# TDK Branding: A New Beginning Attracting Tomorrow

Looking toward the next era, and in order to further grow as a global company, TDK believes that it is important to be recognized as an entity whose existence is of value to society. We are now in the process of redefining the corporate image and fostering a corporate brand that will ensure renewed recognition among a wider audience.

The verb "attract" is used to describe how a magnet draws iron. It also has the meaning of captivating and fascinating people. On the basis of our core competence in magnetics technology, TDK has continued to create new technological frontiers with the capacity to change the future. Rather than just waiting for the future to happen, we should seek to attract it with our own will and effort. This is the sentiment contained in TDK's "Attracting Tomorrow" message.

## The Next TDK

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**TDK corporate brand site opened** http://www.attractingtomorrow.tdk.co.jp/en/

# New Medium-Term Plan

Starting from fiscal 2016, TDK has enacted a new Medium-Term Plan which covers the three-year period to fiscal 2018. While building on the results of the structural reform of the past three years, the new plan actively targets further enhanced corporate value through sustainable growth.

#### Looking back on the previous Medium-Term Plan (Fiscal 2012 to Fiscal 2015)

Prior to the new Medium-Term Plan, the TDK Group implemented a thorough structural reform in fisccal 2012, with the aim of strengthening its corporate backbone and ensuring that it can deal properly with changes in the external environment.



• Promote consolidation of domestic and overseas bases • Sell off idle assets

- Optimize human resources and sites • Streamline organizations and business processes
- Concentrate Management Resources on Growth Markets and Core Businesses • Offer thin-film products utilizing magnetics / HDD head technology
- Strengthen materials technology and process technology (core technologies), Develop ultra compact, high-performance passive components

Balanced Earnings Structure Realized -• Strength concentrated on five key business sectors: inductive devices, high-frequency components, piezoelectric material components, HDD magnetic heads, and recharge-

Until fiscal 2015

• Stable earnings from three segments: passive components, magnetic application products, film application products

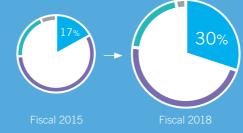
Net Sales Exceed ¥1 Trillion for the -Increased product delivery to three key

- markets: Automotive, ICT Network, and Industrial Equipment and Energy
- Market capitalization exceeds ¥1 trillion in December 2014

## Point 1

As in the past, the new Medium-Term Plan defines a growth strategy for five key business sectors in the three key markets "Automotive," "ICT Network," and "Industrial Equipment and Energy." It also puts the spotlight on new businesses.

Increasing automotive sales to 30% of total As automobiles rely more and more on electrical and electronic equipment, demand will rise not only for conventional parts such as capacitors and inductors, but also for customized products including magnetic sensors and automotive chargers. The emergence of new markets such as for wireless power transfer systems is also on the horizon, which will further stimulate demand. In the course of actively promoting these developments, we aim to raise the share of the automotive sector in our total net sales from currently 17% to 30% by fiscal 2018.



## New Medium-Term Plan

In accordance with its basic policy of fostering collaboration within the group to realize further growth, the TDK Group is pursuing "zero defect quality" based on superior technological competence, and promoting true globalization through speedy management.

#### Background

- Impact of Natural Disasters -• Great East Japan Earthquake, Interruption of parts supply chain by Thailand floods
- Economic Environment -• European debt problems leading to economic recession and exchange
- rate fluctuations Structural Problems of TDK -Delay in response to increased
- smartphone-related demand in ceramic capacitors business • Reduced competitiveness of major
- customer in RF modules business
- Unbalanced earnings structure relying mainly on magnetic application products, in particular, HDD magnetic heads

#### From fiscal 2016 to fiscal 2018



## Point 2

### New Businesses in Growth Fields

Ratio Target of New Business

In the medium-to long-term perspective, it is important to not only focus on our five key business sectors but also to create new business opportunities. On the strength of our strategic global R&D framework, we are making full use of the rich and varied technological resources that the TDK Group has built up over time. In particular, advanced thin-film technology gained from the development of HDD heads is being adapted to thin-film components, magnetic sensors, SESUB products, energy units and other products. The target figures for these new businesses by fiscal 2018 are sales in excess of ¥100 billion and a ratio of 8% of our net sales.



materials technology derived from the passive components field enables expanded marketing of new products



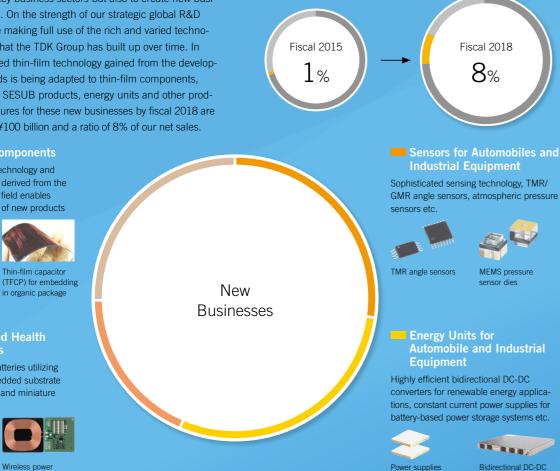
Thin-film power inductor

Wearable and Health Care Devices

Increased sales of batteries utilizing semiconductor embedded substrate (SESUB) technology and miniature module technology



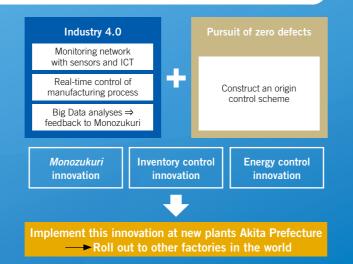
Semiconductor Wireless power embedded substrate transfer coil units (SESUB)



## Point 3 Monozukuri Innovation (Zero defect quality based on high technology)

TDK is pursuing a "zero defect quality" policy, based on the "Industry 4.0" concept. This is a collective term for an approach currently being promoted by the German government, aimed at revolutionizing the way things are made, by drastically intensifying the level of digitization, automatization, and virtualization. At TDK, we are incorporating "Industry 4.0" concepts such as sensor based monitoring and real-time control of production processes, and we are combining these with upstream management, narrowed tolerances, and other aspects of our quest for zero defects, leading to TDK's unique Monozukuri revolution.

In 2016, we plan to implement these at new plants in Akita Prefecture. Subsequently, the approach will be expanded to other plants and bases around the world, with the aim to achieve "location free" whereby the same quality can be achieved regardless of the actual production location.



converters

## Point 4 Growth Investment and Achieving Management Target in Mid Term

We are actively engaged in enhancing productivity in existing fields, rationalizing manufacturing processes, expanding investments in new products and new businesses, and pursuing M & As. Including the construction of new plants in Akita Prefecture, total facilities investments over the 3-year period of the Medium-Term Plan are planned to be ¥350 billion to ¥400 billion.

For fiscal 2016, the budgeted figure is ¥130 billion. With regard to R&D investment, ¥230 billion are planned for the 3-year period of the Medium-Term Plan, and ¥77 billion for fiscal 2016.



"Location free" from New Plants in Akita Prefecture



ROE

an operating income ratio of 10% and ROE of 10% by fiscal 2018.

	Total investment over the next 3 years (Mid-Term Business Plan)	Fiscal 2016 projections
Capital Expenditure	¥350-400 billion ¥130 billion	
R&D Investment	About ¥230 billion ¥77 billion	
Contents of Investment	<ul> <li>Production capacity increase in the 5 core businesses</li> </ul>	

**Over 10%** 

7.2%

#### SPECIAL FEATURE

# **TDK's Competitive Superiority** Established over the Course of 80 Years

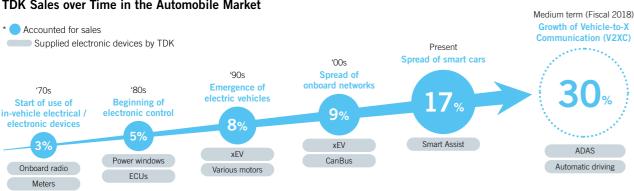
Following its corporate motto of "Contribute to culture and industry through creativity," TDK has used its technical expertise in magnetics technology ever since the company's founding to create products that are truly of use to society. While strengthening our operations in the key areas of the automotive, ICT Network, and industrial equipment & energy, we are operating on the leading edge of technology, developing products that are beyond the reach of our competitors.

## Contributing to the Evolution of the Automobile through Electronic Components

#### TDK Turned its Attention to the Electrification of the Automobile from Early on

The prevalence of electronic equipment and therefore the number of electronic components found in an automobile is still on the rise. To take just one example, whereas the combustion engine used to be the central part of the power train, electrical systems and electrical motors are increasingly being incorporated to save energy and to create a more sophisticated system Furthermore, society demands that automobiles be safe and dependable, and to meet these requirements the technology for electronic control of brakes, steering, and other aspects is also advancing. On the other hand, reducing the weight of automobiles is another important requirement as this contributes to improved fuel economy

to the electrification of the automobile and started to offer magnets for motors at first, and successively a range of products for the automotive field, including inductors, capacitors, and so on. Products for automotive use are subject to particularly high reliability requirements as they deal with safety and security. And because high quantities are used, manufacturers cannot easily switch the product on the grounds of cheaper cost. The large TDK portfolio for the automotive sector comprises not only passive components but also magnets, power supplies, and various other products. Providing exactly the right product that meets the customers' specifications, and delivering it promptly and in large quantities is the source of our strength.



\* xEV: HEV, PHEV and EV

#### Focus

TDK's DNA – The Persistent Progress of Magnetics Technology

TDK was established as a corporation in 1935 to achieve the world's first commercialization of the magnetic material ferrite. Although ferrite is a magnetic substance, it has a higher electric resistance and lower thermal losses than metal, making it resemble the characteristics of ceramics. TDK has accumulated extensive expertise in materials technology related to magnetics, encompassing material composition, powder control, and microstructure control. This allowed us to successfully create various electronic materials for dielectric, piezoelectric, and semiconductor applications. Further combination with coating technology,



#### **TDK Technology Supports Automotive Progress**

Fields on which TDK will focus in particular from now on are magnetic sensors. These sensors enable finely graded control of power steering, and thereby contribute to lower fuel consumption and reduced power requirements. By harnessing magnetic head technology that is TDK's forte, the steering angle can be detected with superior precision and minimal tolerance. We are expecting to supply these sensors to fuel economy-conscious car manufacturers in Japan, Europe, and the U.S. and will begin mass production in Japan from fiscal 2016. We further intend to apply the technology also to rotation sensors and to linear encoders for providing position information. The ultimate aim is to turn the sensor business into a future pillar of earnings.

For somewhat further down the line, we also have the configuration of wireless charging systems in view. Toward this end, we concluded a technology transfer license agreement with WiTricity Corporation in April 2014. By applying our expertise in magnetic materials technology and circuit technology, we are working toward the early realization of wireless power transfer systems for electric vehicles and other mobility applications.

Automotives are continuing to evolve, changing in response to the demands of society and concerns for the environment. TDK is wholeheartedly supporting these developments by supplying advanced electronic components.

Beginning more than 40 years ago, TDK directed its attention

#### TDK Sales over Time in the Automobile Market

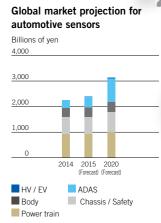


sintering technology and other advanced techniques resulted in a wide range of products.

Magnetics technology therefore is in TDK's DNA, and it is at the root of our competitiveness on the market. But it also is a field that has no end point, as its possibilities are endless. Significant advances are expected for nextgeneration applications such as health care and wearable devices. We will continue to explore this amazing field and work towards creating new and innovative products.







Notes

- 1 The market size is based on the shipment values at manufacturers
- 2. The numeric values of 2014 are actual values and those of 2015 and 2020 are forecast.
- 3 Since the values are rounded, some parts of total and ratio within the table do not coincide
- 4. There are different types of sensor devices such as magnetic sensors and MEMS (Micro Electro Mechanical Systems) sensors. This research only targets sensor devices that are embedded for passenger cars and commercial vehicles that weigh 3.5 tons or less.

Source: Yano Research Institute Ltd. Global In-Vehicle Sensor Market: Key Research Findings 2015 Released September 1, 2015

#### SPECIAL FEATURE

TDK's Competitive Superiority Established over the Course of 80 Years

#### Focus

80 Years of Technological Expertise in Areas with a High Entry Barrier - In-House Development of Materials Technology and Production Facilities

Materials technology is constantly advancing. This is not a field where one can acquire expertise in a single, quick jump. Only through persistent and time-consuming efforts can real breakthroughs be achieved. TDK excels here because we have constantly pushed the envelope over the span of 80 years. Another advantage comes from the fact that we have also developed in-house manufacturing methods and equipment at the same time.

In the world of electronic components, there is extremely fierce price competition, and Asian companies that rely on low labor costs tend to dominate. If a company only offers products that can also be made by others, it is bound to compete on price alone, and competitiveness can easily be lost. To get the ultimate performance out of source materials, advanced production facilities are an absolute must. This is why TDK has never simply relied on externally

# Driving Innovation in the ICT Sector through Electronic Components

#### ICT NETWORK

#### **Contributing to ICT Progress**

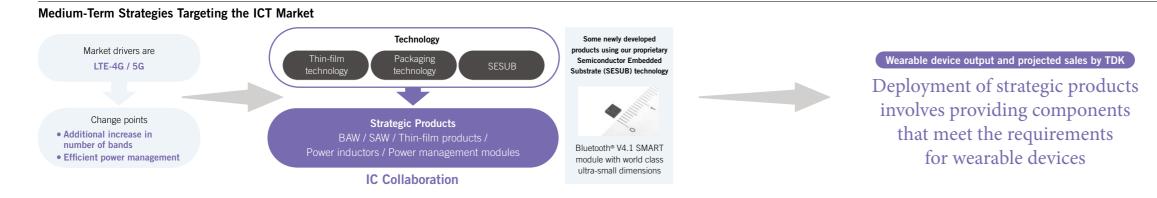
ICT products including smartphones, tablets, and personal computers continue to evolve into a high-level social infrastructure intricately connected via wired and wireless networks. In recent years, the increasing amount of information means that more and more data has to be communicated at higher speeds. In this area, TDK is focusing on the progress of LTE, and we also expect the 5G market to emerge eventually. Terminals that support LTE incorporate more complex circuitry, which calls for components with reduced space requirements, as well as highly effective power management. The TDK product range includes SAW filters that support the frequency bands currently used by mobile phones and smartphones, but we are

already one step ahead. Looking towards the 5G market and beyond, we have BAW filters suitable for the entire range up to the very high frequency bands that cannot be handled by SAW filters. We will aggressively pursue further development of SAW/BAW filters for such applications.

In the ICT area we also expect growth in demand for our actuators which are piezoelectric material components used in camera modules. Voice coil motors (VCM) for autofocusing and optical image stabilizers (OIS) are currently increasingly being used smartphones for the Chinese market, and further increases in sales are to be expected.

#### Strategy Going Beyond Smartphones

The shipping volume of smartphones has up to now drastically risen, but there are signs that the trend is slowing compared with the time when these products were first introduced. However, the move to LTE and the changeover from 3-mode to 5-mode support means that smartphones are still changing and evolving, and the demand for electronic components can therefore be expected to keep growing. However, TDK is not simply basing its projections on smartphone growth alone. We are already putting new strategies in place for the coming age of the Internet of Things (IoT). This term refers to a world where all kinds of things will have connectivity and will be able to link to each other and to the Internet. This will enable automatic recognition and automatic control on a previously unheard-of





procured equipment. Even if competitors conduct research on our products, this does not mean this they are able to gain an understanding of the processes that are needed to manufacture them. Therefore the products cannot easily is duplicated. We value our in-house production facilities highly because they allow us to flexibly respond to product demands, providing the required performance and adjusting production efficiency.



Materials technology

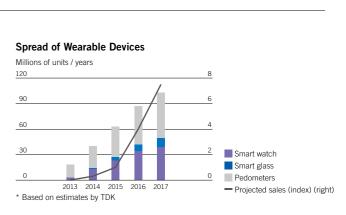




Production facilities developed in-house

scale. We believe that collaboration with chip designers will be a key strategy for the ICT market in this regard, and we are working towards the development of module products in conjunction with chip manufacturers and semiconductor manufacturers. The final target is the creation of products and solutions with high value added including also packaging and design aspects.

The wearables market is taking off, and we expect to offer an expanded range of strategic products also for this market in the future. We are actively pushing ahead with the development of proprietary technologies that are indispensable in this area, such as semiconductor embedded substrate (SESUB) and embedded thin-film capacitors (TFCP).



TDK's Competitive Superiority Established over the Course of 80 Years

#### Focus

#### Producing the Same High Quality all over the World – Location Free and Zero Defects

The new plants currently under construction in Akita Prefecture will be championing two concepts, namely "location free," whereby the same quality can be produced at any site, regardless of factors such as labor cost, personnel proficiency, and geographical location, and "zero defect quality," whereby no nonconforming products are allowed to emerge. Location free involves the use of a large number of cameras and sensors to realize a integrated production line from the materials preparation stage all the way through to assembly. The concept is already partially implemented at Sakata Plant of TDK Shonai, but after full completion in Akita we are planning to expand coverage first to China and then to other overseas production bases. The other concept is "zero defect quality" involves optimizing the product configuration and manufacturing process from the development and design stage and implementing thorough upstream control so that no nonconforming

Contributing to Next-Generation Industrial Equipment & Energy

INDUSTRIAL EQUIPMENT & ENERGY

#### **Towards a Clean & Smart Social Infrastructure**

Smart cities implementing the next-generation power distribution concept called the smart grid are being built in various locales, with the expectation that they will serve as models for the sustainable social organization of the near future. Such developments so far were pursued mainly in Europe, but are now spreading on a global scale. TDK is already supplying a wide range of power electronics products for renewable energy applications such as solar power and wind power systems. This includes, for example, step-up reactors that convert power for feeding into the grid, aluminum electrolytic capacitors for high-capacity storage, and bidirectional DC-DC converters which serve as vital power conversion platforms. These products contribute significantly to maintaining power quality and ensuring high-efficiency conversion.

TDK is currently bolstering its lineup of energy devices for renewable energy applications, while at the same time harnessing its core competence in magnetics technology to expand sales of power-related products designed for controlling and supplying power.

#### Energy Device Growth Scenario / Industrial Equipment & Energy Fields

- Strengthen energy devices for renewable energy-related systems
- Promote the sales of power components drawing on magnetics technology, which is TDK's core competence

2015-2017

Dy\*-free magnets with Nd\* reduced by half for wind power generation

Lead-free piezoelectric material (CeraLink) High-capacity high-efficiency power supplies

Secondary batteries (Storage battery systems)

Wireless-charging system for industrial equi

\* Dy: Dysprosium Nd:Neodymium Both rare earth elements

Rare-earth-free / strongest magnetic materials for wind power generation

Lead-free piezoelectric materials (thin-film, bulk)

Secondary batteries (Stationary type, high-safety battery technology)

#### **Providing Solutions Centered on Highly Capable Industrial Sensors**

In the industrial equipment sector, we are marketing strategic products, in particular, wireless power transfer systems and magnetic sensors. Smartphones and automotive applications are the starting points for wireless power transfer systems, but many more applications are conceivable, such as hybrid buses, catenary-free streetcars, cable-less elevators, and more. For example, the principle of a hybrid bus as currently tested under government guidance is as follows. The charging station has a primary coil embedded in the road, and the secondary coil is located under the floor of the vehicle. The bus is stopped so that the two coils face each other. An inverter in the charging station converts the commercial power supply and sends the output to the primary coil. According to the principle of electromagnetic induction, the power is transferred to the secondary coil and is used to charge the battery of the bus.

With regard to magnetic sensors, development efforts are currently under way to enable use, for example, as encoders (position-detecting sensors) for linear motors, as well as applications for industrial robots. The magnetic sensors supplied by TDK benefit from the magnetics technology expertise gained through the development and manufacture of HDD heads. This makes them highly precise in position and angle detection, and they also feature high output and excellent thermal characteristics. The robotics market is considered one of the growth areas for the future.





products are allowed to emerge. This is based on TDK's belief that quality cannot be assured in a final inspection. Consequently, the final inspection process has been changed into a sampling inspection for nonconforming products. The realization of zero defects enables us to deliver high-quality products that meet the needs of our customers.

TDK Monozukuri revolution = "TDK Industry 4.5"			
Utilization of IoT, robots, big data			
+			
Intensification of TDK's unique upstream management			
Variation Improvement	Eradication of product-destroying operations and actions		
Location free production line configuration			
Realization of zero defects			

Target Equipment (examples)		
Wireless-charging	Hybrid buses	
	Catenary-free streetcars	
	Cable-less elevators	
TMR / GMR sensors	Linear motor encoders	
	Industrial robots	





NC (Numeral Control) machine