come up with the right solution. The necessary combination of basic and applied R&D is truly an art, but that's what makes my work so varied and rewarding. Through our new development we have created a highly efficient CeraDiode® that needs significantly less ceramic, metal and energy to manufacture.

The highly efficient CeraDiode® needs significantly less ceramic, metal and energy to manufacture.



Protect high-performance and extremely sensitive chips and LEDs in smartphones from destruction by electrostatic impulses.

The CeraDiode® family of multilayer varistors combines innovative micro core technology with a new and extremely efficient semiconductor zinc oxide material that possesses significantly more grain boundaries. The result is the world's most compact and flattest overvoltage protection components that are able to absorb electrostatic pulses of up to 25kV.

Automotive

Hiraku Hirabayashi

Design Team Leader
MR Sensor Development Group
HDD Heads Business Group
Magnetic Heads & Sensors Business
Company
TDK Corporation

We asked ourselves if TDK's renowned TMR elements from the HDD sector might be suitable for creating new business opportunities in other areas as well. This led to the start of angle sensor development in 2009. Angle sensors used in cars must withstand a wide range of temperatures from very low to very high while continuing to maintain high detection accuracy and stable operation for many years. Although based on HDD head technology, the product concept for the sensors underwent considerable changes. After many interviews with customers and countless trial and error sessions, we were eventually able to successfully develop a high-accuracy power-saving TMR angle sensor that was five years in the making. The compact dimensions and light weight of the new sensor even make it possible to use a redundant setup of multiple sensors, allowing quick switch over in the rare event that one should develop a problem. This is very difficult to realize with conventional sensors. In 2014, a major car manufacturer decided to adopt the sensor for its electric power steering (EPS) system, prompting us to begin mass production. In future, the sensor will also help to improve steering stability in autonomous driving vehicles which are getting closer to practical realization. But this is only the beginning. TMR elements have the potential for playing a useful role in solving various issues that customers and society at large are dealing with. We will be developing products aimed for example at the industrial equipment and ICT sectors, in keeping with our motto of "Contribute to culture and industry through creativity."



Enhance steering stability and contribute to driving comfort

Magnetic sensor with highly accurate angle detection. Drastically smaller and lighter than earlier sensors, the product also contributes to energy savings

Taking advantage of its technological expertise regarding TMR elements, acquired during the development and manufacture of HDD heads, TDK has successfully created the first practical automotive TMR angle sensor. Compared to conventional resolver type sensors, the new sensor consumes much less energy and is not only smaller and lighter but also provides very high accuracy while being able to withstand the extreme temperature environment that exists in a car. It can function as an essential component for detecting the steering angle and implementing angle control in EPS motors. It is destined to become a groundbreaking product for the magnetic sensor business.

Industrial/ Energy

Kazuki Iwaya

Group Manager
1st Design Group
New Energy Technology Department,
Technology Division
TDK-Lambda Corporation

In the modern world where product applications are becoming ever more diversified, the wish most strongly voiced by many customers is energy conservation. The EZA series of bidirectional DC-DC converters was created in response to this demand. In conventional power supplies, energy travels only in one direction. With the new product on the other hand it becomes possible to configure systems with a bidirectional energy flow, for example storing renewable energy in batteries and releasing the energy as required. In order to realize isolated and highly efficient power conversion, digital control technology was introduced, and optimizing the switching operation became a key aspect that presented developers with a considerable challenge. As this was a first for us, a number of preparatory steps were required, including company-internal briefing sessions and verification of the conditions for product safety and reliability. At the same time, we were conducting repeated trial and error experiments jointly with the customer to realize the necessary functionality and achieve higher performance. In product development, we are always looking for ways to please and surprise the customer, creating excitement through new and promising solutions that did not exist before. For the developer, this is a real thrill and also a challenge. Effective energy saving from now on will not be possible without power converters offering both high efficiency and high performance. Looking toward the smart grid and the effective utilization of renewable energy sources such as solar power, and with the aim of bringing about a truly energy conscious society, we will be exploring ways of further increasing the efficiency of power conversion and keeping energy losses at an absolute minimum.

Bringing joy and excitement to customers by creating products that didn't exist previously



An important platform for power conversion.
Bidirectional DC-DC converters support utilization of renewable energy

The high-performance bidirectional DC-DC converters of the EZA series implement digital control and other advanced technology features to achieve high efficiency and the capability for seamless two-way conversion. They are designed for use in power supplies that handle the exchange of power between a DC bus and storage systems. This technology is indispensable for storage systems that efficiently use renewable energy sources such as solar power generation. The EZA series will contribute to the energy usage patterns of the future that combine the smart grid with an overall energy-saving approach.



TDK's Vision for Future Society

At TDK, we consider it our mission to utilize our unique products and technologies for the greater good. Based on this vision, we seek to maximize the possibilities of the world of electronics. Here we outline our proposed contributions to the future.

Early disease detection and preventive medicine help protect a healthy lifestyle

Contributing to the medical and healthcare sector

As the percentage of elderly people is on the rise around the world, particularly in developed countries, the focus is increasingly on how to ensure a long healthy life expectancy rather than simply extending the average life span. The wide and varied product portfolio of TDK is enabling new scenarios and opening up application possibilities in areas such as preventive medicine and healthcare. In the field of magnetic sensors for example, a sensor for measurement and visualization of the magnetic field distribution in the heart was introduced for the first time worldwide. Unlike earlier devices, the sensor used for this task has portability at normal temperatures and can therefore more easily be used for the diagnosis of heart disease. It is also expected to become an important tool in the diagnosis of muscle and neurological disorders as well as in rehabilitation and sports training situations. Wristband type or necklace type wearable healthcare devices all need a battery and suitable sensors in order to monitor vital signs such as breathing rate, heart rate, and blood pressure. Connecting such wearable devices wirelessly to a smartphone makes it possible to transmit the detected data to a physician or family member at another location, for 24-hour, 365-day medical monitoring. In the IoT domain as well, TDK's ultra-miniaturized low-power communication modules are expected to prove highly useful.

Sensing technology sustains the realization of a safe and dependable automotive environment

Contributing to the automotive sector

For more than 40 years, TDK has been offering a broad portfolio of auto related products. Benefiting from our extensive expertise in this area, we are now increasingly focusing on magnetic sensors that apply magnetic head technology to various sensing tasks. Besides angle sensors that are indispensable for power steering control systems, rotation sensors and linear encoders for position detection as well as various other sensor types optimized for automotive use are contributing to improved fuel economy and comfortable driving. As sophisticated driving assistance systems such as inter-vehicle distance control and autonomous emergency braking are evolving and the dream of the autonomous driving vehicle is becoming a reality, TDK sensing technology has tremendous potential. Various sensors with high sensitivity and high performance can act as the "eyes" and "ears" of a car, providing information about its location and surroundings and augmenting or even replacing the five senses. Such sensors have an increasingly important role to play. Self-driving cars will not only make road travel easier and more convenient, they are also expected to significantly reduce the number of accidents due to human error. Through its engagement in one of the key technologies for the realization of this goal, TDK continues to contribute to the creation of a safe and secure car society.

