Business Strategy of Transportation Solutions

August 18, 2010
Fuji Electric Holdings Co., Ltd.
## 1. Business Outline

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Business Domains

Power electronics

Core technology platform

Inverters
Motors
Controllers

Circuits
Control systems
Power semiconductors

Core products that contribute to energy saving

EV Systems
Global spread of environmentally friendly vehicles (use of electricity, higher voltages in automotive industry)
From the EV (power and drive) production site to global infrastructure

Transportation systems
Modal shift around the world
From passengers getting on and off railroad cars to operational control

Drive systems
(People, goods, water, wind)

Drive products: from components to systems

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Providing environmentally friendly transportation solutions with core products and engineering

**EV Systems**
From the EV (power and drive) production site to global infrastructure

- Major products
  - High-speed chargers
  - Onboard vehicle equipment

**Transportation systems**
From passengers getting on and off railroad cars to operational control

- Major products
  - Main converters for railroad cars
  - Linear doors
  - Tunnel dust collectors

**Drive systems**
(People, goods, water, wind)

- Drive products: from components to systems
- Major products
  - Low voltage inverters
  - Synchronous motors
  - Servo systems
  - Programmable display devices

FY2009 Consolidated Net Sales ¥63.3 billion
# Major Products

<table>
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<th>Major Products</th>
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<th>Drive Systems</th>
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<tr>
<td>Powertrains</td>
<td>Vehicle products, chargers, etc.</td>
<td>Main converters for railroad cars, linear doors, ship propulsion systems, traffic/power receiving and distribution equipment, tunnel dust collectors, etc.</td>
<td>General-purpose inverters, servo systems, motors, programmable display devices, etc.</td>
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<tr>
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<td>EV, HEV</td>
<td>linear doors</td>
<td>Low voltage inverters</td>
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<td></td>
<td>High-speed chargers</td>
<td>tunnel dust collectors</td>
<td>Servo systems</td>
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<td></td>
<td>IGBT-IPM</td>
<td>Jet fans</td>
<td>Synchronous motors</td>
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<td></td>
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<td>programmable display devices</td>
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5. Performance Trends
Focus on expanding products related to EV systems, which are expected to record rapid growth from fiscal 2012

Rapid growth: 20% a year

Average annual growth rate: 3% a year

Average annual growth rate: 5% a year

Figures are Company forecasts.

Please refer to IMS, UNIFE, Fuji settlement information

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## Business Policies

### < Fiscal 2009: Overall >
- **Bolstering business constitution**
  - Transitioning to a constitution that is less susceptible to fluctuations in business conditions
  - Advancing cooperation in railroad cars

### < Fiscal 2010: Business Policies >
- **Bolstering competitive strengths**
  - Bolstering sales systems (bolstering China, Southeast Asia)
  - Increasing production capacity
  - Accelerating cost reductions
  - Advancing incubation

### < Vision >
- Becoming an **electrical system provider that is known in markets around the world in the field of transportation**

|----------------|--------------------------|-----------------------------------------------------------------------------------------|
| **EV systems** | Incubation: “Brand Recognition” | Entering markets with "charging infrastructure" and "onboard vehicle products."
|                |                          | Enhancing and bolstering China bases (development, marketing, production, service)     |
| **Transportation Systems** | Advancing toward globalization | Promote development of global vehicles (international standard compliant systems) |
| **Drive Systems** | Business Expansion: “Expanding Sales Routes” | Bolstering marketing capabilities in Asia
|                |                          | Increasing production capacity (overseas production shift)
|                |                          | Advancing cost reductions (overseas local procurement) |
Business Portfolio

Fiscal 2015: Targets

• Automotive industry:
  machinery industry ⇒ electrical industry
• Wide-ranging development of power electronics technologies

Ev Systems

5% growth line

5% profit margin line

Growth potential

Fundamental operations
(continued expansion)

Drive systems

Transportation systems

EV systems

incubation

FY2010

Fundamental operations
(expand to overseas markets with newly developed products and systems)
Overseas Strategy

Focus on Asia: Thoroughly Bolster China

Drive systems
Targeting No. 1 in Asia by 2015

EV Systems
Entering China market

Transportation systems
Expanding around the world
(international standard compliant)

Strategic focus region

Fiscal 2010: Plan
Introducing 50 employees

Sales bases (existing)
Sales bases (under consideration)
Production bases (existing)
Production bases (under consideration)
Research & Development

Focus allocation on EV systems

Major themes
- Developing power electronics technologies for EV
  - 20% EV Systems

Major themes
- Developing global railroad car systems
  - 19% Transportation Systems

Major themes
- Developing inverters for HVAC
- Expanding servo system capacity
  - 61% Drive systems

Composition of R&D expenditures
1. Business Outline

2. Market Trends

3. Business Policies

4. Growth Strategies

5. Performance Trends
Accompanying the shift to electricity and higher voltages for electric systems, automotive systems, new production facilities, and social infrastructure will change greatly—this represents a business chance.

- Automotive systems utilizing power devices, power electronics, and safe circuit technologies
- EV charging infrastructure system as a part of social infrastructure
- New production and testing facilities accompanying the shift to EVs
Aim for the No. 1 share of the medium to high speed charger market by utilizing the industrial inverter and industrial power supply technologies we have accumulated

- Thoroughly reduce costs through advanced usage of industrial products (inverters, power supplies)
- Provide a nationwide service network (cooperation between power supplies and retail divisions)
- Utilize a wide range of marketing resources (municipal bodies, roads, automobiles, store logistics)

Sales release of high-speed chargers

Fuji Electric Holdings Co., Ltd. announced that Fuji Electric Systems Co., Ltd., a core operating company under its umbrella of Fuji Electric Group companies, has completed development and subsequently commenced sales of high-speed chargers for EVs, which are expected to quickly spread throughout the global market.

1. Characteristics
   (1) Shortness of charge time
      Able to charge a battery to approximately 80% capacity in roughly 30 minutes
   (2) Ease of use
      Taking customer usability into consideration, allows for charging to be conducted through simple operation
   (3) Safety of design
      Takes safety into full consideration and is equipped to prevent electrocution and fires, as well as detect disturbances in transmissions
   (4) Lineup matched to various installation environments

Scheduled sales release of medium-speed chargers (FY 2010)

Provide individual customers with various value-added products

Create a new social infrastructure market
Aim to respond in a timely manner to the growing demand for automotive power equipment resulting from the shift to electricity and the use of higher voltages in environmentally friendly automobiles

- Strengthen development capabilities by leveraging the synergies between automotive power semiconductor technologies and power electronics technologies
- Enhance Chinese operating bases in preparation for global expansion

From automobiles using gasoline to environmentally friendly automobiles

★ From low-voltage systems (12V) to high-voltage systems (Several hundred V)

- Pure-EV: Drive system, power supply, AC/DC charger
- Plug-in HEV: Drive system, power supply, AC charger
- HEV: Drive system, power supply
- Gasoline engine: auxiliary power supply
Drive Systems: Growth Strategy

High-efficiency synchronous motors + leading-edge SiC inverters = contribution to further energy-saving

High-efficiency synchronous motors

Synchronous motors that offer higher efficiency than standard synchronous motors (efficiency: in comparison with standard ▲2P: 75kW units)

Sic Inverters (under development)

Substantial loss reduction in comparison with conventional products (one-third in comparison with conventional products)

High-efficiency systems (high-efficiency synchronous motors + SiC inverters)

Potential Applications
- Intelligent building air conditioning
- Elevator/crane systems
- Plant air conditioning, various facilities and equipment

Buildings

Plants

Comparison of efficiency of high-speed synchronous motors and standard synchronous motors 1,800 r/min

Motor efficiency (%)

Shaft output (kw)

High-speed synchronous motors

Standard synchronous motors

Example of application during Damba use

Inverter + induction motor

Inverter + standard synchronous motor

SiC Inverter + high-efficiency synchronous motor

Energy-saving effects: (effects vary based on motor capacity)
Transportation Systems: Growth Strategies

**Become a provider of electric systems for railroad cars**

- **Fully participate in overseas markets**
  - Develop train communication network systems compliant with the new international standard (IEC61375)
    ⇒ Advertise to railroad car manufacturers and railway operators
  - Enhance overseas operating bases (manufacturing, sales, service, etc.)
    ⇒ Expand into China and the U.S.

- **Improve customer service through product package strategies (product line up)**
  - Improve the competitiveness of existing products ⇒ Propulsion, APS systems, linear doors
  - Develop and commercialize new products ⇒ Train communication network systems
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Performance Trends / Targets

Fiscal 2011 Medium-Term Management Plan
Aiming for net sales of ¥85.0 billion and ratio of operating income to net sales of 8%

Net sales (¥ billion)

FY2009 (Actual)  63.3
FY2010 (Forecast)  77.0
FY2011 Medium-term Management Plan  85.0

- EV Systems
- Transportation Systems
- Drive Systems
- Ratio of Operating Income
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