

Review of Operations

Consolidated net sales for fiscal 2004, ended March 31, 2004, increased 8.2% from ¥608,880 million to ¥658,862 million.

In the electronics industry, TDK's field of operations, the year was characterized by the rising popularity of LCD and plasma flat-screen TVs, digital still cameras and DVD recorders, as well as by the increasing sophistication of mobile phones and replacement demand for PCs, and the growing use of electronics in automobiles. However, deflationary trends in world markets affected these finished products, placing unrelenting pricing pressure on electronic materials and components, and recording media and systems, TDK's main products.



Electronic Materials and Components Segment

In the electronic materials and components segment, net sales increased 10.7%, from ¥472,529 million to ¥522,862 million. Sales in both the electronic materials and electronic devices sectors decreased compared with the previous fiscal year when TDK benefited from a temporary surge in demand related to the 2002 FIFA World Cup™ and strong demand from manufacturers following a period of inventory reductions. This decline occurred despite solid demand for components that was spurred by the growing popularity of flat-screen TVs, digital still cameras, DVD recorders and other electronic products, as well as by recovering sales of mobile phones. Segment sales as a whole rose on the back of a sharp year-on-year increase in sales of HDD heads accompanying burgeoning demand for HDDs. Sector results were as follows.

Electronic Materials

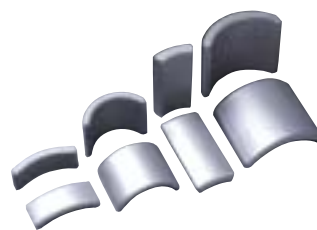
[Product Overview]

The **electronic materials** sector is broadly divided into two product sectors: capacitors, and ferrite cores and magnets.

Multilayer ceramic chip capacitors, the mainstay product of the first category, are produced by alternately stacking many layers of electrodes, consisting mainly of palladium or nickel, and dielectric material, mainly barium titanate or titanium oxide. The standout feature of these capacitors, which are designed to store electrical energy, is that each of the layers is no thicker than several to tens of micrometers. The ability to form such thin layers is one of TDK's greatest strengths and is critical to capacitor



Ferrite cores



Ferrite magnets

performance because energy storage increases with the number of layers. Multilayer chip capacitors store and discharge electric charges in the circuits of electronic devices. They are used to smooth out and stabilize electrical current, eliminate electromagnetic interference, or “noise,” and allow alternate current to pass while blocking direct current, a process known as coupling.

Ferrite is an electronic material that is mainly used as a magnetic material. Consisting primarily of ferric oxide, ferrite also includes cobalt, nickel, manganese or other metals to obtain precisely the desired properties. As ferrite is produced by sintering powder materials, it is called a magnetic ceramic. Ferrite is broadly divided into two types. One is soft ferrite, which is used in cores for transformers and coils. By improving the characteristic of soft ferrite, it is possible to make smaller, lighter and more efficient transformers and coils. The other type is hard ferrite. This material is used chiefly to make magnets that are essential to the operation of motors in office equipment, audio and visual products, automobiles and other widely used products.

TDK has also commercialized rare-earth magnets, consisting mainly of metals such as samarium and neodymium. Extremely powerful in relation to their small size, rare-earth magnets are used in small, voice coil motors (VCMs) for HDDs.

[Results]

Sales in the electronic materials sector decreased 1.3% from ¥168,949 million to ¥166,818 million.

In capacitors, sales of multilayer ceramic chip capacitors, the main product in the capacitor sector, increased. Higher orders for capacitors, which reflected growing demand for communications products, offset falling sales prices and the negative effect of exchange rate movements.

In ferrite cores and magnets, overall sales of ferrite cores decreased year on year. Deflection yoke cores and flyback transformer cores saw sales drop due to falling demand and sales prices. The drop in orders is a reflection of a rapid shift in consumer demand from CRT TVs to LCD, plasma and other flat-panel models. Higher sales of small coils and transformer cores, a category where demand is



Multilayer ceramic chip capacitors



Rare-earth magnets

increasing, failed to offset this decrease. Magnet sales declined as the effect of falling sales prices outweighed higher sales volumes. Overall, sales of ferrite cores and magnets were down year on year.

Electronic Devices

[Product Overview]

The **electronic devices** sector is broken down into three broad categories: inductive devices, high-frequency components, and power supplies and other products.

The main products in the inductive devices category are coils, transformers and EMC components. Coils are typically made by winding a wire around a ferrite core. Because they produce a magnetic field when a current passes through the wire and also produce electromotive force depending on changes in magnetic flux, coils are widely used in electronic circuits. TDK has commercialized SMD coils that use an epoxy resin adhesive and multilayer chip coils, in which coil patterns are formed by a process similar to printing. Choke coils and common mode filters are other coil types. Transformers, which have two or more coils, use electromagnetic coupling to step up and down AC voltage or convert impedance. EMC components reduce electromagnetic noise given off by all types of electronic devices. In recent years, as IC clock frequencies have climbed, high-frequency noise has become an increasingly serious problem. TDK has addressed this with a broad lineup of EMC components, including beads and filters, made from ferrite, which is an excellent absorber of high-frequency noise.

High-frequency components are chiefly used in circuits for mobile phones and other devices that handle high frequency signals. In mobile phones, voice frequencies must be modulated and demodulated at extremely high frequencies. TDK produces isolators that use ferrite to control the movement of these signals, and VCOs (voltage-controlled oscillators) that produce frequencies required for transmission and reception in mobile phones. This category also



High-frequency components



Coils (Inductors)



Chip varistors

consists of diplexers that split and combine signals of differing frequencies in mobile phones. These products are modules made by combining capacitors, coils, resistors, ICs, transistors and other components.

In power supplies, TDK offers switching power supplies that convert alternating current into direct current, DC-AC inverters that convert direct current into alternating current, and DC-DC converters that alter DC voltages.

In other products, TDK manufactures products such as sensors and actuators, as well as chip varistors. Sensors are measurement devices that produce an electrical signal that varies in accordance with a specific parameter such as humidity or printer toner level. Actuators are products that convert electrical energy into mechanical energy for such applications as buzzers. Chip varistors protect electronic circuits from abnormal voltages, such as static electricity and pulses, that can cause equipment to malfunction.

[Results]

In the electronic devices sector, sales decreased 4.2% from ¥112,729 million to ¥107,999 million.

Inductive devices, the largest product category in this sector, posted higher sales as demand for communications products increased in line with advances in the performance of mobile phones. However, sales growth was held back by lower sales prices and foreign currency movements.

Sales of high-frequency components decreased despite an upswing in shipment volumes that resulted from strong demand for components used in mobile phones, the main market for these components, and successful activities to win new orders. The decrease reflects the continuing glut in the supply of high-frequency components in the market as a whole, which prompted customers to demand price reductions that were greater than in other electronic component categories.



Power system products

Sales of other products decreased. Sensors and actuators recorded higher sales due to growth in demand for communications products and PCs and peripherals. However, sales of power systems declined due to lackluster demand associated with the amusement field, a sector where demand was strong in the previous fiscal year.

Recording Devices

[Product Overview]

The recording devices sector is divided into two categories: heads for HDDs, the mainstay of the sector, and other types of heads. HDD heads employ a thin-film construction and magneto-resistive (MR) material to “read” signals recorded on hard disks. MR refers to the phenomenon in which a material’s electrical resistance varies when exposed to a magnetic field. The commercialization of HDD heads using this MR effect has made it possible to “read” signals recorded on hard disks at much higher areal densities. At present, GMR (Giant-MR) heads, which have higher playback sensitivity than conventional MR heads, are the mainstream technology in the HDD head market.

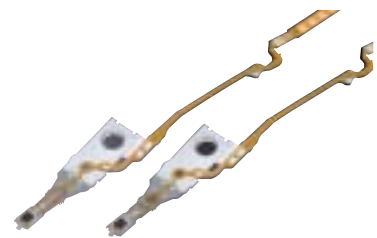
Other heads includes optical pickups, magnetic heads used in floppy disk drives (FDDs) and thermal printer heads.

[Results]

Recording devices sales climbed 30.8% from ¥175,986 million to ¥230,105 million.

Sales of HDD heads grew as steady expansion continued from the previous fiscal year in the HDD market. There were two main reasons for this: steady growth in HDD demand and higher-than-expected demand for HDD heads.

Rising sales of HDDs reflects growth in existing demand for use as storage devices in PCs, as well as increasing use in game consoles, portable audio players, HDD recorders and other consumer electronics equipment. The higher-than-expected demand for HDD heads reflected an end to the downward trend in the number of heads used per HDD.



GMR heads



Optical pickup for DVDs

Sales of other heads, which include magnetic heads used in FDDs, thermal printer heads and optical pickups, also increased. Most noteworthy was the growth in optical pickups as video recorders, PC and other equipment increasingly use optical disk drives.

Semiconductors and Others

[Product Overview]

In the [semiconductors and others](#) sector, two of the main products are semiconductors and anechoic chambers.

Semiconductors represent ICs for cable TV set-top box modems, LAN devices and other ICs used for communications. These products are designed at U.S.-based TDK Semiconductor Corporation.

Anechoic chambers are rooms in which the walls are covered in ferrite tiles that absorb electromagnetic waves. These spaces, designed to block electromagnetic waves emanating from outside as well as to control reflections of electromagnetic radiation within the chamber, facilitate the evaluation and testing of noise in electronic devices, including those used in automobiles.

[Results]

Sales in the semiconductors and others sector climbed 20.7% from ¥14,865 million to ¥17,940 million, despite sluggish sales of semiconductors for communications applications. Growth reflected higher sales of anechoic chambers for noise control and equipment used in these chambers.



ICs for modems



Anechoic chamber

Recording Media & Systems Segment

[Product Overview]

In the recording media & systems segment, the main products are audio-tapes, videotapes, optical media and tape-based data storage media for computers.

TDK supplies several types of optical discs, including write-once CD-Rs and 4.7 gigabyte DVDs that can hold approximately 7 times more data than their CD counterparts, although having the same 12cm diameter. TDK has also commercialized a Blu-ray disc that can store huge volumes of data. These discs are being seen as the next generation of optical media.

In tape-based data storage media for computers, TDK has commercialized a product that has been verified under LTO Ultrium 2 standards, making it compatible with magnetic-tape backup equipment meeting the LTO* (Linear Tape-Open) standard. This segment also handles PC software, portable CD players and other products.

*Linear Tape-Open, LTO, LTO logo, Ultrium and Ultrium logo are trademarks of HP, IBM and Certance LLC in the U.S., other countries or both.

[Results]

In the recording media & systems segment, sales edged down 0.3% from ¥136,351 million to ¥136,000 million. While TDK continues to command a high share of the audiotape and videotape markets, sales in these two categories decreased as demand continues to shrink due to structural changes. Optical media products posted increased sales, with higher sales volumes of CD-Rs and DVDs in an expanding market offsetting lower sales prices. Sales of other products decreased. Higher sales of LTO (Linear Tape-Open) standard tape-based data storage media for computers failed to offset lower sales of PC software, recording equipment and other products.



CD-R



DVD



LTO