Road Map for Growth

To ensure the medium- to long-term growth of the Precision Reduction Gear Business, we will further enhance our stable supply systems established at our Japanese and Chinese plants to steadily meet the increased needs for automation in the automotive and general machinery industries, thereby helping manufacturers save labor and increase productivity at their sites.

Managing Executive Officer, President, Precision Equipment Company  Shinji Jyuman

Sources of Strength

Motion Control Technology, Ability to Develop Applications and Technologies

The compact and lightweight Precision Reduction Gear RV, which boasts excellent durability and high positioning accuracy, serves as the source of Nabtesco’s competitiveness. The high product performance is supported by the competencies the company has accumulated in responding to customer needs.

Relations of Trust with Customers

Nabtesco launched its first precision reduction gears on the market in 1986, and since then its global market share of precision reduction gears for industrial robots has grown to about 60%. Although the basic patents possessed by the company for the products expired in 2006, the high market share has been maintained as a result of conducting business with the greatest importance placed on customer satisfaction and building relations of trust with our customers.

Stable Supply System

In anticipation of a high demand for precision reduction gears, Nabtesco has increased the production capacity of its domestic plants and has launched new production sites in China to ensure the stability of its supply system. We have also been implementing measures for increasingly higher quality and faster delivery on a continual basis, and are able to make flexible responses to changes in demand, which adds another competitive edge to Nabtesco.

Business Environment (Opportunities and Risks)

According to the forecast made by the International Federation of Robotics, in the medium term, the global market of industrial robots (including small-, medium-, and large-sized robots) will grow at the annual rate of 15%. In light of the fact that the growth rate of the market for small robots is relatively high with demand beginning to increase, the annual growth rate of the market for medium and large robots is expected to be 5 to 10%. By region, the growth rate will be around 25% in China, where the need for unmanned, automated operations has seen a remarkable increase. In fields other than industrial robots, we are promoting sales of precision reduction gears for general industries and new-type actuators that integrate precision reduction gears and servomotors in China, Europe and other regions.
Meanwhile, demand for industrial robots is influenced by changes in capital expenditure. Therefore, the Group is subject to the risk that we might face drastic changes in demand depending on end customers’ capital investment policies. We also regard competitors’ catch-up in technology as a potential risk.

### Measures for Medium- to Long-Term Growth

For the medium- to long-term growth of the company, we will further deepen relations of trust with our existing customers by responding to any new needs they have. At the same time, we will strive to find new customers, work for higher quality and faster delivery so that we will not miss any opportunities that come as a result of the increased demand for industrial robots. Moreover, we are enhancing our production capacity and increasing our productivity with automation and labor saving at our manufacturing facilities in Japan while improving the production facilities in China for the maintenance and improvement of our stable supply system to meet demand that is expected to expand on a medium- to long-term basis. Furthermore, in the fields other than industrial robots, we are going to utilize our long-established technological expertise to promote the sales of new products and to develop new markets.

**Major customers**
- FANUC, YASKAWA Electric, Kawasaki Heavy Industries, KUKA Roboter, ABB Robotics and others
- Tsuchiura City, Mie Prefecture, Japan / Jiangsu Prefecture, China

**Production base** (as of the end of December 2016)

**Market share**
- Joints of industrial robots: Approx. 60% global market share
- Machine tools ATC (Automatic Tool Changer): Approx. 60% domestic market share

**History of business development**

In 1976, Teijin Seiki began selling reduction gear-equipped hydraulic motors for use in construction machineries. Subsequently, following the maturation of this market, the company began to focus its attention on industrial robots, which would provide a new growth market where the company could make use of its unique reduction gear technology. The company then proceeded with the development of reduction gears for robot joints and began selling precision reduction gears for industrial robots in 1986. We now have a 60% share of the world precision reduction gear market and our products are widely used in a range of fields in addition to industrial robots. In 2014, we achieved a cumulative production of 5 million units in the business. In 2015, we commenced building a new production base for precision reduction gears in China, which now offers the world’s largest industrial robot market. This base will start production at the beginning of 2016.

- 1986 Commenced launch of the Precision Reduction Gear RV Series.
- 1991 Built the Tsuchiura City Plant for the manufacture of precision reduction gears.
- 2014 Total cumulative production of precision reduction gears reached 5 million units.
- 2015 Began the construction of a production base in China (to start production in early 2016)

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**FACT SHEET**

**Gear Head Type “RD Series”**

This is a gear head product based on the Precision Reduction Gear RV with the emphasis on ease of use. The product is easily installed on servomotors and features airtight grease sealing.

**Gear Head Type (Table Type) “RS Series”**

This table-type series is designed for accurate positioning. The low-profile products with large and hollow shafts are easy to use and are therefore widely adopted for index tables as well as for pivots of various devices.

**Compact Actuator “AF Series”**

This new product possesses the features of high accuracy, rigidity and reliability, which have been inherited from Precision Reduction Gear RV. Directly connected to servomotors, it serves to provide a compact drive part and usability by eliminating the need for embedding the servomotors into reduction gears.

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**Web**

Precision Reduction Gears

Sources of Strength

Nabtesco’s traveling units “GM Series” for crawlers, which integrate a hydraulic motor, a reduction gear, a parking brake and other components in one unit, feature excellence in durability and reliability in addition to great power generation efficiently, while remaining compact. Since the start of mass production in 1977, the GM series, one of the major products, have been highly appraised by customers, helping us to enhance the Nabtesco brand. With the improvement of machine processing technologies, the Tarui Plant has achieved a high level of automation during the manufacturing process, which contributes to the continuous generation of competitiveness.

Business Environment (Opportunities and Risks)

China, the world’s largest construction machinery market, has been gradually recovering from sluggish demand condition, which has driven favorable sales of products used in hydraulic excavators. In the construction machinery market, a new trend towards value creation, such as the incorporation of hybrid systems and ICT, will also help us find new business growth opportunities. Nonetheless, if the growth rate of public investments, which support the demand for construction machinery in China, drops and leads to the excessive supply of hydraulic excavators, or if it takes longer than expected for us to realize a synergistic effect with Hyest Corporation, which we acquired in 2015, there is a higher chance of failing to meet our targets on time.

Measures for Medium- to Long-Term Growth

In the Hydraulic Equipment Business, we completed the restructuring of our production bases in China in FY2015. To further enhance our global production system, we will optimize production at our bases in Japan, China and Thailand to respond flexibly to changes in demand in the construction machinery market. Further, we will develop new markets where we can fully utilize our strengths, while advancing technological innovations in response to...
the incorporation of ICT in construction machinery. Also, based on the product lines expanded through the acquisition of Hyest Corporation, we will foster a shift from selling components to cross-selling of hydraulic equipment and further proposals of optimal hydraulic systems and generate greater added value.

**Growth Matrix of Hydraulic Equipment Business of Nabtesco**

<table>
<thead>
<tr>
<th>Market Development</th>
<th>Diversification</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Develop new applications other than excavators for a wide range of product lines (e.g., Cranes (traveling, swing and winch units, etc.))</td>
<td>• Challenge for one of the diversified hydraulic machinery manufacturer through further development of application and hydraulic systems</td>
</tr>
<tr>
<td>[Market Penetration]</td>
<td>[Product Development]</td>
</tr>
<tr>
<td>• Enhance flexible response to demand fluctuation → Lead-time reduction and automatic manufacturing</td>
<td>• Expand product lineups for package deal and hydraulic systems</td>
</tr>
<tr>
<td></td>
<td>Expansion of product lineups through M&amp;A</td>
</tr>
</tbody>
</table>

**Amplification of Product Lineups for Excavators through M&A**

<table>
<thead>
<tr>
<th>Mini Excavators</th>
<th>Medium- to Large-Sized Excavators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traveling units</td>
<td>Swing units</td>
</tr>
<tr>
<td>Nabtesco</td>
<td>●</td>
</tr>
<tr>
<td>Hyest Corp.</td>
<td>●</td>
</tr>
</tbody>
</table>

**Major customers**

Komatsu, Kobelco Construction Machinery, Hitachi Construction Machinery, Sumitomo Construction Machinery, Kubota, YANMAR, Volvo, JCB, Sany, Xugong Excavator, Liu Gong and others

**Production bases** (as of the end of December 2016)

- Tarui-cho, Fuwa-gun, Gifu Prefecture, Japan / Kobe city, Hyogo Prefecture, Japan / Shanghai, China / Chonburi, Thailand

**Market share**

Traveling units for hydraulic excavators: Approx. 30% global market share

**History of business development**

Both Teijin Seiki and NABCO were engaged in the Hydraulic Equipment Business. NABCO began conducting such business back in the 1930s, offering a range of products, not only for construction machines and special vehicles, but also for general industrial equipment. The company also developed small, multiple-spool control valves for use in road sweepers produced in Japan, and these valves have been developed into our present control valve products. Teijin Seiki began conducting business by establishing the Tarui Plant in 1961. Its hydraulic motors were not highly competitive despite being core products, and the company worked to develop a new product independently. The traveling units “GM Series” that was thus developed provided the four functions necessary for the driving unit of hydraulic excavators (i.e. hydraulic motor, reduction gear, valve and parking brake functions), and was also compact enough relative to the width of an excavator crawler shoe. The company then successfully commenced mass production of this innovative product. Further, the reduction gear technology developed for hydraulic motors led to the development of Precision Reduction Gear RV to control the joints of industrial robots. Subsequently, we established a production base in China in 1996 and another in Thailand in 2008, and have resulted in fostering overseas business expansion and increasing our global market share in the business of traveling units for hydraulic excavators to 30%. In 2015, we acquired Hyest Corporation, the hydraulic equipment division of TOSHIBA MACHINE, with a view to further expanding our product lines and developing new hydraulic systems.

- 1937 Manufactured hydraulic pumps for airplanes in the national defense field.
- 1949 Commenced manufacture and sales of hydraulic equipment.
- 1961 Opened the Tarui Plant for the manufacture of hydraulic equipment and start the Hydraulic Equipment Business.
- 1970 Opened the Nishi Kobe Plant (presently Seishin Plant) for the manufacture of hydraulic and pneumatic equipment.
- 1977 Commenced mass production of the “GM-series” traveling units. By using the reduction gears technology, developed the Precision Reduction Gear RV series for use in industrial robots.
- 1996 Established a joint venture named Shanghai Teijin Seiki Co., Ltd. (presently Shanghai Plant).
- 2008 Established Nabtesco Power Control Co., Ltd. in Thailand.
- 2015 Acquired Hyest Corporation, the Hydraulic Equipment Business division of TOSHIBA MACHINE CO., LTD.
- 2016 Fully Absorbed Hyest Corporation

**Control Valve for Mini Excavators**

This product is a sectional type multi-control valve developed specially for mini excavators, and is ideal for various needs such as action control of excavators. The series is popular for its compact size, versatility, and wide ranging product lines. It has captured a large share in Japan.

**Swing Unit for Hydraulic Excavator**

The swing unit used in hydraulic excavators consists of a high-speed motor and planetary reduction gear unit. Its compact design allows the unit to have fewer components and to excel in quietness. In addition to units for hydraulic excavators, swing units are also used in small-sized cranes and winch motors for aerial working platforms.

**Yaw Drive**

This drive unit has high rigidity and high load performance based on the Rotor Vector (RV) reduction gear technology. It can be used under severe natural conditions, for example, in both low- and high-temperature areas as well as areas prone to salt damage. The low backlash feature helps prolong the field life of wind turbines.
Since receiving the first order for our air brake equipment from the former Japanese Ministry of Railways in 1925, we have been accumulating technologies through the provision of highly reliable brake systems, and have contributed to, for example, space-saving by developing brake units comprising multiple brake mechanisms. Railroad vehicle equipment, a foundational piece of social infrastructure, needs to be highly reliable and safe. We have been working to increase customer satisfaction over many years and we have built solid relationships of trust with our customers. This is one of our strengths and it aids our ability to provide customers with continuous MRO (maintenance, repair and overhaul) services.

Sources of Strength

Since receiving the first order for our air brake equipment from the former Japanese Ministry of Railways in 1925, we have been accumulating technologies through the provision of highly reliable brake systems, and have contributed to, for example, space-saving by developing brake units comprising multiple brake mechanisms. Railroad vehicle equipment, a foundational piece of social infrastructure, needs to be highly reliable and safe. We have been working to increase customer satisfaction over many years and we have built solid relationships of trust with our customers. This is one of our strengths and it aids our ability to provide customers with continuous MRO (maintenance, repair and overhaul) services.

Business Environment (Opportunities and Risks)

In the Japanese market, we expect that demand will continue to be stable mainly due to the need to replace old railroad vehicles with newer models. In China, demand in the high speed train market is expected to stabilize as the market matures, while demand in the subway train market will continue to expand due to the need to improve convenience in people’s daily lives and for mitigation of environmental pollution. If a technology development of high-speed trains progresses in China, however, it will pose a risk to us. In Europe, we expect that demand will continue to grow steadily, while in the Southeast Asian market, Japanese railroad vehicle manufacturers will bolster their activities to obtain more orders, which will provide us with new business opportunities.

Market Size of Railroad Industry (by Region)

<table>
<thead>
<tr>
<th>Region</th>
<th>2015 – 2017 (Average annual amount)</th>
<th>2019 – 2021 (Average annual amount)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAFTA</td>
<td>€180.9 billion</td>
<td>€163.5 billion</td>
</tr>
<tr>
<td>Asia &amp; Pacific</td>
<td>€47.4 billion (26.2%)</td>
<td>€59.0 billion (32.6%)</td>
</tr>
<tr>
<td>West Europe</td>
<td>€41.9 billion (23.4%)</td>
<td>€57.0 billion (31.5%)</td>
</tr>
<tr>
<td>Other*</td>
<td>€163.5 billion</td>
<td>€180.9 billion</td>
</tr>
</tbody>
</table>

*Other: East Europe, CIS, Africa & Middle East and Latin America other than NAFTA

Market Size of Railroad Industry (by Segment)

<table>
<thead>
<tr>
<th>Segment</th>
<th>2015 – 2017 (Average annual amount)</th>
<th>2019 – 2021 (Average annual amount)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling Stock</td>
<td>€55.3 billion (31.8%)</td>
<td>€70.7 billion (39.1%)</td>
</tr>
<tr>
<td>Service</td>
<td>€33.2 billion (18.8%)</td>
<td>€47.4 billion (26.2%)</td>
</tr>
<tr>
<td>Other**</td>
<td>€163.5 billion</td>
<td>€180.9 billion</td>
</tr>
</tbody>
</table>

**Other: Infrastructure, railroad signals and control equipment

Managing Executive Officer, President, Railroad Products Company Yukihiro Imuta

We will contribute to building safer and more convenient railroad transportation through provision of highly reliable brake control and door operating systems. These are the core components of railroad vehicles that require high safety. We will also pursue sustainable growth by proactively conducting business not only in Japan but also in overseas railroad vehicle markets.

Road Map for Growth

Managing Executive Officer, President, Railroad Products Company Yukihiro Imuta

We will contribute to building safer and more convenient railroad transportation through provision of highly reliable brake control and door operating systems. These are the core components of railroad vehicles that require high safety. We will also pursue sustainable growth by proactively conducting business not only in Japan but also in overseas railroad vehicle markets.
Measures for Medium- to Long-Term Growth

In order to conduct business in an effective and efficient manner in highly promising markets identified around the world, we will expand our business system in an all-encompassing manner, fostering the optimization of our development, procurement and production activities in the three regions of Japan, China and Europe. Particularly in the world’s largest railroad market of Europe, we will work to obtain new orders and certifications through our local bases, aiming to expand the business in the region during the period of the Medium-term Management Plan.

We will also promote sales of products targeting subway trains in China by making use of our local sales network as well as results and technologies accumulated in Japan. In addition we will continue focusing on increasing customer satisfaction and expand the MRO business both in Japan and China based on our relations of trust with our customers. Moreover, in the second-hand vehicle market in Southeast Asia, we will continue our efforts to secure more orders in the MRO business, while extending technological support and supplying maintenance parts to railroad companies through a newly established after-sale service base, thereby contributing to the local establishment of railroad infrastructures.

### Major customers
Japan Railway (JR) companies, private railway companies, Kawasaki Heavy Industries, Hitachi, Ltd., railway related companies in China and others

### Production bases (as of the end of December 2016)
Kobe City, Hyogo Prefecture, Japan / Jiangsu Prefecture, China / Piedmont, Italy

### Market share
Brake systems: Approx. 50% domestic market share Approx. 40% high-speed railways market share in China
Door opening systems: Approx. 70% domestic market share.

### History of business development
In 1925, we received an order for its air brake systems from the Ministry of Railways, and this marked the beginning of our Railroad Vehicle Equipment Business.

In the 1960s, Shinkansen bullet trains began running in time for the Olympic Games in Tokyo, and the urban railway networks were increasingly improved for transportation at higher speeds and in greater quantity. In response, we developed highly reliable automatic train control systems to ensure safety even during high-speed operations, as well as electric command air brake systems. We continued to expand the business as subway systems were successively constructed to mitigate traffic congestion in urban areas.

We also changed our business model from the development of hardware products to making proposals to individual customers in order to expand our business.

In and after the 2000s, we expanded our market share in Chinese and Taiwanese high speed train and subway businesses. Further, in 2013, we acquired an Italian railroad vehicle door manufacturer (presently Nabtesco Oclap S.r.l) to spearhead business in Europe and around the globe.

- **1925** Received the first order for air brake equipment from the former Japanese Ministry of Railways. Commenced manufacturing and sales of air brake systems for railroad vehicles.
- **1998** Relocated and opened the Kobe Plant for the manufacture of railroad vehicle equipment.
- **2011** Established Jiangsu Nabtesco KTK Railroad Products Co., Ltd.
- **2012** Acquired International Railroad Industry Standard (IRIS) Certification.
- **2013** Acquired OCLAP, an Italian railroad equipment manufacturer, and established Nabtesco Oclap S.r.l.
  - Received an order for pneumatic door systems for train cars under the Intercity Express Programme (IEP) implemented in the United Kingdom.
- **2014** Became the first Japanese company to be certified as a global supplier of doors for train driving cabs and cars by Bombardier Transportation.
- **2015** Received an order for passenger doors for the Rennes subway line in France from Siemens AG.
- **2017** Established Nabtesco Service Southeast Asia Co., Ltd. in Thailand as a base for after-sales service to customers in Southeast Asia.
In the civil aircraft market, where growth is continuing, we will steadily supply products that support safe flights, thereby achieving the sustainable growth of the business. We will pursue innovation in production, technologies and after-sale services to reduce the environmental impact of our operations. Also, by expanding our business, we will contribute to the development of the Japanese aircraft industry and our local communities.

Deputy Chief Executive Officer, President, Aerospace Company and in charge of Production innovation
Nobutaka Osada

Sources of Strength

Motion Control Technology and Technological Development Ability
We have long accumulated know-how and technologies by meeting the needs of customers in both private and national defense sectors, which are sources of strength for Nabtesco. We have developed the world’s highest-level production technologies and expertise in the aircraft market, which prioritizes safety, and using these technologies, we are developing a highly reliable flight control actuation system (FCAS).

Relations of Trust with Customers
We have been providing the world’s aircraft manufacturers with the best solutions for nearly 40 years, always taking the viewpoint of customers and a proactive attitude. The close relations of trust we have built with customers provides us with the strength to establish ourselves as the world’s first-class supplier of FCAS.

 Manufacturing System
We have been continuously taking measures to attain higher quality and productivity at two plants—one in Japan and the other in the United States.

Forecast for passenger aircraft demand

Source: Japan Aircraft Development Corporation

Flight Control Actuation System
Nabtesco is the leading Japanese manufacturer of this system, which controls the aircraft’s attitude. This system is used to move the surface such as the ailerons on the main wings and elevators on the tail surface. Nabtesco has a solid reputation as a global leader in the commercial aircraft market.
Business Environment (Opportunities and Risks)

In the private sector, the number of operating airplanes will double over the next twenty years. The budget for national defense will be at a stable level, although it might slightly increase. On the other hand, risks exist caused by stagnant growth of the world economy and political changes.

Measures for Medium- to Long-Term Growth

By communicating closely with customers based on our relations of trust, we will analyze their “needs and wants” and propose highly competitive and high-quality solutions by concentrating our resources appropriately. We will also improve our technological development ability to deliver more value to customers and expand the capacity of our manufacturing facilities in Japan and the United States to grasp the business opportunities provided by demand in the aircraft market, which will rapidly expand following the start of new mass production programs by aircraft manufacturers in and after 2017.

Moreover, we will undertake actions while considering the provision of value across the value chain, and enhance measures in the after-sale market, while keeping the importance of achieving “profitable growth” in mind.

Major customers
Boeing, Mitsubishi Aircraft Corporation, Kawasaki Heavy Industries, Mitsubishi Heavy Industries, IHI, the Japanese Ministry of Defense, airline companies and others

Production bases (as of the end of December 2016)
Tarui-cho, Fuwa-gun, Gifu Prefecture, Japan / State of Washington, the United States

Market share
FCAS: Approx. 100% Market share for domestically-produced aircraft

History of business development

The history of our Aircraft Equipment Business dates back to the period during the war, when we began manufacturing landing gear for airplanes. After the end of the war, we introduced overseas technologies and adopted a range of element technologies. We also acquired the know-how necessary for the design, development, and production of aircraft equipment.

We subsequently worked to enter the overseas civil aircraft market, and began dealing with Boeing in 1976. In 1990 we secured a contract to supply flight control actuators (FCAs) to Boeing for use in the B777, thereby receiving the world’s first order for FCA systems for use in civil aircraft. This success helped us to improve our position in the global market and also promote a growth afterward.

Since 2014, we were awarded Boeing Supplier of the Year Awards for the third time in four years, acclaimed for our performance improvement of QCDS (Quality, Cost, Delivery and Service). We have continued to steadily receive orders and supply FCAS and services for various airplanes and expand the business.

1944 Commenced production in Japan for airplanes in the national defense field.

Latter half of the 1970s
1979 Received orders for spoiler actuators for the B767 and for aileron actuators for the B757.
1990 Received an order for FCAS for the B777.
2006 Received an order for high-voltage electric power distribution unit for the B787.
2006 Received an order for aileron actuators/spoiler actuators for the B747-8.
2008 Received an order for the FCAS for the MRJ (Mitsubishi Regional Jet).
2012 Total cumulative delivery of FCAS for the B777 reached 1,000 units.
2013 Received an order for spoiler actuators for the 737MAX, the latest model in the B737 family.
2014 Received 2013 Boeing Supplier of the Year Award.
2015 Received an order for FCAS for the B777X, the B777 next-generation model.
2016 Received 2015 Boeing Supplier of the Year Award.
Expanded the Gifu Plant by adding the buildings for the manufacture of EHSVs and for surface treatment.
2017 Received the 2016 Boeing Supplier of the Year Award.
The technologies and brand power developed to meet demand for high quality products by Japanese automakers are Nabtesco’s strengths. Nabtesco became the first company to develop an air dryer in Japan, and our air dryers, which are highly safe and environment-friendly, are now one of the best known products in our Commercial Vehicle Equipment Business. We conduct business globally by making use of our production bases outside of Japan, and that is also a source of our strength.

**Sources of Strength**

As Japan’s No. 1 manufacturer of air brake systems for commercial vehicles, we will help meet the need for safe, environment-friendly, labor-saving transportation by truck, which is increasing in line with the expansion of transportation amounts over long times.

President, Nabtesco Automotive Corporation  
Michio Ogawa

**Business Environment (Opportunities and Risks)**

In Japan, the volume of freight movement is increasing, driven by the government’s economic measures and growing e-commerce business. In addition, the environmental law enforced ten years ago stimulated a replacement cycle for trucks. This cycle has supported and will likely support the continuous and steady demand for new trucks. In emerging countries, the demand is anticipated to grow by around 5% annually over the medium-term. Nonetheless, in ASEAN market where Japanese truck manufacturers hold a large share, the price competition between European automakers and those of emerging countries is intensifying and considered a risk that can affect the Group.

**Measures for Medium- to Long-Term Growth**

By creating added value and enhancing the quality management system for higher competitiveness, we will continuously seek to increase customer satisfaction, thereby maintaining our share in the Japanese market. Also, we will make more use of our bases in Japan and overseas, and foster local procurement with an eye to securing all opportunities provided by robust demand in the highly promising ASEAN market, while also receiving more orders in India through proactive marketing activities.

Furthermore, through acquisition of European compressor makers, we aim to not only achieve early commercialization of a high value-added system by combining an air dryer and compressor, both of which are our most popular products, but also generate sales synergy as we build stronger customer relationships in Europe.
Hydraulic Clutch Master Cylinders for Passenger Vehicles

This product converts the clutch force from the clutch pedal of manual-transmission vehicles into hydraulic pressure and transmits the pressure to the clutch system. It is supplied to automotive manufacturers nationwide.

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**Factsheet**

- **Major customers**: Hino Motors, Mitsubishi Fuso Truck and Bus, Isuzu Motors, UD Trucks, Nissan Motor and others

- **Production bases** (as of the end of December 2016)
  - Murayama City, Yamagata Prefecture, Japan
  - Samutprakarn, Thailand
  - Haryana, India
  - Saxony, Germany

- **Market share**
  - Wedge brake chambers for commercial vehicles chambers: Approx.70% domestic market share
  - Air dryers for commercial vehicles: Approx.85% domestic market share

**History of business development**

Nippon Air Brake became the first company to manufacture and sell automobile oil brakes in Japan in 1933. Subsequently, it also succeeded in producing commercial vehicle air brake systems in Japan and continued to develop safety-related technologies and peripheral devices, further expanding its business in line with the development of the automobile industry.

In 1972, the company became the first to succeed in the development of air dryers for commercial vehicles in Japan. The air dryers contributed to solving various problems, such as the rusting and freezing-up of valves, by removing water contained in air brake systems.

We established a new production base in Thailand in 2004 and spun off the growing Commercial Vehicle Equipment Business from Nabtesco Corporation, founding Nabtesco Automotive Corporation in 2009. Then, in 2013, we established Minda Nabtesco Private Limited in India as a joint venture to conduct business in the local truck market. We are thus further expanding our target market for this business.

- **1933**: Became the first company to manufacture and sell oil brakes for commercial vehicles in Japan.
- **1937**: Began manufacturing and selling air brake systems for commercial vehicles for the first time in Japan.
- **1972**: Became the first company to succeed in developing air dryers for commercial vehicles in Japan.
- **1991**: Opened the Yamagata Plant for the manufacture of commercial vehicle equipment.
- **2004**: Established a joint venture to manufacture and sell automobile components [Nabtesco Automotive Products (Thailand) Co., Ltd].
- **2009**: Began operations as Nabtesco Automotive Corporation.
- **2013**: Established a joint venture to manufacture and sell commercial vehicle equipment in India [Minda Nabtesco Automotive Private Limited].
- **2016**: Acquired a German air compressor maker and founded "Nabtesco ITG GmbH"
Sources of Strength

We are developing products to create new value, environmentally conscious products. In addition to conventional products, we have included new product in our product lines corresponding electronic engines for large-sized marine vessels in response to the enhancement of environmental regulations. This provides us with strength in the market. Moreover, we are implementing a substantial around-the-clock service support system, making use of our bases in Japan, Singapore, the Netherlands, China and South Korea.

Business Environment (Opportunities and Risks)

The mainstream of engines for large marine vessels has been rapidly shifting to electronic products at a pace that has exceeded our expectations, and in our strategy for the business, we will focus on obtaining more orders as demand for electronic engine control devices increases. Although the Marine Vessel Equipment Business is cyclic and has a risk to be affected by economic changes, we believe expansion of the MRO business will bring stability to the business.

Global Production of 2–stroke Diesel Engines for Marine Vessels

Source: Nabtesco estimates
Measures for Medium- to Long-Term Growth

We will respond flexibly to market needs and create new products to help customers solve their problems, focusing on demand for electronic devices and environment-friendly products. In addition, we will put the three-polar (Japan, China and South Korea) production system on track to make further improvements in QCD (quality, cost and delivery). Moreover, we will expand our service network to build up a system to provide services with additionally higher quality, thereby making proposals and satisfying customers’ potential needs for preventive equipment maintenance service. To this end, we will develop not only product failure prediction functions but also new products that are capable of reducing maintenance lead time and costs. We will also establish a system to provide around-the-clock, seamless support service to customers to aid in their safe navigation.

Electronically Controlled High-Speed Hydraulic Valves

Each Electronically Controlled diesel engine cylinder is equipped with one electronically controlled high-speed hydraulic valve, which electronically controls the timing and amount of fuel injection and the timing at which the exhaust valve opens and closes. The valve contributes to higher fuel economy and is attracting much attention as an environmentally friendly component.

Electronically Controlled Diesel GAP Sensors

Sensors monitor the behavior of engine fuel injection pumps and exhaust valves. The sensor gives an alarm when an abnormality is detected, thereby increasing the reliability of electronic diesel engine control systems.

Major customers
Kawasaki Heavy Industries, Mitsui Engineering & Shipbuilding, Mitsubishi Heavy Industries, Hitachi Zosen, Hyundai Heavy Industries, Doosan Engine, Shanghai Waigaoqiao Shipbuilding, Hudong Heavy Machinery, MAN Diesel and others

Production bases (as of the end of December 2016)
Kobe City, Hyogo Prefecture, Japan / Shanghai, China / Busan, South Korea

Market share
2-stroke main engine control systems: Approx. 60% domestic market share (Approx. 40% world market share)

History of business development
Since it developed the pneumatic valve in 1943, NABCO had been improving its pneumatic control technology for industrial use, and manufactured remote control equipment consisting of a range of valves, such as starting air pipe control valves, to be used in diesel engines for power generators and marine vessels, as well as gas compressors for freezers.

Subsequently, NABCO had built the foundation for meeting the standards that had been set by the ship classification societies of each country, and developed a pneumatic remote control system for ship engines ahead of others in Japan in 1963. Within only eleven years following the end of the war, Japanese shipbuilders had ascended to the level of the world’s top producers in terms of the number of new ships built and further expanded their business, driven by increased international trade. Also, in response to accelerated automation of devices of marine vessels, NABCO had dramatically boosted its market share for pneumatic remote control system used in large marine vessel engines in Japan.

Around 1975, as needs for advanced control systems using electronic technologies began to increase, NABCO decided to develop mechatronics technologies as well. In 1983, it developed a microcomputer-based main engine remote control system, which was later standardized. In 1987 the company launched a microcomputer-based electronic governor for marine vessel engines and established the position as a top engine control system manufacturer.

In addition, aiming to enhance service by making proposals to customers on preventive maintenance, we expanded our service network through establishing bases in the Netherlands and Singapore in the latter half of the 1990s.

1950 Delivered gas compressors for freezers of marine vessels.
1963 Commenced manufacture and sales of marine vessel engine control equipment.
1983 Developed and commenced sales of microcomputer controllers for marine vessels.
1986 Commenced sales of M-800X, a mass production model of microcomputer controllers for marine vessels.
1987 Developed and commenced sales of microcomputer-based electronic governors for marine vessels.
1998 Established Nabtesco Marine Service Pte., Ltd. in Singapore.
2000 Established Nabtesco Marinetec Co., Ltd. in South Korea.
2006 Total cumulative shipment of marine vessel equipment reached 30,000 units.
2008 Commenced manufacture and sales of hydraulic control valves for electronic controlled engines.
2013 Established production facilities (Nabtesco Marine Machinery (Shanghai) Co., Ltd.) in China.
2014 Decided to participate in the R&D network of Maritime Innovation Japan Corporation.
2016 Total cumulative delivery of marine vessel electronic governor systems reached 7,000 units.
2016 Total cumulative shipment of marine vessel equipment reached 50,000 units.
2016 Total cumulative shipment of Electronically Controlled High-Speed Hydraulic Valves reached 10,000 units.
Global Business Development
Since the first releasing Japan’s first domestically produced automatic doors on the market in 1956, we have been engaged in the Automatic Door Business, and with roughly 50% and 20% shares in the domestic and global markets respectively, are now among the top market players. “NABCO” and “GILGEN” are two of our brands providing automatic door products in the four core markets: Japan, Europe, North America, and China, are the essential sources of our strength.

On a global scale, we conduct the value chain business focusing on automatic doors for buildings. We provide customers with a range of products and solutions, including installation, maintenance and management services in an integrated manner, which is also a source of strength for us. We are the only company in the world who sell automatic doors and platform doors in all of the four aforementioned markets, and thus occupy a unique position in the industry.

Broad Product Lines with Focus on Automatic Doors
We offer a wide spectrum of products to meet our customer needs as one of the world’s top automatic door brands. We focus on automatic doors used for buildings but also special purposes and industrial use.

Sales and Installation Network
We have sales, installation and maintenance services supporting systems that covers all regions across Japan and helps us to maintain high market share. Similarly, we have world-class shares in major overseas markets sustained by our well established network of sales, installation, and maintenance.

Business Environment (Opportunities and Risks)
In the European market, there is concern over the risk of sluggish demand for automatic door products due to rising political and economic uncertainty; however, the demand in the Swiss market is forecasted to remain steady. In the short-term the global market for automatic door products is expected to remain stable supported by the strong domestic demand driven by upcoming Tokyo 2020 Olympics and Paralympic Games. In the long-term, the declining birth rate and aging of Japanese population will increase the risk of domestic market shrinkage. In response, in order to offset these risks and secure consistent profitability, we will increase the business scale through acquisition of domestic and overseas distribution companies, and through expansion to markets in North America with its continuously growing population and South-East Asia whose social infrastructure is gradually maturing.
Measures for Medium- to Long-Term Growth

We will expand the size of our business through M&A and organic growth. In the mature markets, we will take advantage of our large market shares to provide a range of products including general-purpose automatic and custom-made doors and offer a variety of solutions from installation and maintenance to management services with an eye to enhancing profitability and customer satisfaction.

Automatic Doors Market

<Diagram of Automatic Doors Market>

![Automatic Doors Market Diagram](image)

Source: HIS

### Major customers

Automatic doors for buildings: Leading construction companies, sash manufacturers, commercial facilities, hospitals, public organizations, industrial facilities (factories) and so forth.

### Production bases (as of the end of December 2016)

- Kobe City, Hyogo Prefecture, Japan
- State of Wisconsin, the United States
- Bern, Switzerland
- Beijin, China

### Market share

- Automatic doors for buildings: Approx. 30% domestic market share, Approx. 20% world market share
- Platform screen doors: Approx. 95% domestic market share (cumulative)

### History of business development

NABCO, which is one of the former companies of Nabtesco, worked to launch a new business in addition to supplying transportation vehicle equipment, including brake systems for railroad vehicles and automobile oil brakes. In 1953, the company began manufacturing and selling automatic door systems for railroad vehicles and buildings. Then in 1956, it produced the first automatic door in Japan ahead of all others. The Olympic Games held in Tokyo caused an explosive increase in new building construction mainly in the city center, and skyscrapers were built one after another, which also boosted the use of automatic doors.

By establishing a sales network across Japan as well as a careful service system, the company established a robust market position in the country by the early 1960s. Subsequently, started by the export of products to Hong Kong, it proactively expanded its business to overseas markets and gained a foothold in the U.S. market in the 1990s.

In 2011, we acquired Gilgen Door Systems AG [the automatic door division of the Kaba Group] to enter the European market on a full scale and have been operating the business under multiple global brand names.

In Japan, the Company has achieved two million units of cumulative production of NABCO automatic doors and our products are increasingly adopted in famed commercial and public facilities. Building the brand of "NABCO" and "GILGEN", we are establishing the top-class position predominating the four largest markets (Japan, North America, Europe and China) in terms of automatic door and platform door businesses.

1956 Became the first company to manufacture automatic doors in Japan.
1957 Established Osaka Door Engines (presently NABCO DOOR).
1992 Acquired LANSON, an automatic door manufacturer in the United States (presently NABCO ENTRANCES).
1995 Established CSCEC-NABCO Auto Door Co., Ltd. in China (presently NABCO Auto Door [Beijing] Co., Ltd.).
2011 Acquired the Automatic Door Business Division from Kaba Group of Switzerland and established Gilgen Door Systems AG. Building tetrapolar-system (Japan, North America, Europe and China) for automatic door and platform door businesses.
2012 Full acquisition of NABCO DOOR as the result of stock swap
2013 Total cumulative production of NABCO automatic doors reached two million units.
2016 Converted NABCO SYSTEM into a consolidated subsidiary as the result of additional stock acquisition.

Automatic Platform Doors

Automatic platform doors are now used worldwide to ensure passenger safety at railway stations. Demand for these doors is fast expanding over the world. Nabtesco has over 20% share of the global market and is successfully operating in European, Asian and Japanese markets.

Platform Screen Doors

Platform screen doors help ensure passenger safety on platforms. These doors also contribute to higher air conditioning efficiency, and enable unmanned operation of new transportation systems.

Web

Automatic Doors and Platform Doors

Advanced Technologies and Abilities of Onsite Employees

Nabtesco’s strengths include technological capabilities, which enabled us to become the world’s first successful developer of a rotary packaging machine. The machine integrated a stream of involved steps in packaging into one line with a control technology that enabled high-speed, reliable, stable, and airtight packaging. The finely-tuned response abilities of onsite employees who support application of the technologies can also be considered as one of our competitive advantages.

Relations of Trust with Customers

We have earned trust from food manufacturers for our compact packaging machines, which provide high performance, require only limited space, and even seal packages with high air tightness to ensure the safety of food products contained therein.

Business Environment (Opportunities and Risks)

Japan has seen increased demand for prepared meals for consumption by individuals at home, and demand for food packaging in pouches from manufacturers of private brand has been robust. Also, in North America, foods packed in pouches are gradually being accepted in place of cans as the preferred form of preserved foods. Moreover, in China and other emerging economies, people are increasingly focusing on the safety and hygienic quality of food products, and the demand for our packaging machines that enable high-precision processing are on the rise. However, risks associated with foreign exchange rates are also increasing as the export of these machines expands leading to greater changes in conditions with regard to competition and business results.

We will promote the development of next-generation high-speed packaging machines, the enhancement of our service system and the expansion of our business outside Japan, thereby meeting food processing company needs to save labor while ensuring food safety. We will also provide customers with a wide range of retort pouch packaging machines. Retort pouches have high transportation efficiency, which contributes to the reduction of CO2 emissions in logistics.

President, Toyo Jidoki Co., Ltd. Akiyoshi Kitamura

Sources of Strength

Packaging Machine Business

Main Products

Super High-Speed Automatic Filler/Sealer

A high-speed automatic continuous motion filler/sealer that delivers high performance in a compact space. This equipment is not only used for retort pouch foods but also for soups, sauces, and other food products as well as for refills for liquid detergents. It contributes to reducing the costs of mass production.

Packaging Machine Business

We will promote the development of next-generation high-speed packaging machines, the enhancement of our service system and the expansion of our business outside Japan, thereby meeting food processing company needs to save labor while ensuring food safety. We will also provide customers with a wide range of retort pouch packaging machines. Retort pouches have high transportation efficiency, which contributes to the reduction of CO2 emissions in logistics.

President, Toyo Jidoki Co., Ltd. Akiyoshi Kitamura
We will strengthen our bases and official distributors outside of Japan to promote sales mainly in Europe, the United States, China and Southeast Asia. Also in line with the sophistication of customer needs, we will maintain and increase a competitive edge through the development of next generation high-speed machinery and enhancement of services in Japan and overseas.

Major customers
Sugar and salt manufacturers, food and beverage manufacturers, detergent manufacturers, hair-care and cosmetics manufacturers, pet food manufacturers, beverage manufacturers in North America, food manufacturers in China and others

Production bases (as of the end of December 2016)
Iwakuni City, Yamaguchi Prefecture, Japan / Dalian, China

Market share
Packaging machines for retort pouch foods: Approx. 85% domestic market share

History of business development
In line with Japan’s economic growth, requirements for automation and energy conservation began to increase. In 1964, we started developing an automatic packaging machine, and thus entering the packaging machine market. In the middle of the 1960s, automatic packaging machines were rapidly adopted by sugar and salt manufacturers as well as by confectionery companies. In the 1970s, requirements for automatic food processing machines increased among frozen food manufacturers due to the spread of so-called fast food and the growth of the restaurant industry. In response, we began developing automatic food machines and became the first company to develop a curry cubes packaging machine in Japan. We also succeeded in developing a vacuum packaging machine.

Further, in 1994 we began supplying packaging machines for spout bags, and in 2011, established a production base in Dalian, China. Additionally, in 2013 we established a local corporation for sales promotion and service provision in the United States. We are thus favorably expanding the business.

1964 Developed an automatic packaging machine and started the packaging machines business.
1970 Delivered Japan’s first retort pouch curry packaging machine.
1976 Began delivering vacuum packaging machines.
1994 Began delivering spout bag packaging machines.
2011 Established a subsidiary in Dalian, China.
2013 Established a local distribution company for packaging machines.