Minebea's ball bearings, fan motors, electronic devices and components and other precision products are used in a wide range of applications in the home and office, as well as in the aerospace and automotive industries. It is estimated that, for example, between 100 and 200 small-sized ball bearings are used in the average home. Ball bearings are bearings that contain rolling elements, that is, balls, which minimize friction, thus enabling devices to rotate smoothly. In today's increasingly sophisticated, information-driven society, miniature ball bearings are required in ever-greater numbers for advanced home and office electronic equipment and are contributing to efforts to develop models that are smaller, use less energy and last longer.

# Minebea Products: Essential to Modern Lifestyles 11 Ball bearings Fan motors Hybrid-type stepping motors PM-type stepping motors HDD spindle motors Induction motors PC keyboards Lighting devices for LCDs Strain gauges Load cells Pivot assembli Tape guides Aerospace/autom Brush DC motors Vibration motors 8 8

# Development of Environment-Friendly Products

# Newly developed high-performance, long-life color wheel

Digital Micromirror Devices (DMD™)¹ are semiconductor chips used in Digital Light Processing (DLP™)² projectors. The most widely used type of DLP projector uses a single DMD. Single-chip DLP projectors use a color wheel to create color images. The characteristics of the optical thin-film filters used in the color wheel are the key to achieving exceptional colorization and color rendition. Since the color wheel must also rotate at a high speed, a high-performance, long-life motor is also essential.

Minebea has capitalized on its accrued thin-film filter technologies to develop a high-performance optical film that facilitates outstanding colorization and color rendition. The combination of these optical technologies and brushless DC motor technologies cultivated through the production of spindle motors—a core Minebea product—have enabled the Company to realize integrated production of optical-thin film filters and motors.



Six-segment color wheel

# Reduction or Elimination of Hazardous Chemical Substances in Products

#### Promote Non-PVC Coating Materials for Speaker Boxes

Until recently, polyvinyl chloride (PVC) has been one of the most popular coating materials for speaker boxes because it is easy to process and does not deteriorate significantly over time. However, it is believed that the incineration of waste PVC is a source of dioxins in the atmosphere because the material tends to not burn completely. There are also concerns that additives in PVC pose a human health hazard.

Although Minebea has used PVC to coat its speaker boxes to date, it is currently promoting a decisive switch to alternative materials. A paper sheet material is already in use, while the use of polypropylene sheet is under consideration.



Speaker box

#### Glossary

# 1. DLP™ (Digital Light Processing)

A projection format that uses one or more DMDs.

#### 2. DMD™ (Digital Micromirror Device)

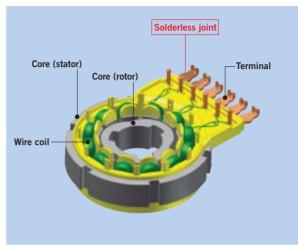
A silicon semiconductor chip upon which several tens of thousands of microscopic mirrors have been laid in a matrix.

 $\mathsf{DLP^{\mathsf{TM}}}$  and  $\mathsf{DMD^{\mathsf{TM}}}$  are trademarks of Texas Instruments Incorporated.

# Development of Environment-Friendly Products

# Environment-friendly design of variable reluctance (VR) resolver

This VR resolver senses the rotating angle of the motor shaft in electronic power steering (EPS) systems. EPS systems use electric, rather that hydraulic, power to provide steering assistance. As assistance is provided only when needed, EPS systems do not require a constantly running hydraulic pump and thus offer significantly improved fuel efficiency over conventional hydraulic power steering systems. The environment-friendly design of this VR resolver uses no lead solder and eliminates or reduces the use of substances that negatively impact the environment. This product is compatible with the RoHS¹ and ELV² directives.



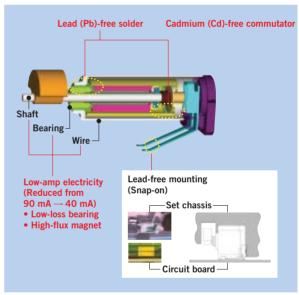
VR resolver

# Reduction of Energy Consumption/Contribution to Prevention of Global Warming

#### Environment-Friendly Design of Vibration Motors Product name: Vibration motor for cellular phones

This vibration motor was designed specifically for use in cellular phones.

Engineered to be environment friendly, this motor features a design that uses no lead solder, eliminates cadmium from the commutator and reduces energy-consumption. This motor is compatible with the RoHS and ELV directives.



Vibration motor for cellular phones

#### Glossary

#### 1. RoHS (Restriction of Hazardous Substances) directive An EU directive banning the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ether (PBDE) in electrical and electronic equipment brought to market after July 1, 2006.

#### 2. ELV (End-of-Life Vehicles) directive

An EU directive aimed at reducing environmental impact and improving the recyclability of end-of-life vehicles by banning the use therein of lead, cadmium, mercury and hexavalent chromium after July 2003.