Business Briefing on Air-Conditioning & Refrigeration Systems

Masahiko Arihara
Head of Air-Conditioning & Refrigeration Systems

June 11, 2012

MITSUBISHI HEAVY INDUSTRIES, LTD.
## Relations Between Air-Conditioning & Refrigeration Systems and Business Domains

<table>
<thead>
<tr>
<th>Business domain</th>
<th>Customers/Markets</th>
<th>Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Shipbuilding &amp; Ocean Development</td>
</tr>
<tr>
<td>Energy &amp; Environment</td>
<td>• Power companies • Gas companies • Resource companies (oil, chemicals, steel)</td>
<td>• GTCC • Large-scale thermal power plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Nuclear power plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Environmental plants • Chemical plants</td>
</tr>
<tr>
<td>Machinery, Equipment Systems</td>
<td>• Core industries (steel, etc.) • Automotive industry • Logistics, etc.</td>
<td>• Stationary engines • Compressors • Metals machinery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Crane &amp; material handling systems • Environmental plants • Chemical plants</td>
</tr>
<tr>
<td>Transportation</td>
<td>• Airlines (air) • Shipping companies (sea) • Railways (land), etc.</td>
<td>• Commercial ships • Transportation system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Commercial aircraft</td>
</tr>
<tr>
<td>Defense &amp; Aerospace</td>
<td>• Ministry of Defense (land, sea, air) • JAXA</td>
<td>• Destroyers &amp; submarines for the Ministry of Defense</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Defense aircraft • Missiles • Space Systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Special vehicles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others (Air-Conditioning/Machine Tool)</td>
</tr>
</tbody>
</table>
## Table of Contents

1. Introduction to Air-Conditioning & Refrigeration Systems
2. Summary of FY 2011 (Review of 2010 Mid-Term Business Plan)
3. Business Policy for Achievement of 2012 Mid-Term Business Plan
4. Priority Measures Under 2012 Mid-Term Business Plan
1. Introduction to Air-Conditioning & Refrigeration Systems (1)

* Sales and domestic/overseas sales shares are based on FY 2011 consolidated results. The market sizes are estimated by MHI.

**Air-conditioners (PAC/RAC)**

- **PAC**
  - Saison
  - Q-ton

- **RAC**
  - BEAVER

Aiming to evolve from a minor player in a huge market to a dominant leader in a niche market. [Global market size in 2011]

- Approx. 8 trillion yen
- In addition, the hot water supply and heating market is worth 2-3 trillion yen.

**Car Air-Conditioner (CAC)**

- World number two in scroll compressors and electric compressors. [Global market size in 2011]
  - Approx. 3 trillion yen

**Centrifugal Absorption Liquid Chiller (TACRM)**

- Taking a comfortable lead in Japan. [Global market size in 2011]
  - Approx. 0.3 trillion yen

- Domestic/overseas sales ratio
  - Domestic: 90%
  - Overseas: 10%

**Transport refrigeration units (TRU)**

- Taking a comfortable lead in Japan. [Global market size in 2011]
  - Approx. 0.2 trillion yen

- Domestic/overseas sales ratio
  - Domestic: 93%
  - Overseas: 7%
1. Introduction to Air-Conditioning & Refrigeration Systems (2)

* Figures reflect consolidated results for FY 2011.

**Sales by product**
- CALC: 9%
- TRU: 11%
- CAC: 19%
- PAC/RAC: 61%
- **Total: 159.9 billion yen**

**Sales by region**
- The Americas: 10%
- Asia & Oceania: 40%
- China: 14%
- Europe: 19%
- Japan: 54%
- **Total: 159.9 billion yen**

**Production by region**
- North America: 4%
- China: 19%
- Asia & Oceania: 33%
- Japan: 44%

**Staff by region**
- North America and others: 4%
- China: 31%
- Asia & Oceania: 33%
- Japan: 32%
2. Summary of FY 2011  
(Review of 2010 Mid-Term Business Plan) (1)

Orders received (= net sales)

- Up 22.5 billion yen from FY 2009 level
  - Among other products, PAC/RAC displayed healthy growth.
  - Orders increased, mainly from Europe and from China.

Operating profit

- Up 10.4 billion yen from FY 2009 level
  - After hitting bottom in 2009, sales rallied. This led to growth in the gross margin.
  - PAC/RAC production shifted overseas to improve profitability. Strict management and other actions also helped.
The Air-Conditioning & Refrigeration Systems failed to reach forecast sales and operating profit for FY2011. Principal reasons include:

- Adverse impacts of the earthquake in March 2011 and the flooding in Thailand in October on supply chains in Japan and overseas
- Domestic production cuts by automakers after the earthquake and the strong yen
- Soaring prices of materials and rare earth metals

The process of reform and growth defined in the 2010 Mid-Term Business Plan—which included expanding overseas production and improving funds efficiency to revamp and develop environmentally benign products and achieve collaboration for growth—were executed virtually as planned.
3. Business Policy for Achievement of the 2012 Mid-Term Business Plan (1)

Orders received (= net sales)
- Expand the business, chiefly in PAC/RAC and overseas CAC operations.
- Attain PAC/RAC sales expansion in China and Asia.
- Achieve growth in the domestic and overseas heat pump and hot water supply business.
- Commence CAC production for a large-scale overseas program for which the order has been received.

Operating profit
- Boost overseas PAC/RAC and CAC production in an effort to cut costs.
- Complete the shift to full overseas production in PAC/RAC within 2012.
- Bring a new overseas CAC plant in Thailand online and resume full-scale mass production at the U.S. plant.
3. Business Policy for Achievement of the 2012 Mid-Term Business Plan (2)

The 2012 Mid-Term Business Plan follows the 2010 Mid-Term Business Plan. (Rolling Plan)

- **Policy**

- **Aim to play a role in MHI’s environmental business and to become a manufacturer of air-conditioning and refrigeration systems that help preserve the global environment.**

- **Establish a light, nimble business structure to operate as a dominant niche player and then open the way to becoming a global niche leader.**
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (1): Overseas expansion (i)

- **PAC/RAC**
  - Complete the shift of PAC to full overseas production in 2012. (In PAC/RAC, all but scroll compressors will be produced outside Japan.)

  MACO in Thailand adds a new plant capable of producing large outdoor units.
Establish a light, nimble business structure (1):
Overseas expansion (ii)

**Overseas expansion**

◊ **PAC/RAC**
- Shift to direct transactions between MACO in Thailand and overseas bases to skip back office operations in Japan, shorten commercial flows, and reduce production lead times.
Establish a light, nimble business structure (1): Overseas expansion (iii)

Overseas expansion

◇ CAC
- A third overseas CAC base was built in Thailand in October 2011 in a bid to increase overseas production.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (1): Overseas expansion (iv)

**TRU & CALC**
- For TRU and CALC, step up procurement of components outside Japan and begin preparing for overseas production.

Schematic of cost cutting through overseas procurement and production for TRU
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (1): Overseas expansion (v)

Overseas expansion

Overseas production share

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic Production</th>
<th>Overseas Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td>75%</td>
</tr>
</tbody>
</table>

Up 40% or more
Establish a light, nimble business structure (2): Funds efficiency (i)

Funds efficiency

Inventories

- Introduce the *Yatai* system for production at MACO in Thailand to domestic production of refrigeration units so that land transporters can cut production lead times.

The iPad is introduced to provide process support using electronic process manuals and to achieve enhanced process quality.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (2): Funds efficiency (ii)

Funds efficiency

Diamond Inventories
- Introduce a system for centralized control of global sales, inventories, and the production of air-conditioners to minimize the inventories.

- Eliminate wasteful inventory overlaps, such as spare goods for MHI and group companies and finished product stock.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (2):
Funds efficiency (iii)

Period of TRU Inventory on hand (2008 = 100)

- 2008: 100
- 2011: 40

Down 60%

Period of Inventory on hand (2009 = 100)

- 2009: 100
- 2014: 60

Down 40%

Funds efficiency
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (2):
Funds efficiency (iv)

- Trade receivables
  - Reduce trade receivables through direct transactions between Thailand-based MACO and overseas bases that lead to shorter commercial flows and curtailed production lead times.
  
  - Also incorporate financial scheme such as liquidizing, and negotiate with customers for shorter payment terms.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (2): Funds efficiency (v)

Funds efficiency

Period of Trade Receivables on Hand
(2009 = 100)

2009  100

2014  80

Down 20%
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (3): CAC business (i)

CAC business

Current state
- In the automotive market, environmentally benign vehicles, such as compact cars, electric vehicles, and hybrid vehicles, will become more prevalent.

Forecast demand for hybrid vehicles and electric vehicles

730 950 1,000 1,100 1,160 2,400 3,600 9,700

Unit: thousand vehicles
The figures are estimated and forecast by MHI.
Establish a light, nimble business structure (3): CAC business (ii)

- MHI is one of the world’s few manufacturers capable of covering both the belt drive system and the electric drive system.

- MHI is the leading manufacturer of scroll compressors, although the market is small.
Establish a light, nimble business structure (3): CAC business (iii)

- Establish a third overseas base in Thailand for the purpose of cutting costs and incurring costs in foreign currencies.
- Focus on efforts to attract new customers and win new projects in Japan and abroad by taking advantage of cost competitiveness generated from production in Thailand.
- Strive to introduce electric compressors and electric heaters for electric and hybrid vehicles, among other products, to new overseas customers.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (3):
CAC business (iv)

◊ Reorganization into an operating company
  - Meanwhile, competitors specialize in vehicle parts manufacturing. Operated as part of the general manufacturer, the business has difficulty in responding swiftly to radically changing business circumstances.

  - Given that, MHI will set up a new wholly owned company that takes over its CAC business in a bid to construct an agile and robust business structure that can quickly respond to changes in harsh market conditions and thereby to rival its competition.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Establish a light, nimble business structure (3):
CAC business (v)

CAC Sales Plan
(2011 = 100)

2011
100

Up 80%

2014
180
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (1): Heat pump water heaters (i)

Heat pump water heaters

Offering an array of products with unrivalled performance mainly for niche business and industrial applications

Q-ton ESA30: EcoCute water heater for business use

ETW: waste heat recovery heat pump

Winning
- An ECCJ Chairman Prize in the Energy Conservation Grand Prize run by the Energy Conservation Center, Japan (ECCJ)
- A Chairman Prize from the Heat Pump & Thermal Storage Center of Japan
- A Technology Award from the Japan Society of Refrigerating and Air Conditioning Engineers
- A New Product Prize in the MHI Internal Best Innovation 2011

Using heat in the air to boil water

High Power
-25°C⇒90°C
Supplying hot water at 90 deg. C under cold conditions at the minimum temperature of -25 deg. C

Ecology
COP 4.3!
The industry's top-class efficiency with the COP value of 4.3 in the middle phase

With the heat pump, it is lower than boilers in:
- CO₂ emissions by 70%
- Costs by 40%

Continuous hot water supply at a maximum of 90 deg. C

Using hot waste heat at 10 deg. C to 50 deg. C
Heat pump water heaters

Operate as a dominant niche player (1): Heat pump water heaters (ii)

Heat pump water heaters are renewable energy systems that produce hot water with the use of heat in the air.

[Diagram of heat pump water heater system with labels for each component: heat source (heat pump unit), hot water storage tank unit, absorbing heat from air, compression, heat exchanger, expansion valve, circulation pump, CO2 refrigerant cycle, 90°C, hot water supply, water supply.]
Heat pump water heaters

Developed in pursuit of high performance under cold conditions and high efficiency

- Competitors have their performance decline at outdoor temperature of 5 deg. C and below. MHI’s product maintains its rated performance until the outdoor temperature falls to -7 deg. C. It has thus massively broadened the region of applications of heat pump water heaters.

Conventional heat pump water supply systems have a drawback in that their performance is poor in cold environments.

At a lower outdoor temperature
- Heating capacity and
- Efficiency (COP) decline significantly.

Unrivalled in performance and efficiency
- Supplies hot water at 90 deg. C under outdoor temperature as low as -25 deg. C at the minimum
- Achieves the industry's highest COP value of up to 4.3
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (1):
Heat pump water heaters (iv)

Heat pump water heaters

The Q-ton is used by many different customers for different purposes.

- Kitchens
  - Restaurants, wedding halls, barbers, beauty salons, food preparation centers, school/hospital/works site canteens, etc.
- Bathing facilities and others
  - Hospitals, elderly care facilities, group homes
  - Baths in tourist hotels and Japanese-style inns
  - Business hotels

* The figure enclosed in a circle represents the number of corresponding facilities estimated by MHI. The value is expressed in thousands.

- Kitchens
  - Restaurants with 100 seats or more
  - Kitchens for wedding halls

- Bathing facilities and others
  - Hospitals, elderly care facilities, group homes
  - Baths in tourist hotels and Japanese-style inns
  - Business hotels

- Hot water supply in barbers and beauty salons
  - 220 (Liters per day)
- Food preparation centers for day care facilities
  - 25
- Kitchen for school, hospital, and worksite canteens
  - 2
- Company dormitories, welfare facilities, and public bathhouses
  - 6
- Business hotels
  - 4

© 2012 MITSUBISHI HEAVY INDUSTRIES, LTD. All Rights Reserved.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (1):
Heat pump water heaters (v)

Europe
- Released in June 2012 after concentrating resources in the U.K., Italy and France. In the U.K., a field test was commenced.
- Rapid market growth is expected in Italy, where legislation imposing obligations to use heat pumps has come into force.

Distribution of demand for heat pump water heaters

Europe: 47%
China: 16%
Japan and elsewhere: 8%

A hotel in the U.K. where the field test takes place
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (1): Heat pump water heaters (vi)

Heat pump water heaters

[Sales Expansion]

China
- There is potentially a large market as late-night power rates are available.
- The local base (MHIAS) is accelerating its effort to cultivate the market and to expand sales.
Operate as a dominant niche player (2): Sales operations in China (i)

Sales operation in China

A company for selling room air-conditioners was established jointly with Suning Appliance Co., Ltd. which is China’s largest mass retailer of home electric appliances.

- High performance room air-conditioners
- China’s largest mass retail network

- MHI and Suning Appliance made a joint investment to set up a company that exclusively sells MHI-branded room air-conditioners in China.
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (2): Sales operations in China (ii)

Sales operation in China

◊ Suning Appliance will provide each of its stores with a booth dedicated to MHI room air-conditioners. Front-line sales information supplied from the booths will be incorporated into product development.

Schematic of a booth dedicated to MHI room air-conditioners

Beijing Chaoyang Road Store

Ningbo Tianyi Store

Nanjing Jiangpu Road Store
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (2): Sales operations in China (iii)

Sales operation in China

- Sales functions are integrated under the MHI brand in view of individual optimization of MJA and MHAQ.

- Unification of brand strategies
  - Increase in selling strength
    - Effective integration of air-conditioner selling functions between MHIAS and MHIRS (with the same executives)
    - Integration and closedown of regional bases (sales offices)

- Enhancement in product appeal
  - Multi-system air-conditioners for home use (KX Mini & RAC Multi)
  - Room air-conditioners
  - Air quality products

- Expansion of K-Point stores

- Accelerated technology transfer

- Collaboration with Suning Appliance

- Specialization for inverter models (for production share of 100%)
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (2): Sales operations in China (iv)

**Sales operation in China**

Expand the sales network of K-Point stores dealing exclusively with MHI’s commercial air-conditioners. As part of the brand strategy for the K-Standard, a brand for MHI air-conditioning systems, K-Point stores are operated in the Chinese market. These stores deal exclusively in MHI’s products. It is planned to increase the number of K-Point stores from 237 as of the end of May 2012 to 400* in December 2012. * Including “air +” Stores

*Exterior appearance of a K-Point store*

*Interior appearance of a K-Point store*

*A conceptual representation of a customer’s residence*
4. Priority Measures Under the 2012 Mid-Term Business Plan

Operate as a dominant niche player (2):
Sales operations in China (v)

- Unify the images of selling spaces, products, technologies and quality to clarify the appeal to consumers. Implement the “air +” brand strategy.

- Concept of the “air +” brand
  To quickly implement below message and image by using simple words:
  - MHI’s air conditioning products are based on its comprehensive technical capabilities;
  - MHI is a one-stop provider of the brand, products, services and others; and
  - The products are designed to improve air-related quality of life.

- Design unification for sales sections
  Before the change:
  Selling spaces looking disorganized
  After the change:
  Selling spaces well coordinated

- Increasing recognition of the “air +” brand

© 2012 MITSUBISHI HEAVY INDUSTRIES, LTD. All Rights Reserved.
To improve installation and servicing quality for air conditioning systems, Nanjing Mitsubishi Funded Course has been established within Jiangsu Economy & Trade Polytechnic College located in the city of Nanjing in an effort to provide education on air-conditioning technologies.

Jiangsu Economy & Trade Polytechnic College

Education is given with the use of MHI's air conditioning system.
Supporting an attempt to enter the world stage

- MHI sponsors pro golfer Li-Ying Ye.
  - Plays in the LPGA tour. She had her first win in Japan in September 2011.
  - Helps to boost publicity for MHI’s air conditioning systems through Chinese media.

Thank you very much for your attention.
Forecasts regarding future performance in these materials are based on judgment made in accordance with information available at the time this presentation was prepared. As such, those projections involve risks and insecurity. For this reason, investors are recommended not to depend solely on these projections for making investment decision. It is possible that actual results may change significantly from these projections for a number of factors. Such factors include, but are not limited to, economic trends affecting the Company’s operating environment, currency movement of the yen value to the U.S. dollar and other foreign currencies, and trends of stock markets in Japan. Also, the results projected here should not be construed in any way as being guaranteed by the company.