Hitachi Metals Magnetic Materials Business

March 30, 2007

Hitachi Metals, Ltd.
## Corporate Overview of Hitachi Metals

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established</td>
<td>April 10, 1956</td>
</tr>
<tr>
<td>Capital</td>
<td>¥26.3 billion (March 31, 2006)</td>
</tr>
<tr>
<td>Representative</td>
<td>Nobuo Mochida, President and Chief Executive Officer</td>
</tr>
<tr>
<td>Consolidated net sales</td>
<td>¥590.7 billion (FY05, ended March 31, 2006)</td>
</tr>
<tr>
<td></td>
<td>*2010 Vision: ¥700 billion</td>
</tr>
<tr>
<td>Consolidated operating income</td>
<td>¥47.5 billion (FY05) *2010 Vision: ¥70 billion</td>
</tr>
<tr>
<td>Consolidated workforce</td>
<td>22,213 (as of March 31, 2006)</td>
</tr>
<tr>
<td>Stock listings</td>
<td>First Sections of Tokyo and Osaka stock exchanges (Code: 5486)</td>
</tr>
<tr>
<td>Consolidated subsidiaries</td>
<td>102 companies (Japan: 43; Overseas: 59)</td>
</tr>
<tr>
<td></td>
<td>(as of March 31, 2006)</td>
</tr>
</tbody>
</table>
Hitachi Metals Group Business Structure

**Business Segments**  
High-Grade Metal Products and Materials  
FY05 Sales ¥246.1 billion

**Business Divisions**  
- Specialty Steel Company  
- Roll Company  
- Hitachi Tool Engineering, Ltd.

**Main Products**  
Molds and cutting tool materials, automotive components and materials, display-related materials, semiconductor package materials, rolls for mills, injection molding machine parts, cutting tools

**Business Segments**  
Electronics and IT Devices  
FY05 Sales ¥160.0 billion

**Business Divisions**  
- Information System Components Company  
- Soft Magnetic Materials Company  
- NEOMAX Co., Ltd.*

**Main Products**  
Information communication components and materials, optical communication-related components, soft magnetic materials and their applications (amorphous metal materials, FINEMET®, ferrite), rare-earth magnets, ferrite magnets and their applications

**Business Segments**  
High-Grade Functional Components and Equipment  
FY05 Sales ¥184.3 billion

**Business Divisions**  
- Automotive Components Company  
- Piping Components Company  
- Hitachi Metals Techno, Ltd.

**Main Products**  
Casting components for automobiles (motor, chassis and drive system) aluminum wheels for automobiles, gas and water system piping components, internal and structural systems

*NEOMAX will merge with Hitachi Metals on April 1, 2007.

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Hitachi Metals produces high-function materials by adding new ideas to traditional core technologies refined over many years.

- Molds
- Cutting tools
- Piston ring materials
- Lead-free solder balls
- Razor blade materials
- Ni-based IC lead frame materials
- Sputtering target materials
- Rolls for mills
- Injection molding machine parts
- Ceramics for use with molten aluminum
This segment provides unique materials and components with advanced functionality based on the development of new materials and cultivation of proprietary component design technologies.

Information communication components

Triaxial acceleration sensors

Optical network communication devices

Metglas® amorphous alloys

FINEMET® nanocrystalline soft magnetic materials

Soft ferrite

Rare-earth magnets NEOMAX®

Ferrite magnets

Linear motors

MRI (Magnetic Resonance Imaging) systems
Main Products of the High-Grade Functional Components and Equipment Segment

We provide construction and plant materials as well as casting components for automobiles boasting advanced functionality based on casting technologies refined over many years.

- Exhaust line components HERCUNITE® series heat-resistant cast steel and iron components
- SCUBA® large-diameter, stylish aluminum road wheels
- Diesel particulate filters
- Gourd® pipe fittings, stainless steel and piping components
- Polyethylene gas piping system
- Precision mass flow control devices [SAM® mass flow controllers]
- HIBASE® steel frame joints for construction
- Free Access Floor System for offices
Market Fields of the Hitachi Metals Group

- **Industrial Infrastructure**
  - Soft magnetic materials
  - Tool Steels
  - Cutting tools
  - Mill rolls
  - Piping components
  - Internal and structural systems

- **Automobiles**
  - Information communication components
  - Hard magnetic materials (permanent magnets)
  - Automotive castings

- **Electronics**
  - Electronic alloys

FY05 Sales to Market Fields

- **Automobiles** Approx. 30%

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The Expanding Possibilities of Magnetic Materials
The Hitachi Metals Group’s Magnetic Materials

**Hard magnetic materials** (permanent magnets)
- Neodymium magnets (NEOMAX®)
- Ferrite magnets
- Alnico magnets

**Soft magnetic materials**
- Silicon steel
- Permalloys
- Nanocrystalline (FINEMET®)
- Amorphous metal Materials (Metglas®)
- Soft ferrites (ceramics)

**Representative Magnetic Properties by Permanent Magnet Material**
- Nd-Fe-B
- Alnico
- Ferrite
- Nd anisotropic bonded
- Nd isotropic bonded
- Bonded Ferrite

**Relative Permeability and Saturation Flux Density of Soft Magnetic Material**
- Co-based amorphous alloys
- Fe-Al-Si
- Mn-Zn ferrite amorphous alloys
- Electromagnetic steel sheets
- FINEMET®

**Limit of properties of conventional materials**
- More compact

**Intrinsic Coercive Force (Hc)**
- Residual Flux Density (Br)
- Frequency

**Properties of Co-based amorphous alloys**
- Frequency × 10^6
- Relative permeability
- Saturation flux density

**Materials Magic**

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### Permanent Magnet Generations and Recent Trends by Application

<table>
<thead>
<tr>
<th>Application</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>Recent Trends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speakers</td>
<td>ALNICO</td>
<td>FERRITE</td>
<td>Nd-Fe-B</td>
<td></td>
<td>Use of neodymium magnets for in-vehicle SPs: lighter</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Japanese cars at vanguard in use of neodymium magnets: 17% in 2005, 30% by 2010</td>
</tr>
<tr>
<td>Magneto generators</td>
<td>ALNICO</td>
<td>FERRITE</td>
<td>Nd-Fe-B</td>
<td></td>
<td>Small motorcycles: ferrite magnets for higher performance</td>
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<td></td>
<td>Increased use of neodymium magnets for large motorcycles</td>
</tr>
<tr>
<td>DC motors</td>
<td>ALNICO</td>
<td>FERRITE</td>
<td>Sm-Co</td>
<td>Nd-Fe-B</td>
<td>Coreless DC motors using neodymium magnets (mobile phones)</td>
</tr>
<tr>
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<td>Growing use in electrical equipment (for higher performance, respond to global requirements)</td>
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<tr>
<td>Spindle motors</td>
<td>FERRITE</td>
<td>BOND</td>
<td></td>
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<td>Growth in office equipment</td>
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<td>Cater to China and ASEAN region</td>
</tr>
<tr>
<td>VCM</td>
<td>ALNICO</td>
<td>FERRITE</td>
<td>Sm-Co</td>
<td>Nd-Fe-B</td>
<td>Growth in HDD demand (Smaller with higher capacity: require higher-performance magnets)</td>
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<td>HDD production: 370 million units in 2005; 555 million units by 2008</td>
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<tr>
<td>Optical pickups</td>
<td>Sm-Co</td>
<td>Nd-Fe-B</td>
<td></td>
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<td>Growth in optical recording devices (CD/DVD/HD/BD)</td>
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<td></td>
<td></td>
<td>700 million units in 2005; 860 million units by 2008</td>
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<tr>
<td>Industrial use elevator motors</td>
<td>FERRITE</td>
<td>Sm-Co</td>
<td>Nd-Fe-B</td>
<td></td>
<td>Servo motors (machine tools, robots, LCD and semiconductor production equipment)</td>
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<td>Greater use of electric motors (Elevators, injection molding machines, presses)</td>
</tr>
<tr>
<td>Home appliances incorporating</td>
<td>FERRITE</td>
<td>Nd-Fe-B</td>
<td></td>
<td></td>
<td>Energy saving (air-conditioners and refrigerators account for 41% of household electricity use)</td>
</tr>
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<td></td>
<td></td>
<td>Current use of PMs: air-conditioners (18%), refrigerators (5%)</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>FERRITE</td>
<td>Sm-Co</td>
<td>Nd-Fe-B</td>
<td></td>
<td>Trend toward hybrid electric vehicles (HEVs), greater use of electric motor-driven pneumatic and hydraulic equipment (EPS, electric pumps, electric motorbikes (EMB))</td>
</tr>
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<td></td>
<td>HEVs: 0.6 million units in 2006; 1.5 million units by 2010; EPS: 22% in 2006</td>
</tr>
<tr>
<td>New applications</td>
<td>Nd-Fe-B</td>
<td></td>
<td></td>
<td></td>
<td>New applications for magnets in wind turbines, co-generation systems and electricity storage</td>
</tr>
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<td></td>
<td>Large linear motors (LCD, semiconductor and photovoltaic cell production equipment)</td>
</tr>
</tbody>
</table>

**Main materials**

- ALNICO
- FERRITE
- Nd-Fe-B

**Supplementary materials**

- Nd-Fe-B
Energy Conservation and Environmental Needs Are Driving Increasing Demand for Magnets (Automotive Field)

HEV • EV
Drive Motors • Generators
(Nd-Fe-B Magnets "NEOMAX®")
[Reduce fuel consumption]

Engine Control
Alternators ("NEOMAX®")
Starter Motors
(Ferrite Magnets)
Cooling Fan Motors
(Ferrite Magnets)
[Reduce fuel consumption, Lowers Emissions]

Intake/Exhaust Systems
Exhaust Gas Re-circulation (EGR)
("NEOMAX®, Ferrite Magnets")
Electric Intake Valves
("NEOMAX®, Ferrite Magnets")
[Reduce fuel consumption, Lowers Emissions]

Transmission control
Automatic Gear Shifts (Ferrite magnets)
[Lower fuel consumption, Lower exhaust gas emission]

Steering Control
Electric Power Steering (EPS)
("NEOMAX®, Ferrite Magnets")
[Reduce fuel consumption, Reduce size and weight]

Utility
HVAC Systems*
("NEOMAX®, Ferrite Magnets")
HDD/DVD for Navigation Systems
("NEOMAX®")
Power Window Motors
(Ferrite Magnets)
[Reduce size and weight, Lowers Power Consumption]* Heating,Ventilating and Air Conditioning System

Brake Control
Antilock Brake System (ABS)
("NEOMAX®, Ferrite Magnets")
Electric Brake Motors
("NEOMAX®, Ferrite Magnets")
Electric Suspension
("NEOMAX®, Ferrite Magnets")
Auxiliary Brake System (Retarder)
("NEOMAX®")
[Reduce fuel consumption, Reduce size and weight, Improves Safety]

* A system currently under development.
Energy Conservation and Environmental Needs Are Driving Increasing Demand for Magnets (IT, Home Appliances, FA)

**Air Conditioner**
- IPM Motor
- Compressor Motors (“NEOMAX®”) [Lowers Power Consumption, Increases Efficiency, Reduces Noise]

**PC**
- HDD
  - Voice Coil Motors (VCM) (“NEOMAX®”)
  - Spindle Motors (Nd-B Magnets)
  - DVD/CD Drive
  - Optical Pick-up Parts (“NEOMAX®”) [Reduces Size, Raises Efficiency, Lowers Power Consumption]

**Mobile Phones**
- Micro Speakers (“NEOMAX®”)
- Vibration Motors (“NEOMAX®”)
- Isolators (“NEOMAX®”) [Reduces Power Consumption, Smaller, Increases Efficiency]

**Manufacturing Facilities**
- Factory Automation Motors (“NEOMAX®”, Ferrite Magnets)
- Linear Motors (“NEOMAX®”) [Saves Energy, Enhances Performance]

**Refrigerators:** Compressor Motors (“NEOMAX®”, Ferrite Magnets)

**Washing machines:** Rotary Motors (“NEOMAX®”, Ferrite Magnets) [Low power consumption, High performance, Low noise]

**Copier Printing Machine**
- Magnetic Rolls (Ferrite Magnets, Bond Magnets) [Lowers Power Consumption, Increases Efficiency]
Main Growth Product Markets (HEVs and EPS)

Sales: ¥100 million/year

2005-2010 market growth rate
HEV annual growth 30%
EPS annual growth 25%

Hitachi Metals sales (HEV + EPS)

Neodymium EPS market

HEV market

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Interior permanent magnet synchronous motors
IPM (Interior Permanent Magnet) motors

Fuel Economy Compared to Gasoline Passenger Car (Automobile Body Weight 1 to 1.26t)

Source: Japan Automobile Manufacturers Association, Inc. (JAMA) website
Ferrite Magnet Electrical Applications

- Electronic throttle control (ETC) motors
- Valve control motors
- Power window motors
- Blower motors
- Cooling fan motors
- Power seat motors
- CVT motors
- EGR valve motors
- EPS motors
- Motor for vehicle height adjustment
- Power-assisted brake motors
- ABS, VSC motors
- Power-window motors
- Water pump motors
- Wiper motors

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Neodymium Magnets and Ferrite Magnets—Properties

**Neodymium Magnets (NEOMAX® Series)**

- **Hc / kOe**: 12, 16, 20, 24, 28, 32

- **Br / T**: 1.0, 1.2, 1.4

- **Br / kG**: 48, 46, 44

**Ferrite Magnets**

- **Hc / MA/m**: 1.0, 1.5, 2.0, 2.5

- **Br / kG**: 10, 12, 14

**Dry-type low-oxygen materials**

- HILOP®

**Dry-type high-performance materials**

- 55 AH, 51 CH, 50 BH, 46 H, 48 H, 44 AH, 547 DH, 43 EH, 42 AH, 38 VH, 40 FH, 38 AH, 42 AH, 35 VH, 35 EH, 32 EH, 32 AH

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• Achieved volume production of ferrite magnets with outstanding magnetic characteristics
• Possible to develop smaller, lighter and thinner motors thanks to superior magnetic characteristics
• Uses volume production processes similar to conventional materials
Path to Merger of NEOMAX Co., Ltd.

Aug. 2003
Shares of former Sumitomo Special Metals Co., Ltd. (SSM) acquired from Sumitomo Metal Industries, Ltd.
Former SSM becomes equity-method affiliate

Launch of Hitachi Metals’ magnetic materials business, merger with SSM

32.9% of voting rights

Synergy effects sought for magnet business
Apr. 2004
Creation of NEOMAX Co., Ltd.
becomes consolidated subsidiary

50.3% of voting rights

Tender offer for NEOMAX shares

Hitachi Metals’ share of voting rights raised to 93.9%
Dec. 2006

93.9% of voting rights

Deliberations on management integration

Synergy effects sought for magnetic materials business
Apr. 2007

Merger of NEOMAX

Merger
## Generating Synergies

### Magnet Business Integration (April 2004)

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hitachi Metals Magnetic Materials Business</td>
<td>No. 1 in ferrite magnet sector</td>
</tr>
<tr>
<td></td>
<td>Global operations centered on automobile field</td>
</tr>
<tr>
<td></td>
<td>Production line tailored to automobile market</td>
</tr>
<tr>
<td>Former Sumitomo Special Metals</td>
<td>No. 1-ranked in neodymium magnet sector</td>
</tr>
<tr>
<td></td>
<td>Owned neodymium magnet patents</td>
</tr>
<tr>
<td></td>
<td>Leveraged economies of scale to become cost competitive</td>
</tr>
<tr>
<td></td>
<td>4th-ranked in neodymium magnet sector</td>
</tr>
<tr>
<td></td>
<td>Small-scale production meant lacked cost competitiveness in general-purpose field</td>
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<tr>
<td></td>
<td>(Focus on specialized products)</td>
</tr>
<tr>
<td></td>
<td>□ Ring magnets, high-performance magnets, HILOP®</td>
</tr>
<tr>
<td></td>
<td>3rd-ranked in ferrite magnet industry</td>
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<td></td>
<td>Customer base centered on Japanese customers</td>
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<td></td>
<td>Growth in the IT and home appliance markets</td>
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</tbody>
</table>

### Synergies

- Expand automotive applications for neodymium magnets
  - Develop global market for neodymium magnets like that created for ferrite magnets
  - Build a neodymium magnet production line suited to automotive applications
  - Dominate the market using cost competitiveness stemming from economies of scale and launch of ring magnets and high-performance magnets (HILOP®)

### Merger Between NEOMAX and Hitachi Metals (April 2007)

<table>
<thead>
<tr>
<th>Hard magnetic materials</th>
<th>Soft magnetic materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>(permanent magnets)</td>
<td>(nanocrystalline, amorphous, soft ferrites)</td>
</tr>
</tbody>
</table>

Merger

Synergies

1. Integration and development of alloy manufacturing technologies, which are key to magnetic materials
2. Capable of providing wide-ranging magnetic material and other solutions to the same markets and customers (e.g. amorphous metal materials and magnets for motors)
3. Capable of creating optimal user-oriented technologies by sharing the Hitachi Group’s leading-edge development technologies in the automotive field
<table>
<thead>
<tr>
<th>Automobile Product Category</th>
<th>Application Field</th>
<th>Current Products</th>
<th>Key Products and Development Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motors/inverters</td>
<td>Motors inverter</td>
<td>Various magnets</td>
<td>Magnets for next-generation HEVs</td>
</tr>
<tr>
<td></td>
<td>Inverters</td>
<td></td>
<td>Soft magnetic materials for stators and reactors</td>
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<td></td>
<td>Noise control</td>
<td></td>
<td>Soft magnetic materials for power inductors</td>
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<td>Silicon nitride mounting materials</td>
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<td>Noise reduction components and materials</td>
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<td>Cu core solder balls and other packaging materials</td>
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<tr>
<td>Engine peripheral components</td>
<td>Engine exhaust gas sensors</td>
<td>Valve materials Turbine housings</td>
<td>Development of specialty wire applications</td>
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<td>EGR components and materials</td>
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<td>Air flow sensor terminal components and materials</td>
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<td>Absolute angle sensors</td>
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<td>Pressure sensors</td>
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<td>Safety and reliability</td>
<td>Power steering</td>
<td>Materials for power steering vane pumps Components and materials for suspension systems</td>
<td>Steel strip application development</td>
</tr>
<tr>
<td>Drive control components</td>
<td>Drive control</td>
<td></td>
<td>Magnets for next-generation EPS</td>
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<tr>
<td>and materials</td>
<td>systems</td>
<td></td>
<td>Motion sensors</td>
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<td>Position detection sensors</td>
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<td></td>
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<td>Ceramic circuit board for millimeterwave package mounting</td>
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</tbody>
</table>
This document contains forward-looking statements, such as results forecasts and management plans, which are not historical facts. All such forward-looking statements were based upon all available information and upon assumptions and projections that were deemed rational at the time the Company prepared this document. Changes to the underlying assumptions or circumstances could cause actual results to differ substantially. Factors for causing such differences include, but are not limited to, the following:

- Changes in economic conditions and regulations in main markets where the Company operates, particularly Japan, the United States, Asia and Europe
- Sudden changes in technological trends
- Changes in competitive advantage and the capabilities of the Company and its subsidiaries and affiliates to develop and commercialize new products and businesses
- Fluctuation in status and conditions of product markets, exchange rates or international commodity markets
- Changes in financing environments
- Capability of the Company and its subsidiaries and affiliates to cope with fluctuations in product supply and demand, status and conditions of product markets, exchange rates or international commodity markets
- Protection of the Company’s intellectual property, and securing of licenses to use intellectual property of other parties
- Changes in status of alliances with other parties for product development, etc.
- Fluctuation of Japanese stock markets