CONTENTS

I. OVERVIEW

II. MAIN BUSINESS FIELD
# I. OVERVIEW

## Company Profile

<table>
<thead>
<tr>
<th>Company Name</th>
<th>NRTEC Co., Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEO</td>
<td>KyoungHun, Nam</td>
</tr>
<tr>
<td>Establishment Date</td>
<td>August 22(^{nd}), 2002</td>
</tr>
</tbody>
</table>
| Head Office & Factory| # 9-24, Gadong-ro, Hanlim-myeon, Gimhae-si, Gyeongnam, Korea  
Total Ground Area : 43,000 \(\text{sq} \text{m}\)  / Roofed Area: 14,300 \(\text{sq} \text{m}\) |
| Gross Capital        | USD 10 Million  |
| Total Sales (2015)   | USD 15 Million  |
## Customer Base

### Domestic

<table>
<thead>
<tr>
<th>Industry</th>
<th>Ship &amp; Marine</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doosan Heavy Industries</td>
<td>Samsung Heavy Industries</td>
<td>Hyundai E&amp;C</td>
</tr>
<tr>
<td>Hanwha Techwin</td>
<td>Hyundai Heavy Industries</td>
<td>Samsung C&amp;T</td>
</tr>
<tr>
<td>Hyundai Heavy Industries</td>
<td>Daewoo Shipbuilding &amp; Marine Engineering</td>
<td>GS E&amp;C Corporation</td>
</tr>
<tr>
<td>BHI</td>
<td>STX Shipbuilding</td>
<td>POSCO E&amp;C</td>
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<tr>
<td>Hansol Seentec</td>
<td>Hyundai Samho Heavy Industries</td>
<td>LOTTE E&amp;C</td>
</tr>
<tr>
<td>Daewoo Engineering</td>
<td>Hyundai Mipo Heavy Industries</td>
<td>HANWHA E&amp;C</td>
</tr>
<tr>
<td>Hyundai Engineering</td>
<td>Hyosung Corporation</td>
<td>DAERIM E&amp;C</td>
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</tbody>
</table>

### Overseas

- Mitsubishi Hitachi Power Systems
- Mitsubishi Heavy Industries
- Kawasaki Heavy Industries
- Toshiba Plant Systems & Services
- Sumitomo Heavy Industries
- IHI Corporation
- SIEMENS Germany
- TOYO Engineering
- Hangzhou Boiler Group
<table>
<thead>
<tr>
<th>Year</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>◆ Established as NRTEC Co., Ltd.</td>
</tr>
<tr>
<td></td>
<td>◆ Completed Silencer Performance Test Equipment (ISO 7235)</td>
</tr>
<tr>
<td>2003 - 2004</td>
<td>◆ Acquired ISO 9001 Certification</td>
</tr>
<tr>
<td></td>
<td>◆ Registered as Venture Business</td>
</tr>
<tr>
<td>2005</td>
<td>◆ Organized R&amp;D Center Annexed to Company</td>
</tr>
<tr>
<td></td>
<td>◆ Developed Gas Turbine Inlet &amp; Exhaust System</td>
</tr>
<tr>
<td>2006 - 2007</td>
<td>◆ Completed Gas Turbine Inlet &amp; Exhaust System</td>
</tr>
<tr>
<td></td>
<td>◆ Acquired INNO-BIZ</td>
</tr>
<tr>
<td>2008 - 2009</td>
<td>◆ Became a Registered Vendor with</td>
</tr>
<tr>
<td></td>
<td>- DSME / STX Shipbuilding / HANWHA E&amp;C</td>
</tr>
<tr>
<td>2010</td>
<td>◆ APEC Engineer</td>
</tr>
<tr>
<td></td>
<td>◆ Acquired ISO 14001 Certification</td>
</tr>
<tr>
<td>2011</td>
<td>◆ Registered as a Vendor of Major EPC Company</td>
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<tr>
<td>2012</td>
<td>◆ Became a Registered Vendor with</td>
</tr>
<tr>
<td></td>
<td>- KAWASAKI Heavy Industries</td>
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<tr>
<td></td>
<td>- TOSHIBA Plant Systems &amp; Services Corp.</td>
</tr>
<tr>
<td></td>
<td>- HITACHI Power Systems Company</td>
</tr>
<tr>
<td></td>
<td>◆ Nominated as Excellent Vendor Group by Korea Western Power</td>
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<tr>
<td>2013</td>
<td>◆ Became a Registered Vendor with</td>
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<tr>
<td></td>
<td>- MITSUBISHI HITACHI Power Systems</td>
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<tr>
<td></td>
<td>- SIEMENS</td>
</tr>
<tr>
<td>2014</td>
<td>◆ HQ Moved to New Location (43,000 m²)</td>
</tr>
<tr>
<td>2015</td>
<td>◆ Newly Built Shot Blasting &amp; Painting Shops</td>
</tr>
<tr>
<td></td>
<td>◆ Became a Registered Vendor with</td>
</tr>
<tr>
<td></td>
<td>- Toyo Engineering</td>
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<tr>
<td></td>
<td>◆ Renewed ISO 9001 &amp; 14001 Certifications</td>
</tr>
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</table>
## Engineering & Products

### Engineering

- **Noise Control**
  - Noise Analysis & Design of HRSG
  - Environmental Noise Analysis & Measurement of Industrial Plants
  - Flow Induced Noise Control of Piping, Duct, Valve, Orifice, etc.

- **Vibration Control**
  - Vibration Analysis & Measurement of Industrial Plants
  - Flow Induced Vibration Control of Piping, Duct, Valve, Orifice, etc.

- **Heat Transfer & Fluid Flow**
  - Flow Analysis of Environmental Plants (SCR, Duct)
  - Heat & Fluid Flow and Combustion Analysis of Boiler
  - Flow Model Test

- **Structural & Stress Analysis**
  - Base Frame, Steel Structures, etc.

### Products

#### Noise Reduction

- **Gas Turbine Generator System**
  - Intake Filter House
  - Air Inlet & Exhaust System
  - Enclosure & Ventilation System

- **Acoustic Enclosure System**
  - Gas Turbine Enclosure
  - Steam Turbine Enclosure
  - Industrial Machinery Enclosure

- **Ship & Marine Silencers**
  - Noise Control of LNG GCU System
  - Fan & Fan Room Silencer
  - SCR System
  - Exhaust Gas Pipe Silencer

- **Power Plant Silencers**
  - Steam Vent Silencer
  - Main & Bypass Stack Silencer

- **Industrial Silencers**
  - Railway Air-conditioner Silencer
  - Excavator Muffler & HVAC Silencer

#### Hydraulic Engineering & Machinery

- **Supersized Hydraulic Cylinder**
  - Hydraulic Cylinder
  - Hydraulic Power Unit
  - Synchronized Control System

- **Large Shaft Machining**
  - External / Internal Honing
  - Deep Hole Machine
  - CNC Lathe
  - Grinding Machine

- **Propulsion System**
  - Propeller Shaft
    - Controllable Pitch Propeller Shaft
    - Fixed Pitch Propeller Shaft
  - Intermediate Shaft
  - Rudder Shaft
NRTEC Manpower

(As of Aug., 2016)

Total Number: 95

Number of Employee

<table>
<thead>
<tr>
<th>Year</th>
<th>Technician</th>
<th>Engineer</th>
<th>QA / QC</th>
<th>Production Manager</th>
<th>Total</th>
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<tbody>
<tr>
<td>Y2011</td>
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<tr>
<td>Y2012</td>
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<tr>
<td>Y2014</td>
<td>60</td>
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<tr>
<td>Y2015</td>
<td>104</td>
<td></td>
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</tr>
<tr>
<td>Y2016</td>
<td>95</td>
<td></td>
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</tbody>
</table>
Certification

ISO 9001

ISO 14001

ABS Certificate

DNV Certificate

Qualification by DHI

R&D Center
II. Main Business Field

- Gas Turbine Generator System
- Acoustic Enclosure System
- Power Plant Silencer
- Ship & Marine Silencer
- SCR System
- Exhaust Stack System
- Machinery & Engineering
- Supersized Hydraulic Cylinder
- Propulsion System
- Large Shaft Machining
NRTEC is providing optimized GT Generator System that fits the requirements of each and every project based on proven skills in design, engineering and manufacturing, and also offer high performance by carrying out shop test.

**Components**

1. Air Intake & Inlet Duct System
2. Enclosure & Ventilation System
3. Exhaust System
   - Base Frame / Common bed (Walkway, Support Structures)

**System Features**

- Maximization of Gas Turbine Efficiency (CFD Analysis)
- Noise Reduction System
- Structural Stability

**Industrial Field of Application**

- Heavy-duty Power Generation System
- Light-duty Power Generation System
- Offshore Platforms and FPSOs
NRTEC is providing optimized GT Generator System that fits the requirements of each and every project based on proven skills in design, engineering and manufacturing, and also offer high performance by carrying out shop test.

**Components**
- Sound Attenuating Enclosure
- Control Panel
- Intake Air, Exhaust Silencer
- Fuel tank, Auto Door

**System Features**
- Space Saving Design
- Low radiated vibration
- Easy transportation and installation
- Perfect Integration

**Industrial Field of Application**
- Standby Generators
- Mobile/ Trailer Generators
Acoustic Enclosure System

◆ Acoustic Enclosure System is specially designed to reduce noise and maintain optimal internal temperature. NRTEC has designed based on engineering expertise including noise analysis/ fluid flow analysis / structural analysis and extensive project performance experience.

◆ Components
  - Maintenance & Access Door
  - Acoustic Panel & Roof case
  - Ventilation System
  - Lighting System

◆ System Features
  - Noise Reduction
  - Optimal Ventilation
  - Protection from External Risk Factor

◆ Industrial Field of Application
  - Gas & Steam Turbine
  - Industrial Machinery (Compressor, etc.)
  - Portable Soundproofing Acoustic Enclosure
NRTEC has provided silencers to control the noise generated from various industrial plants such as power generation, environment, desalination and oil & gas processing plants.

◆ **Products**
  - Steam Vent Silencer & Steam Blowing Out Silencer
  - Main Stack Silencer
  - Bypass Stack Silencer

◆ **Product Features**
  - Noise Guarantee
  - Flow Control
  - Pressure Drop & Thermal Stress Considerations

◆ **Industrial Field of Application**
  - HP, IP, LP Safety Valve
  - Blow down Tank & Blowing Out
  - Flash Tank
NRTEC is the first company in Korea to develop total noise control technology for a car ferry. Our aim is to provide effective noise control solutions for a cruise ship.

**Products**
- Fan & Fan Room Silencer
- SCR System (Silencer + Instrument)
- EGP (Exhaust Gas Pipe) Silencer

**Product Features**
- Noise Control of Near & Far Field
- Various Silencers for Noise Source
- Optimal Design of Pressure Drop

**Industrial Field of Application**
- Car Ferry
- GCU System of LNG Carrier
- Commercial & Special Vessels
SCR System

SCR (Selective Catalytic Reduction) System is applied to reduce Nox in exhaust gases which come from diesel engine. NRTEC is able to supply core components - SCR chamber, silencer and mixing unit, and design the most reliable system to meet IMO Tier III regulation.

Components
- SCR Chamber & Silencer
- Mixing Unit & Injection Pipe
- Soot Blowing Unit
- Urea Dosing Unit
- Urea Supply Unit

System Features
- Robust Components for Marine Application
- Compact Design for Easy Installation
- SCR Performance Test to Ensure Quality

Applications
- Drillship, FPSO, Car Ferry, etc.
- Power Generation Systems
NRTEC designs durable Exhaust Stack System to withstand high temperatures and harsh operating conditions as well as reduce airborne noise with minimized pressure drop.

Components
- Self-supporting Stack & Silencer
- Exhaust Duct
- Expansion Joint

System Features
- Noise Control
- Thermal Expansion & Stress Design
- Sliding Support System Design
- Surface Temperature Control

Industrial Field of Application
- Gas Turbine
- Boiler, Diesel Engine
- GCU of LNG Carrier
Machinery & Engineering

◆ **Products & Features**

- Railway Silencer
  - Noise Attenuation for Railway Air-conditioning System

- Acoustic Barrier Wall
  - To prevent the Transmission of Airborne Noise

- Noise Trap in Excavator
  - Radiator Fan Noise Attenuation

- Excavator Muffler
  - Noise Attenuation for Combustion Equipment or Ventilation System

◆ **Engineering Service**

- Measurement and Analysis of Noise & Vibration
- Noise Analysis of Industrial Plants
- Fluid Flow and Heat Transfer Analysis
- Structural & Strength Analysis
NRTEC offers supersized hydraulic cylinders as big as 20 meter long which are optimally designed to control precise position, and gone through tests on oil leak, pressure and operation before delivery in shop.

**Components**
- Hydraulic Cylinder
- Hydraulic Power Unit
- Synchronized Control System

**System Features**
- Max. Stroke : 20m
- Max. Cylinder Weight : 50Ton
- In house Machining in Shop
- Tests : Leakage, Pressure, Operating

**Industrial Field of Application**
- Drillship
- Floodgate, Giant Crane
- Press Machine
NRTEC’s Propeller shafts are available in a variety of diameters. These shafts can be applied to not only commercial vessels also special vessels. They can be provided in the form of complete shaft or un-machined shaft itself.

**Products**
- Propeller Shaft
- Intermediate Shaft
- Controllable Pitch Propeller
- Rudder Shaft

**System Features**
- Max. Stroke : 20m
- Max. O.D. : ø950
- O.D. Box Shop Test
- In house Stress Analysis of Hub Body

**Industrial Field of Application**
- Commercial Vessels
- Special Vessels (Warship, Naval Vessel, Coast Guard Vessel, etc.)
NRTEC owns major machines such as CNC lathes and honing machines for in house manufacturing. Our shafts have a wide range of applications in industry including water / nuclear / thermal / wind power plants.

**Main Machine**
- External / Internal Honing : \( \varnothing 2000 \times 15m \times 70Ton \)
- Deep Hole Machine : \( \varnothing 1600 \times 13m \times 60Ton \)
- CNC Lathe : \( \varnothing 1350 \times 16m, \varnothing 3300 \times 10m \times 70Ton \)
- Grinding Machine : \( \varnothing 1500 \times 10m \times 75Ton \)
- Turning Machine : \( \varnothing 2200 \times 1600H \times 15Ton \)
- Lathe : \( \varnothing 2400 \times 12m \times 100Ton \)

**Industrial Field of Application**
- Main & Flange Journal for Crankshaft
- Back Up Roll for Rolling Mill
- Propeller Shaft for Vessels
- Main Shaft for Wind Power
- Rotor Shaft for Generator
Major Project of Gas Turbine Generator

**ITEM : GAS TURBINE GENERATOR**

- **MHI 501F (185MW)**
- **GE PG5371PA (27MW)**
- **GE LM2500 (25.1MW)**
- **Kawasaki M1T-06 (1MW/2MW/3.6MW)**
Major Project of Enclosure

ITEM: ENCLOSURE

- Steam Turbine Enclosure
- Compressor or Machine Enclosure
- Gas Turbine Enclosure
Major Project of Power Plant

ITEM : POWER PLANT

- Stack Silencer
- Vent Silencer
- Vent Silencer for Blowing Out
- Bypass Stack & Silencer
- Inlet Duct Silencer
- Vent Silencer with hood
ITEM : CAR FERRY

SHI HN1523/24/74 Norfolk Line: Total Ship Noise Control Using Silencer

- Total Silencers: 92 sets/ship
- Noise Guarantee: Good
  - Far Field (50m from ship): 55 dB(A)
  - Near Field (Car Deck, etc.): 80 dB(A) ~ 85 dB(A)
  - Public Space: 57 dB(A)
ITEM: SUPERSIZED HYDRAULIC CYLINDER

- Cylinder Installed in Floodgate
- Hydraulic Pump Unit
  - Machining Process
    - Deep Hole
    - Internal Honing
    - Machining long shaft
ITEM : NOISE & VIBRATION ENGINEERING

- Analysis of Plant Noise
- Analysis of Plant Noise
- Modal Analysis of Vibration

- Stress/ Heat Fluid Flow Analysis
- Sound Field Analysis for Enclosure
- Structural Analysis