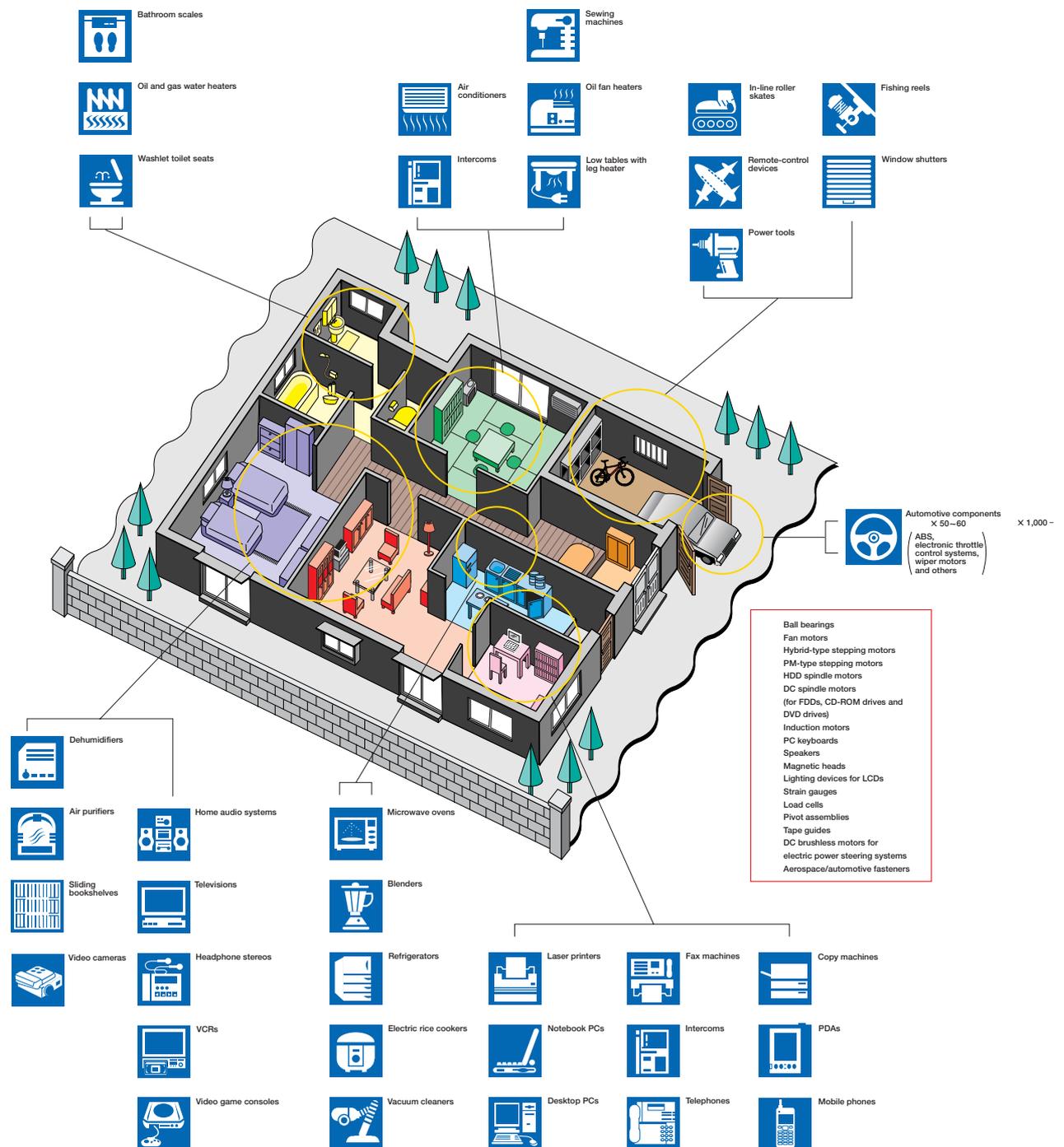


Minebea ball bearings, motors and electronic devices and components are used in a broad range of applications around the home, as well as in aerospace and automotive applications. A minimum of 100 miniature and small-sized ball bearings are used in an average household, with some homes containing as many as 200. In a ball bearing, the rolling of the balls minimizes friction, ensuring smooth rotation—an essential requirement for precision equipment. With the increasing importance of information and telecommunications technologies, ball bearings will continue to play a crucial role in office equipment and household electrical appliances, contributing to efforts to develop more compact models and minimize energy requirements.

**MINEBEA PRODUCTS: ESSENTIAL TO MODERN LIFESTYLES**



## ■ REDUCTION OR ELIMINATION OF HAZARDOUS CHEMICAL SUBSTANCES IN PRODUCTS

### ► Switch to Lead-Free Solder

Lead has traditionally been a standard ingredient in solder used to join electric and electronic devices and components, as well as in functional plastic materials and pigments. In recent years, lead from scrapped household electrical appliances and automobiles has attracted attention as a source of soil and groundwater contamination.

Recognizing the environmental and social implications of lead-based solder, in 1998 Minebea began working toward the use of lead-free varieties. By December 2004, the Group aims to switch completely to lead-free solder, cable insulation and plastic materials.



HDD spindle motors



Hybrid-type stepping motors



PC keyboards



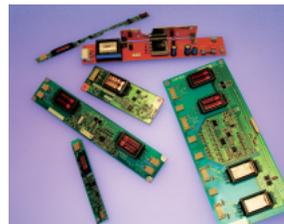
MOD drive subassemblies



PM-type stepping motors



Fan motors



Backlight inverters



Lighting devices for LCDs

### ► Switch to Cadmium-Free Plastic Materials

Cadmium is used as a stabilizing agent in plastic materials, as well as in pigments and dyes. Recent years have seen a tightening of regulations on the use of cadmium, particularly by the EU. Increasing attention is being given to its use in materials for applications that involve frequent human exposure, such as cable insulation, cable ties, switches on remote controls and coating resins used on electronic components. Decisive measures enabled Minebea to terminate the use of cadmium-based plastic materials.

### ► Eliminate Hexavalent Chromium

Stainless steel and fasteners for household electrical appliances and automobiles are often coated with anticorrosion coatings called chromates. Chromates contain hexavalent chromium, which is considered a hazardous chemical substance and is banned under the EU's ELV, RoHS and WEEE directives. (See glossary on page 11.) Minebea has targeted the elimination of hexavalent chromium from its electronic devices by December 2004 and automotive fasteners by June 2005.

► **Eliminate Asbestos from Electronic Clutches and Brakes**

Electronic clutches transmits or intercepts rotational force from an engine or motor, while electronic brakes control, slow and stop it. Rotational force is transmitted, intercepted, controlled, slowed or stopped via a lining of friction material. Until recently, one of the most commonly used friction materials has been asbestos, a known carcinogen. Minebea has set a target of March 2004 for switching to asbestos-free friction materials in its electronic clutches and brakes.



Electronic clutches and brakes

► **Switch to Non-PVC Materials for Coating Speaker Boxes**

Until recently, PVC film has been one of the most popular coatings for speaker boxes. When end-of-life PVC film-coated speaker boxes are incinerated, the PVC film releases dioxin into the atmosphere. Accordingly, Minebea has begun the process of switching to olefin resins and other non-PVC coatings and has set a target of January 2005 for the switch to be achieved.



Speaker boxes

■ **REDUCTION OF ENERGY CONSUMPTION/CONTRIBUTION TO PREVENTION OF GLOBAL WARMING**

► **Ball Bearings**

A ball bearing's precision grade depends on the raceway roundness of its inner and outer rings, sphericity of its balls and quality of the materials used in its various parts. Minebea's constant efforts to improve its performance on all fronts has enabled it to set the global standard for ball bearing precision.

Minebea also develops the lubricating greases and oils it uses in the production of its ball bearings, contributing to higher performance, longer life and lower energy consumption.



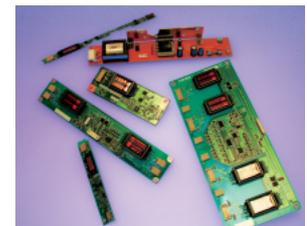
Miniature and small-sized ball bearings



RO bearings

► **Backlight Inverters**

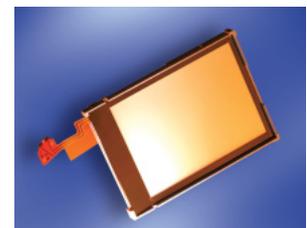
Backlight inverters are essential components of LCD units for PCs. Minebea's backlight inverters use control ICs and leakage transformers developed in-house, significantly lowering energy consumption and improving reliability.



Backlight inverters

► **Lighting Devices for LCDs**

Minebea manufactures lighting devices for LCDs used in cellular phones, portable game machines, PDAs<sup>1</sup> and other small mobile devices. Our outstanding design and development capabilities, together with our high-precision injection molding technology—which uses molds manufactured in-house—are enabling us to develop models that use less energy and are considerably smaller and lighter than conventional devices.



Lighting devices for LCDs

· **Glossary**

- **1. PDA (Personal digital assistant)**  
· PDAs are handheld personal data terminals.

## COMPATIBILITY WITH “3R” CRITERIA

### High Tension Bolts

Minebea has developed high tension bolts (tension grade: 12.9 or higher<sup>2</sup>) using special materials that greatly improve delayed fracture resistance, thereby facilitating downsizing. This achievement has contributed to the development of more compact and lighter connecting rods and other engine components, reducing inertia and increasing engine output.



High tension bolts

#### Glossary

##### 2. 12.9 Tension Grade

In Japanese Industrial Standards (JIS) standard B 1051, pertaining to the mechanical properties of fasteners, 12.9 is the highest grade for bolt tension.

## ENVIRONMENTALLY SOUND DISTRIBUTION

### Environment-Friendly Packaging

#### 1. Recycle cardboard boxes

Minebea is simplifying the recycling of cardboard boxes by

- using paper packing tape and
- eliminating the use of large metal staples.

#### 2. Select environment-friendly packaging materials

Minebea primarily uses the following selected, environment-friendly packaging materials:

- cardboard
- molded pulp
- biodegradable plastic



Packaging materials

#### 3. Eliminate polystyrene foam

In light of the global shortage of landfill sites, Minebea has stopped using polystyrene foam packaging materials in its operations worldwide.

#### 4. Promote “3R” concept

Minebea is recycling polyethylene containers as fuel pellets for electric power generation.

### Energy-Efficient Transport

1. To reduce loading and unloading during transport and the distance products are transported, Minebea is increasing direct-from-factory shipping to customers' sites or specified warehouses. To reduce the total distance of truck transport in Japan and other countries, we are switching from truck freight to ocean transport from ports situated close to customers.

2. We are also stepping up use of railway container shipping. In western Japan, in particular, we take advantage of both modes to ship to customers.