

Special
Feature

The Start of a New “Nonlinear Progress”

Over the years, TDK has achieved sustainable growth through “nonlinear progress,” our ability to remain alert to the future needs of society and make bold changes in our business portfolio before existing businesses enter a period of maturity. Today, in anticipation of the future before us, we are taking our powerful first steps toward a new nonlinear progress.

Re-invention



1935

Development of ferrite cores



1968

Development of magnetic tapes



1980

Development of fine multilayering technology



1987

Development of HDD magnetic heads

2005

Acquisition of ATL, Hong Kong-based manufacturer of lithium polymer batteries

2008

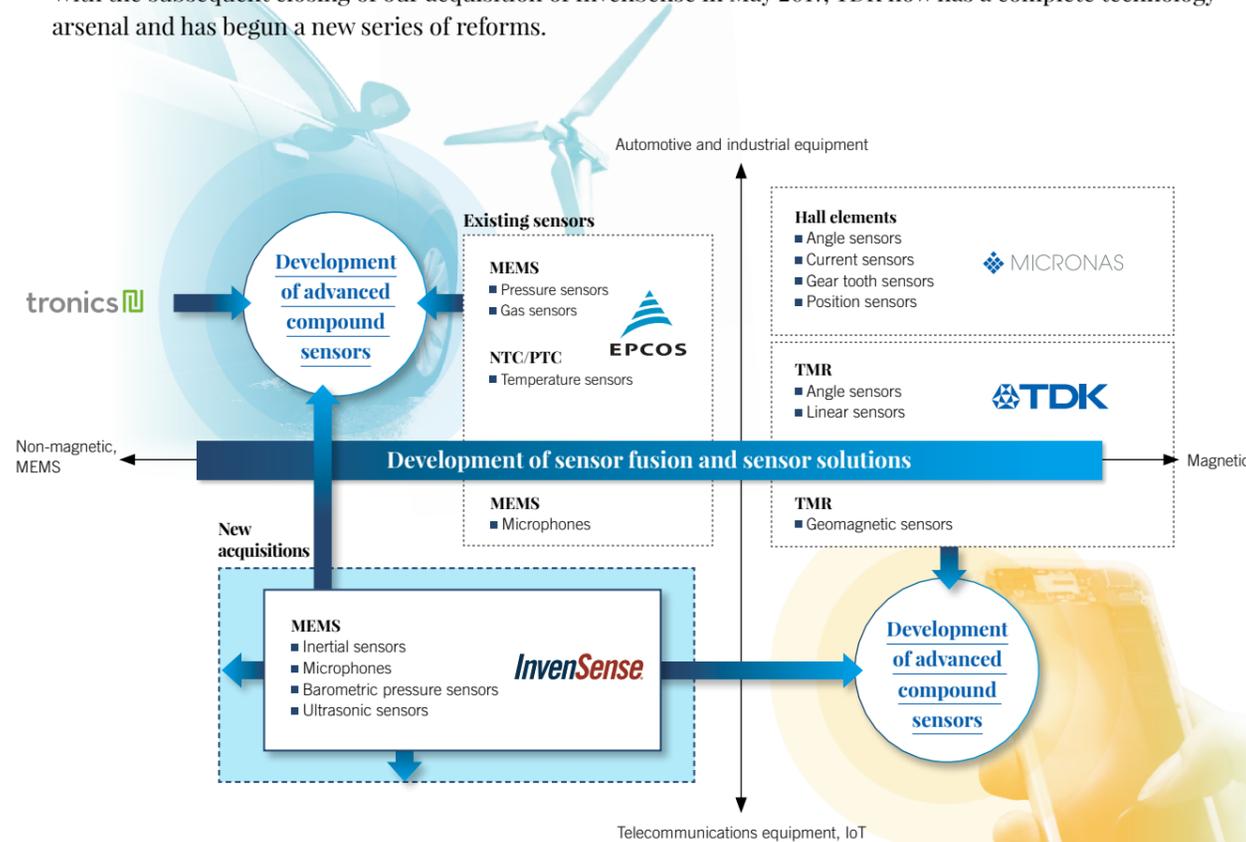
Acquisition of the EPCOS Group, a German electronic device manufacturer

Power of Synergy



A Complete Technology Arsenal

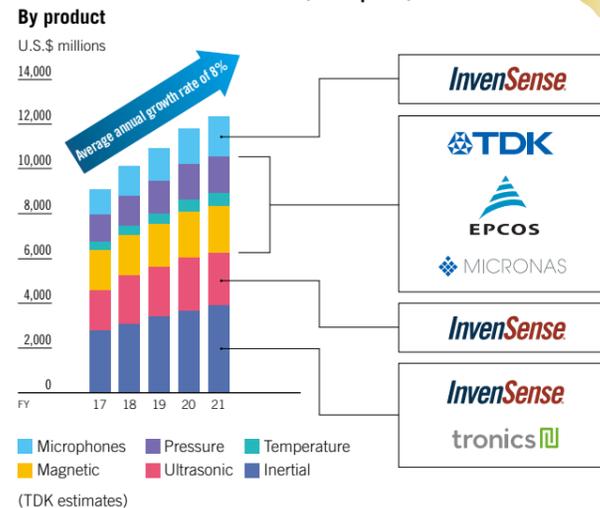
Beginning with our agreement to acquire Micronas at the end of 2015, TDK has pursued aggressive M&As, primarily in the sensor field, and we have quickly moved to deepen our relationships with IC manufacturers, starting with Qualcomm with which we established a joint venture to provide high-frequency components. With the subsequent closing of our acquisition of InvenSense in May 2017, TDK now has a complete technology arsenal and has begun a new series of reforms.



Target Markets

Demand for the non-optical sensors TDK considers its target is expected to grow at an annual rate of 8% up to fiscal 2020. Through its acquisition of InvenSense, TDK has obtained a platform for sensors based on micro electro mechanical systems (MEMS) technology, putting the entire non-optical sensor market within range. It has also allowed us to expand our target from our previous focus on the automotive market to other fields, including mobile and IoT, enabling us to build a more balanced product portfolio.

Outlook for Global Sensor Demand (Non-Optical)



Key Factors behind New Reforms

Speed

The source of competitiveness in business lies in the speed with which needs can be captured, prototypes can be offered, and those new offerings can be incorporated into products and solutions, and thus the cycle also leads to improved profitability. TDK is engaged in a Companywide effort to increase the speed at which it does business.

► Speed-Related Synergies with InvenSense

1. Ability to offer solutions

The speed with which InvenSense is not only able to develop software, but to take a concept from the initial capturing of market needs to actually providing a solution, will enhance the ability of the TDK Group as a whole to offer solutions.

2. Accelerated prototype development through in-house manufacturing

InvenSense is a fabless operation, and by bringing their production in-house within the TDK Group, we will significantly shorten the time required to provide prototypes, as well as the time needed to offer solutions.

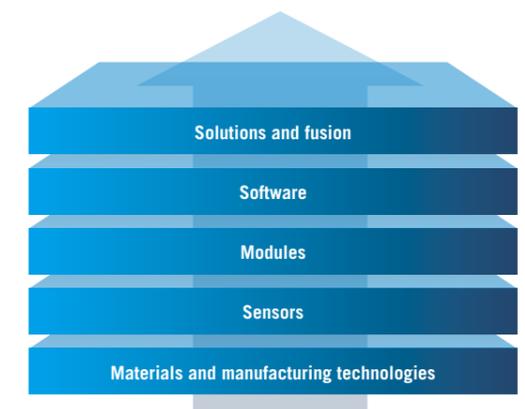
► Accelerated Cycle Times

TDK is working to not only reduce lead times between development, manufacturing, and sales, but is pushing to cut non-value-added time Companywide, including in the back office, thus accelerating the entire business cycle (□ P.59 Manufacturing).

► Building a Total Value Chain in the Sensor Business

With our acquisition of ICsense, which deals in ASIC development, TDK has built a consistent value chain, from materials to solutions and fusion. This will not only allow us to respond totally to our customers' needs from materials onward, but also increase the speed of business.

Customers and Business Partners



Driver of a New Business Model — Collaboration with Qualcomm

TDK's collaborative relationship with Qualcomm is a powerful driving force behind our new business model.

Key Collaborative Synergies

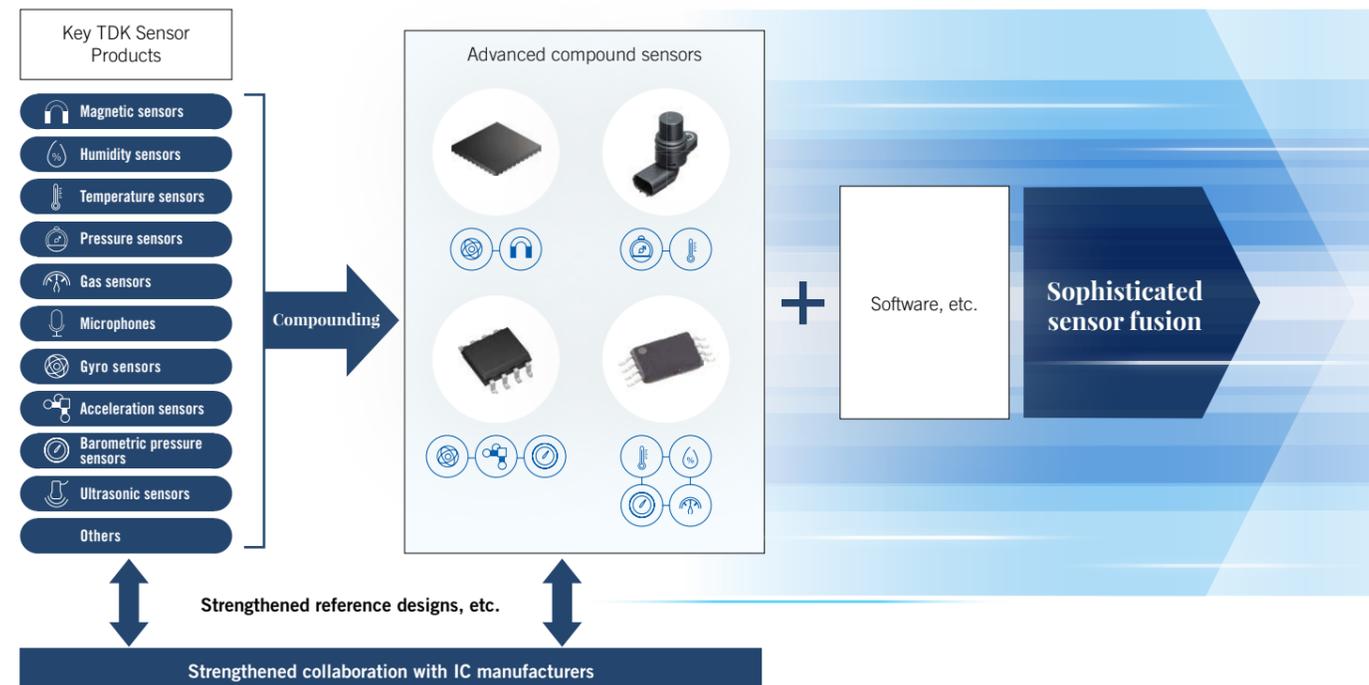
- The ability to use advanced RF solutions to provide integrated systems via the joint venture RF360
- Technical cooperation across a wide range of advanced technologies in next-generation mobile communications, IoT, and automotive-related sectors, including passive components, batteries, wireless power transfer, sensors, and MEMS
- Enhanced reference design capabilities through Qualcomm
- Early disclosure of Qualcomm technology road map

What TDK Can Do Sensor Solutions

With a full lineup of non-optical sensors, TDK is now prepared to respond to any market need. Our goal is to contribute to resolving social issues and become the world's No. 1 provider of sensor solutions by creating sensor elements that offer higher sensitivity, higher accuracy, and lower power consumption; by developing compound sensors and integrating sensors with arithmetic elements and memory; and, with the addition of software, by increasing added value through sensor fusion.*

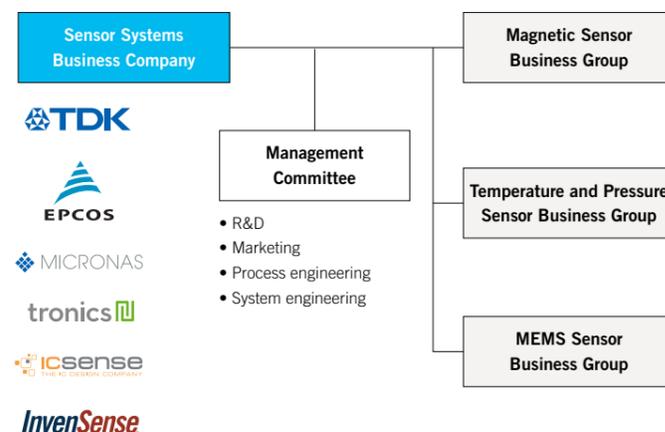
* Combining multiple sensors with software to achieve advanced sensing functions.

TDK's Goals for Sensor Solutions



Sensor Business Integration and Rapid Launch

TDK integrated some divisions and related companies belonging to disparate business domains by fiscal 2017, including magnetic sensors, temperature and pressure sensors, MEMS and microphones, etc., and established Sensor Systems Business Company. With six Group companies in 13 locations worldwide engaged in marketing and R&D efforts across the Group, we are aiming toward a rapid launch of the sensor business (note the addition of “Sensor Application Products” in our segment reporting beginning in fiscal 2018).



Examples of Compound Sensor and Software Application Solutions

Gyro Sensors + Software

⇒ Improved Workability and Efficiency

Gyro (angular velocity) sensors are used to detect the orientation and state of motion of a moving object. Familiar uses include car navigation systems, camera image stabilization, and more. Gyro sensors can be adapted for use in anything that moves. Used in combination with software in industrial and mobile robots, they contribute to improved workability and efficiency by enabling robots to create and learn new motions. Installed in wearable devices, they can detect a person's posture and movements, and may have applications in the sports and healthcare sectors.

Ultrasonic Sensors + Software

⇒ Improved Security

The use of biometric authentication systems involving passwords is expanding. One of these is a fingerprint authentication system with an ultrasonic sensor using MEMS technology. With excellent water resistance, it can read fingerprint and blood vessel patterns deep in the skin, eliminating the errors common with conventional methods. This makes high-performance fingerprint authentication systems possible, and contributes significantly to improved security. Depending on the software, ultrasonic sensors can be combined with wearable devices and used in near-field communications, offering a wide range of potential applications.

TMR Sensors + Hall Sensors

⇒ Improved Redundancy

Ultra-high-sensitivity TMR sensors, adapted from HDD head technology, and Hall sensors, a kind of sensor flexible enough to adapt to a diverse range of applications, are the two leading types of magnetic sensing technologies, and one of TDK's strengths is its lineup of magnetic sensor products. Angle sensors, rotation sensors, position sensors, and others each bring their distinctive characteristics to the automotive, robotics, and other fields. In addition, use of TMR sensors and Hall sensors together as a set enhances the likelihood that one or the other will maintain its sensor functions even in the harshest conditions, significantly improving redundancy.

Acceleration Sensors + Gyro Sensors

⇒ Improved Safety

Combining acceleration sensors with gyro sensors creates inertial sensors capable of detecting the attitude of a vehicle around three different axes: front and back, left and right, and up and down. The angular velocities around each of these axes are known as the roll rate, the pitch rate, and the yaw rate. During left and right turns, for example, the sensor detects angular velocity in terms of yaw rate, preventing drift, where the vehicle cannot turn, and spin, where the vehicle turns too far. This technology is also critical to ensuring the safety of autonomous-driving vehicles. Applications can also be expected for mobile robots.

Acceleration Sensors + Gyro Sensors + Barometric Pressure Sensors + Software

⇒ Improved Navigation Accuracy

Inertial sensors made up of acceleration sensors and gyro sensors can be combined with barometric pressure sensors to achieve highly accurate car navigation even on roads with height differences. Going forward, we will also see the development of software and systems that use AI to analyze and manage the information gathered by various automotive sensors, using it to inform the driver in the event of possible breakdowns or accidents. Automobile sensor networks, connected by the vehicle's engine control unit (ECU), will also connect to sensor networks in the IoT society to come.

Future Potential

Efforts are underway worldwide to utilize sensor networks as a means of improving the safety and economic efficiency of public infrastructure. The number of potential targets for sensing devices is innumerable, from railways and roads, to rivers, harbors, bridges, and steel towers. Because many of these involve dangerous working environments, sensor units equipped with internal batteries need to remain usable for long periods of time following installation. This is why the ability to offer highly durable, highly reliable sensor units will greatly enhance competitive advantage in the IoT market to come.



What TDK Can Do Power Solutions

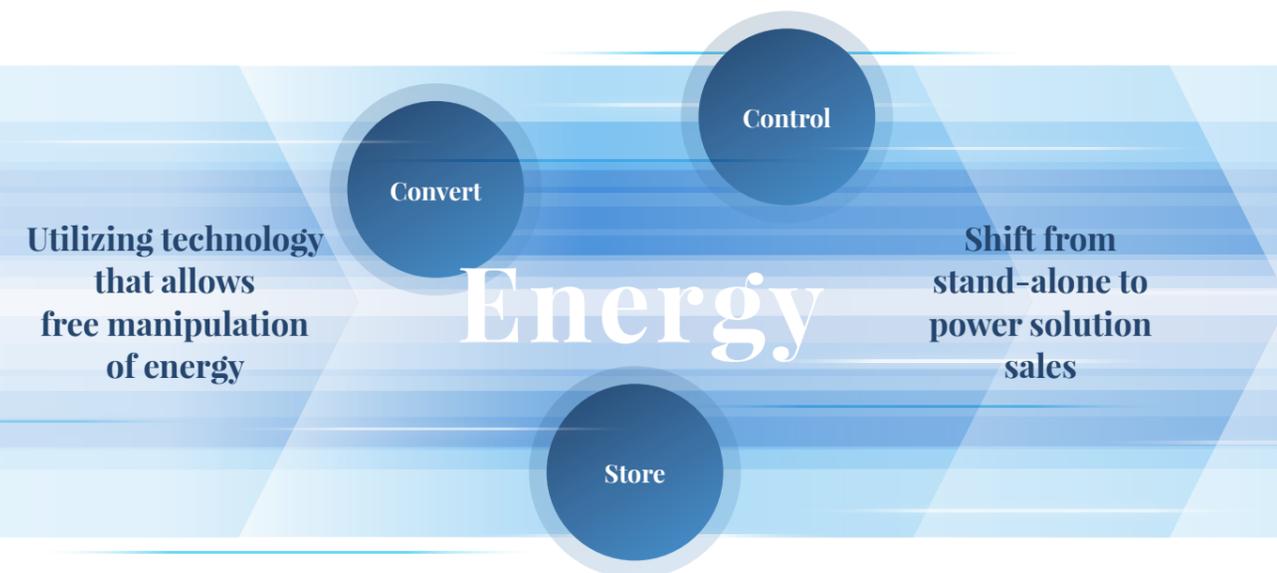
Complex Solutions That Leverage Competitive Advantage

Building on its strengths in high performance and reliability based on technology accumulated over many years, TDK is working to enhance its position as the leading manufacturer of batteries for consumer use, while also further expanding its range of energy-related products, including its rich lineup of power supply equipment. Leveraging our competitive advantage in developing products from the material and component stage, TDK will offer complex power solutions with high added value.

Expanding Power Solutions Unique to TDK

Today, TDK is focusing on power solutions in addition to sensors and actuators and next-generation electronic components.

Energy devices such as lithium-ion polymer batteries, as well as power supply equipment, generally relied primarily on conventional stand-alone sales. By pivoting to offer high-value-added units that combine these products with hardware and software, TDK's policy going forward will be to push aggressively ahead with proposals for unique power solutions in the three priority markets of automotive, industrial and energy, and ICT.



From its origins in the development of ferrite, an innovative magnetic material, TDK has continued to refine its core competence in magnetics technology, and today offers a diverse range of products related to core power electronics functions, including energy conversion, storage, and control. Utilizing our technology and expertise that allow for free manipulation of energy, we will develop highly-value-added power solutions.

Energy conversion-related products	Energy storage-related products	Energy control-related products
<ul style="list-style-type: none"> • AC-DC/DC-DC converters • Automotive inverters • Programmable DC power supplies • Bidirectional converters • Wireless power transfer coils • Drive power and power generation magnets 	<ul style="list-style-type: none"> • Lithium polymer batteries for industrial equipment • Electric double-layer capacitors (EDLC) 	<ul style="list-style-type: none"> • Battery management system (BMS) transformers • Battery management units (BMUs) • IGBT transformers • Sensors (current sensors, temperature sensors, etc.)

Examples of the Integration of TDK Elemental Technology for High-Value-Added Power Solutions

Power Transfer Coil Technology + Capacitor Technology + High Reliability Design Technology

⇒ Wireless Power Transfer System for Industrial Equipment

Expectations are high for the introduction of wireless power transfer systems in the industrial equipment sector as well, including for automated guided vehicles (AGVs) and robots, in terms of their ability to improve convenience, safety, and reliability, while reducing manpower and costs through automated charging. Envisioning a wide variety of applications, TDK has developed three platforms (1kW, 200W, 50W for rotating bodies) that allow for the building of wireless power transfer systems that employ advanced magnetic field resonance methods.

Ferrite Technology + Coil and Transformer Technology + Cooling and Heating Design Technology

⇒ On-board Chargers for EV and PHEVs

EVs and PHEVs are installed with on-board chargers used to charge the main battery. The chargers are comprised of a rectifying and smoothing block that converts commercial AC power to DC, a power factor correction (PFC) block, a DC-DC converter, and other components. One of TDK's strengths lies in the fact that it has commercialized a diverse range of electronic components that comprise on-board chargers, and can offer compact, lightweight, high efficiency on-board chargers that represent a concentration of power electronics technology.

Ferrite Technology + Power Conversion Technology + Circuit Design Technology + Coil and Transformer Technology

⇒ Regenerative Energy Bidirectional DC-DC Converters

In industrial equipment such as elevators and cranes that run on motors, braking of the motor releases wasted energy in the form of heat. Bidirectional DC-DC converters function to store that regenerative energy in a battery, providing a boost for stored power when the motor is started and requires a high level of power. TDK can offer comprehensive systems that integrate power conversion, storage, and control.

Ferrite Technology + Coil and Transformer Technology + Circuit Design Technology

⇒ AC-DC Power Supply Units for Storage Battery Charging

Power storage systems using lithium-ion batteries are widely used in peak cut and peak shift power demand systems as well as emergency power sources during disasters. TDK's AC-DC power supply units for storage battery charging utilize advanced power electronics technology to provide a constant-voltage, constant-current (CVCC) power supply optimized for charging storage batteries. The units offer particularly outstanding charging performance when used in commercial high-capacity power storage systems.

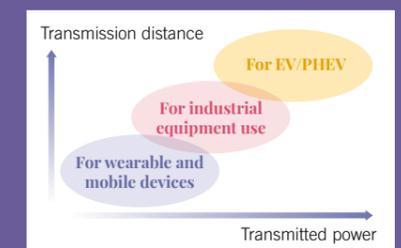
SESUB Technology + Circuit Design Technology + Assessment and Simulation Technology

⇒ Power Management Unit (PMU)

TDK's semiconductor embedded substrate (SESUB) is a proprietary substrate technology for embedding thin IC chips in a resin substrate, allowing for three-dimensional mounting of other components. Power management units installed in smartphones and tablet devices were developed using this technology. Power supply management functions, including DC-DC converter circuits, battery charging circuits, and LCD backlight power supply circuits are packaged in a single module, not only saving space, but enhancing heat discharge and noise characteristics.

TDK's Wireless Power Transfer System Development Portfolio

TDK's wireless power transfer systems, which target the three priority markets of automotive, industrial and energy, and ICT, feature a broad development portfolio that includes high-power systems for EV and PHEV use, medium-power systems for industrial equipment, and low-power systems for wearable and mobile devices. Our greatest competitive advantage is that we have the wide range of core technologies needed for system development, as well as many of the electronic components and devices that comprise those systems.



Strengths of Materials and Components Technologies for Enhancing Competitive Advantage

To enhance the competitiveness and sustainability of its new business model, TDK is working to build up the strengths of its components business, based on a foundation of materials and process technologies and integrated production, and the passive components they generate.

Strengthening *Monozukuri* (Manufacturing Excellence) Power

TDK is moving forward to expand its business in fields that require not only high efficiency, but also high reliability, including the automotive market, the industrial and energy market, and the healthcare market. Under our policy of pursuing “zero defect” quality in addition to the “Industry 4.0” concept, we are pushing ahead with *Monozukuri* reforms (□□P.60 Manufacturing).

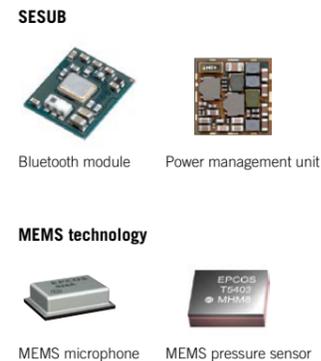


Strategic Background

Because their use is expanding in the automotive market and other fields involving human life, component quality is a critical issue both in terms of differentiation and reducing risk.

The Endless Pursuit of Compact, Low-Profile Technology

Going forward, requirements that IoT devices be compact, slim, and highly integrated are expected to increase even further. TDK continues to pursue highly competitive, compact, low-profile technologies, as typified by semiconductor embedded substrate (SESUB), and will promote the development of high-value-added next-generation electronic components and modules.



SESUB

This proprietary technology embeds integrated circuits thinner than 100μm three-dimensionally in the substrate, rather than mounting them on the substrate. Used in ultra-compact power supply modules and Bluetooth modules, this technology contributes to the development of thinner, more compact mobile devices. We are also working to develop more highly integrated modules and a wide range of other IoT device applications.

MEMS technology



Strategic Background

Responding to increasingly compact, lightweight, highly functional smart devices and IoT devices will require a new dimension in highly integrated design.

Fundamental Restructuring of the Magnet Business

In fiscal 2017, the magnet business recorded an impairment loss, due in part to a large number of production sites, process segmentation, and other structural issues. While working to incorporate demand for use in automobiles and wind power generation, which is expected to grow, we will undertake a fundamental restructuring of the business.

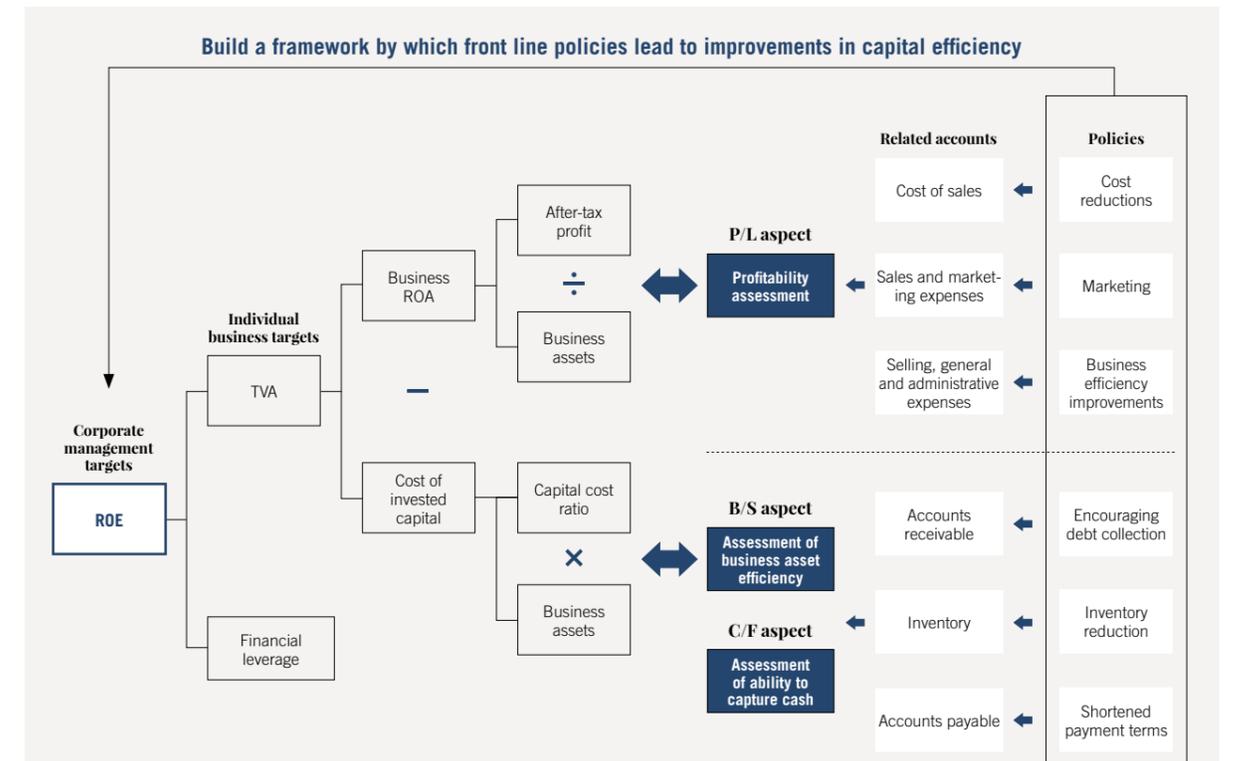


Strategic Background

We must ensure that demand for use in automobiles and wind power generation, which is expected to expand, leads to profitable growth.

Linking Strategy to the Front Lines

To ensure the solid execution of our growth strategy leads to improvements in profitability and corporate value, TDK is working to instill that growth strategy on the front lines. The performance management framework we are working to deploy calls for KPIs to be established by individual business division and site, and for an acceleration in the speed of business, which is key to our new business model. The goal of these efforts is to improve profitability Companywide. Investment effectiveness, including assessment of the efficiency of business assets and capital expenditures based on TDK Value Added (TVA, a proprietary index for evaluating performance), will come under even stricter monitoring, which will lead to an improvement in capital efficiency for the Company as a whole.



Accelerating the Speed of Business by Reducing Non-Value-Added Time

At TDK, we are working to reduce lead times based on three strategies: (1) getting an early start; (2) reducing non-value-added time (on the front lines of manufacturing, equivalent to time not spent in production); and (3) shortening of work cycles. A variety of projects are underway, led by the front lines, with one factory working to reduce lead times by half from the planning and coordination stage through material procurement and manufacturing. By sharing success stories, we are working to accelerate the speed of business with the participation of all our employees.



Assessment by the Chairman of the Board (Outside Director)

Makoto Sumita

Outside Director
Chairman of the Board of Directors
Chairman of the Nomination
Advisory Committee
Chairman & CEO of
INNOTECH CORPORATION



About three years ago, it became clear that under the status quo, profit growth would slow not only in HDD magnetic heads, which had led TDK's growth, but also in the core electronic components business. That was when TDK began discussions around what its future strengths would be and the direction the Company should take going forward.

As discussions progressed regarding which technologies should be nurtured internally and which should be acquired by borrowing outside capabilities, the conclusion was reached that a partnership between Qualcomm, which has software and algorithm technology, and TDK, which is capable of embodying those technologies in its own products, would be ideal. The business tie-up with Qualcomm that emerged from those discussions eventually determined the direction of a major strategy that included expansion of TDK's sensor business.

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The business tie-up with Qualcomm determined our strategic direction.
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Once that larger direction was decided, it was not long before companies such as Micronas and InvenSense came to the fore as potential acquisitions. In selecting those deals, we analyzed demand trends in the sensor market and the status of competitors from a variety of angles, looking for the companies that would best fit with TDK's growth strategy.

The cycle of technological change in the high tech sector has sped up and the cost of corporate acquisitions has risen; the risks involved have grown compared with five years ago. At the same time, it is impossible to predict whether those acquisition costs will drop going forward. To ensure that the execution side could take risks within an appropriate range when carrying out

this series of acquisitions, we continued to review the suitability and growth potential of businesses brought before the Board by the management meeting, while the Board conducted a multi-faceted review of the investment effects and risks and continued to provide feedback. With regards to InvenSense, a fables firm, I give high marks to the execution side for their speedy response to employee and customer retention risks.

Because TDK is pursuing an offensive investment strategy, we try, to some extent, to keep positive scenarios in mind as we conduct feasibility studies. In the case of InvenSense, for example, while the deal presented significant potential for synergies in terms of software and algorithms, my assessment of areas that are not making

much of a contribution to profit is quite conservative. I also believe that TDK's true capabilities will be tested as it attempts to enhance corporate value for both parties to these acquisitions, extracting value from technologies dependent on individuals that may not even appear as intangible fixed assets on the balance sheet, or value of which the acquired party may not even be aware.

In terms of corporate governance, I think TDK has made progress in splitting the business execution function from the supervisory function. On the Board of Directors, of which I am chairman, the three outside directors share an understanding of the importance of balancing accelerated decision-making with the need for vigorous discussion as part of fulfilling our obligation to be accountable to the Company's shareholders and investors. Based on his past experience, Mr. Yoshida is well acquainted with the investment risks associated with venture companies, and Mr. Ishimura has extensive experience in corporate acquisitions overseas. I think that kind of background has proven useful in discussions about the assessment of M&A deals and management of post-acquisition risks.

To encourage deeper discussions by the Board of Directors, about three years ago we instructed the management meeting to present the Board only with the most important agenda items, and only after they had been discussed thoroughly at the management meeting level. Beginning in 2017, we narrowed down the number of members participating in the management meeting, which has led to progress on this issue.

With the “shape” of the business in place, now comes the time to deliver results. I plan to keep a close eye on whether plans are being executed with a sense of speed, and whether strategies and investment targets are undergoing proper review. As one of TDK's outside directors, I look forward to seeing the Company quickly integrate its acquisitions, dispel any concerns in the market, and demonstrate growth that exceeds investor forecasts.

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We hope this dispels any concerns remaining in the market.
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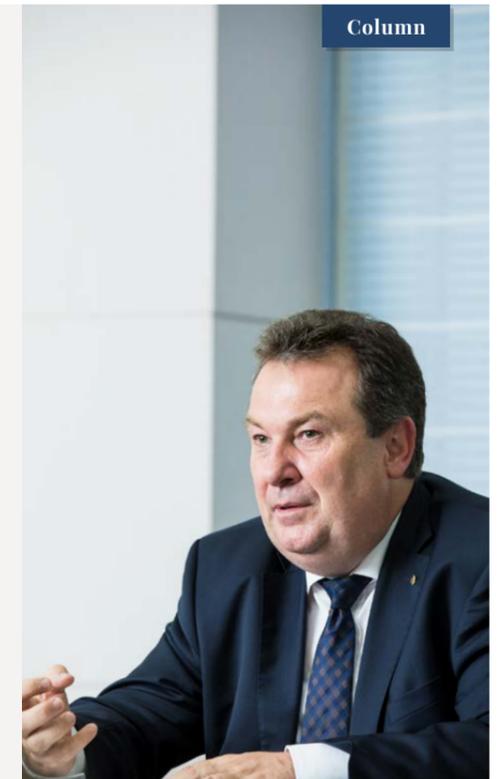
The Strength of Diversity

Fully Leveraging the Strengths of Acquired Companies through TDK-Style Post-Merger Integration

I currently serve as the CEO of the EPCOS Group, which became part of the TDK Group in 2008. This merger was a very attractive deal for both companies, as it helped in complementing our respective product portfolios. In addition, the merger process was carried out very smoothly thanks to the fact that TDK treated EPCOS not simply as a company it acquired but rather as a business partner of equal status that it newly incorporated as an important member of the Group. I believe that the trust-based relationships that were subsequently established between the two companies have acted as the foundation for the synergies we are creating in various areas of operation today.

TDK has adopted a Group-wide approach that respects the culture and values of the companies it acquires, without forcing its approach on them, in an effort to realize mutual growth. TDK is today a truly global company, with over 90% of its employees on a consolidated basis being from countries other than Japan. Management meetings are conducted mainly in English, allowing participating members of various nationalities to voice their opinions without hesitation. This, in turn, encourages the active exchange of opinions. All members participating in these meetings, including myself, find these meetings to be very engaging as we are able to experience TDK's global spirit and business approach. Moreover, TDK has fostered a corporate culture that allows anyone, regardless of age or position, to voice their opinions to the Company's management. I believe that such a culture represents a strength that will support TDK's growth going forward.

By fully leveraging the strength of diversity in these ways, TDK will be able to move forward with Group-wide initiatives to realize further growth.



Joachim Zichlarz

Executive Vice President
Electronic Components Business Company CFO



The EPCOS OHG Deutschlandsberg factory (Austria)