Haedong Engineering

Company Profiles

Electric Control System for Land, Maritime and Railway Renewable Energy
WE ARE WISE CHALLENGE FOR ELECTRIC CONTROL AND ENERGY DIVISION.
WE ARE WISE CHALLENGE FOR ELECTRIC CONTROL AND ENERGY DIVISION.
Greetings

We, Haedong Engineering, aim to become the leader in the field of distribution board and automatic control system, and to constantly advance since our establishment in 2014. Cooperating with numerous key midsize businesses in Busan and Gyeongsangnam-do region, we built up our foothold in the manufacture of land-maritime distribution board, maritime control panel, railroad distribution board, power box, factory automation (FA), and so forth. Now, the area of our business is expanding to the fields of smart factory and new & renewable energy.

As the economic recession goes on, many small and medium-size businesses are expected for downsizing or shut down. Haedong Engineering is a modest newborn business. Nevertheless, we have plans to stand up to this crisis, by diversifying our business area and expanding abroad according to the analysis on the future demand. This is how we will contribute to the local community and economy through employment, improve the quality of life of all the staffs, and become a socially responsible company that share our profit with those in need.

We will become an exemplary case who turned the risk into opportunity.

Thank you.
Company Profiles

**History**

- **2018**
  - Registered domestic patent related to Railway vehicle

- **2017**
  - Received a Social Contribution Award (from the Korean media)
  - Registered 2 domestic patents related to Railway vehicle
  - Certified INNO-Biz
  - Received Achievement Award for INNO-Biz Company (from INNO-Biz Association)
  - Received Achievement Award for SME (from Korea Federation of SME)
  - Certified SME with outstanding employee development programs

- **2016**
  - Certified CLEAN workspace
  - Certified Family-Friendly Company
  - Received Busan City Hosted 2016 Busan Venture Business Award

- **2015**
  - Certified Korean Venture Company
  - Factory registration and head office relocation (Current Location)
  - Authorized HAEDONG ENGINEERING R&D Center
  - Certified ISO 9001 and ISO 14001

- **2014**
  - Founded and registered as head office (in Sasang-gu, Busan)

**Management Philosophy**

- **Neighbors love**
  - Profit Sharing with the Society
  - Becoming a Social Enterprise

- **Customer Satisfaction**
  - Product Quality, Price and Service

- **Respect for Human**
  - Coexistence of the Company and the Staffs
  - Improving the Happiness and Welfare of all Staffs

**Organization Chart**

- **Quality Team**
  - Quality Control & Customer Service

- **Future Strategy Team**
  - General Sales Team

- **Technical research institute**
  - Research, Develop & Design

- **Production team**
  - Manufacturing & Management

- **Management Team**
  - Price & Accounting
Electric Power & Control System

Power System

Electric Distribution Board
Our distribution board product adopts standardized parts and the introduction of our own smart manufacturing process to implement the efficiencies of material and personnel, saving the cost of manufacture. Based on our excellent experience and skill, the product can be customized to fit into various environments, at both land and sea.

< Details >
1. Electricity converted from extra-high voltage power is distributed through a protector
2. Load sensing and protection
3. Changes in capacity and additional load acceptable
4. Changes in dimension, specification etc. available depending on environmental conditions.

Motor Control Center
Our motor control panel adopts the design and parts that fit various land and maritime environments to achieve high reliability, convenience in maintenance, and cost reduction.

< Details >
1. Motor control for various land and maritime motors
2. Prevention of overvoltage, overload and current leakage
3. Automatic ON/OFF of motor using a time relay
4. Changes in capacity and additional load acceptable
5. Changes in dimension, specification etc. available depending on environmental conditions.

Control System

Starter Panel
We manufacture and install starter panels which start, control and protect the cranes, hoists, and other types of mechanical equipment installed in and out of a vessel or factory.

< Details >
1. Standardized parts for different vessel classes
2. Waterproof and dustproof design satisfying the conditions for outdoor installation
3. Protection against the overvoltage, overload, and current leakage of motor and equipment
4. Adoption of overload limiter to prevent overloading of crane and limit S/W to prevent mechanical failure
5. Changes in capacity and additional load acceptable
6. Changes in dimension, specification etc. available depending on environmental conditions.

Motor Control Center
We manufacture and install starter panels which start, control and protect the cranes, hoists, and other types of mechanical equipment installed in and out of a vessel or factory.

< Details >
1. Standardized parts for different vessel classes
2. Waterproof and dustproof design satisfying the conditions for outdoor installation
3. Protection against the overvoltage, overload, and current leakage of motor and equipment
4. Adoption of overload limiter to prevent overloading of crane and limit S/W to prevent mechanical failure
5. Changes in capacity and additional load acceptable
6. Changes in dimension, specification etc. available depending on environmental conditions.

Automatic Control Panel
We manufacture and install starter panels which start, control and protect the cranes, hoists, and other types of mechanical equipment installed in and out of a vessel or factory.

< Details >
1. Standardized parts for different vessel classes
2. Waterproof and dustproof design satisfying the conditions for outdoor installation
3. Protection against the overvoltage, overload, and current leakage of motor and equipment
4. Adoption of overload limiter to prevent overloading of crane and limit S/W to prevent mechanical failure
5. Changes in capacity and additional load acceptable
6. Changes in dimension, specification etc. available depending on environmental conditions.
LED Lighting

**Indoor LED Lighting**

- Panel Light
- Circular Down Light
- Light Fitting
- Linear Batten Light
- Coffeer Lighting
- Adjustable COB LED

**Feature**
- Designing LED lightings with structural improvement to reduce weight and to achieve excellent quality, high efficiency, economic feasibility, and environmental friendliness.
- ON/OFF switch prepared
- More stabilized performance and increased lifetime (more than 20 times the lifetime of existing products)
- Low energy consumption (more than 50% reduced)
- Higher efficiency and longer lifetime, thus greatly reducing maintenance cost
- Customizable design for different customers

**Application**
- Offices, apartment buildings, residential buildings, or commercial facilities where existing common fluorescent lightings need replacement

**Outdoor/Factory LED Lighting**

- High Bay Light
- Low Bay Light
- Linear Bay Light
- Waterproof Down Light
- Waterproof Linear Batten Light
- Adjustable Down Light

**Feature**
- Intensity of illumination increased by 130% compared to existing lightings
- Semi-permanent lifetime (over 50,000 hours in a switched mode power supply (SMPS) – about 20-30 times the lifetime of existing lightings)
- Low energy consumption (more than 80% saved compared to existing lightings)
- Higher efficiency and longer lifetime, thus greatly reducing maintenance cost
- Optimal design of light distribution, considering the height and interval
- Durability for withstanding harsh outdoor environment

**Application**
- Factories, warehouses, large-scale stores, gyms, auditoriums, security lightings (Replaces 100-1000W metal halide lights and 2000W mercury lamps)
- Pendant-type / wall-mount type available
Smart Factory System

Necessity of smart factory

01 The smart factory includes all the processes related to the product manufacture, from the product development to the mass production, and from the expectation of market demand and orders from mother company to the shipping of end product.

02 Increased complexity in the system
   - Modularization
   - Simplified development tools

03 Custom development solution
   - Industrial protocols
   - Finding the right time and synchronization required

04 Reflecting the consumer needs
   - Simplified definition of functions
   - Platform-based approach

Introduction for Solution (S/W)

SPI (Smart Factory Innovation)

- Log-in screen
- Setting the accessibility to menus
- Material / Inventory
- Production management
- Quality Assurance
- Tracking management

- Accuracy in inventory management through the storing and releasing of materials
- Convenient material/product management using barcode system
- First-in first-out rule to prevent errors in the product release
- Tracing and thinning the incongruity using quality measurement data, process diagnosis, and defect management
- Providing comprehensive IoT quality information based on production history including material/semi-product input, quality test, and personnel information throughout the entire production period, beginning from the introduction of raw materials to the finishing of end products.

Smart Factory System | 15
**Photovoltaic Energy Business**

**Photovoltaic system**
- The photovoltaic system comprises a solar battery module and an inverter for converting the direct current (DC) voltage generated from the battery to an alternating current (AC) voltage. The system is capable of directly converting the energy of sunlight into electricity.

**Solar-powered house**
- A solar-powered house refers to a residential building installed with the solar battery modules on its rooftop and windows to directly take advantage of the electricity generated from the module.
- A household can receive governmental support for installing the solar-powering equipment which generates 3kW or less electricity. An approximate area of 23㎡ is required.

**Effect of solar-powered house**
- The efficiency of a solar-powered house is highest when the solar panels of the module are installed to face the south, as the influence of shade decreases. Because the billing of electricity in residential buildings follows the progressive stage system, households with more electricity consumptions are bound to benefit from the photovoltaic system.
- Example

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
<th>Annual cost saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,278,000</td>
<td>1,073,000</td>
<td>205,000</td>
</tr>
</tbody>
</table>

**Advantages of Solar-powered house and exemplary case**
- Infinite source of energy without pollution and cost for fuel
- Environmentally-friendly energy without mechanical vibration and noise
- No maintenance cost regarding management and operation after the installation
- Electric charges saved by the energy production of photovoltaic system

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**Photovoltaic System Business (RPS)**

“Lifetime Salary Savings Account” “Sunlight Financial Technique”

**Exemplary Cases**
- Residential building, commercial building, factory, warehouse, stable (pen), forest land, salt field, cultivation facility, parking lot, gas station, etc. Real estate owners are welcome!
- The weighted value for installing and operating solar-powering equipment on existing buildings is 1.5 times (50% more)

Best-quality products and materials used for stabilized profit.
Renewable Energy Business

ESS (Energy Storage System)

- Specialized personnel for perfect consulting
- Systematic and stabilized design and construction
- Constant monitoring for better maintenance
- Verified performance through the provision of best quality service

Rules on the Propulsion of Energy Use Rationalization of Public Organizations

- Article 11 (Use of Energy-efficient Equipment) Paragraph 5
A public organization is to install an energy storage system (ESS) which can bear 5% or more electricity of the contract power of a building with 1,000 W or more contract power. However, buildings on lease, power plants, electric supply facilities, gas supply facilities, oil storage facilities, water supply and drainage facilities and rain water pump stations are excluded.

- Article 11 (Use of Energy-efficient Equipment) Paragraph 6
A public organization is to use the ESS as the preliminary power supply in case its period of retrenchment and extension.

- Article 2 of Addendum (Interim Measures)
3. The rule as in the Paragraph 5 of Article 11 is effective from January 1st, 2017 for a newly constructed building (based on its application for construction/building permission). Existing buildings apply to the following standards:

<table>
<thead>
<tr>
<th>Contract Power (kW)</th>
<th>Over 10,000</th>
<th>5,000~10,000</th>
<th>2,000~5,000</th>
<th>1,000~2,000</th>
</tr>
</thead>
</table>


Management Operation Guideline for RPS and RFS → (Annex 2)Weighted values for new & renewable energy source type

- Weighted values for ESS supply equipment is granted, in case the ESS equipment is linked with the solar-powering equipment of the RPS.
- Weighted values are applied for the electricity, which is charged in the storage battery during the hours from 10 to 16 in the solar-powering equipment and used at the time other than the charging hours.
- The capacity standards for inverter and storage battery should suffice the detailed standard as designated by the certificate authority.

<table>
<thead>
<tr>
<th>REC weighted value</th>
<th>Energy type and standard</th>
<th>Over 10,000</th>
<th>2,000~5,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>ESS equipment (linked with solar-powering system)</td>
<td>2016, 2017</td>
<td></td>
</tr>
</tbody>
</table>
### Valves for Engine System

#### FCTV (Flange-Type Ball Valve)
- **Pressure Range**: JIS 10K Up to 20K
- **Size Range**: 15A Up to 100A
- **Standard Materials**: Cast Iron, Ductile Iron
- **Used for**: Marine & Industrial Field

#### GBBTV (Gas Burner Ball Valve)
- **Pressure Range**: ANSI 300LB
- **Size Range**: 25A
- **Standard Materials**: Cast Steel, A216 WC8
- **Used for**: Marine & Industrial Field

#### WBTV (Wafer Type Ball Valve)
- **Pressure Range**: DIN Standard
- **Size Range**: 25A Up to Requested
- **Standard Materials**:
  - Body: CF8, CF8M
  - Ball: SUS304, SUS316
  - Stem: SUS304, SUS316
  - Seats: PTFE, RPTFE, PEEK
- **Used for**: Marine & Industrial Field

#### Bronze Valve (With Stopper)
- **Pressure Range**: JIS / ANSI / DIN
- **Size Range**: 15A Up to Requested
- **Standard Materials**:
  - Body: Bronze
  - Bonnet: Bronze, Brass
  - Stem, Disc: Bronze, Brass
- **Used for**: Marine & Industrial Field

#### Brass Thread Ball Valve (2Way / 3Way)
- **Pressure Range**: JIS / ANSI / DIN
- **Size Range**: 10A Up to 100A
- **Standard Materials**: Brass, SUS304, SUS316, SUS316L
- **Used for**: Marine & Industrial Field
Valves for Boiler & Hot Steam

Casted Valves

Globe Type
- Pressure Range: JIS 10K Up to 40K / ANSI 150LB Up to 600LB
- Size Range: 50A Up to Requested
- Standard Materials: Bronze, Cast Iron, Ductile Cast Iron, Cast Steel, Stainless Steel
- Used for Marine & Industrial Field
- Painting: Optim 300℃ or 600℃ / Order Requested

Angle Type
- Pressure Range: JIS 10K Up to 40K / ANSI 150LB Up to 600LB
- Size Range: 50A Up to Requested
- Standard Materials: Bronze, Cast Iron, Ductile Cast Iron, Cast Steel, Stainless Steel
- Used for Marine & Industrial Field
- Painting: Optim 300℃ or 600℃ / Order Requested

Forged Valves

Globe Type
- Pressure Range: JIS 10K Up to 40K / ANSI 600LB Up to 2500LB
- Size Range: 6A Up to 40A
- Standard Materials: SF440, A105, F304, F316, F316L
- Used for Marine & Industrial Field
- Painting: Optim 300℃ or 600℃ / Order Requested

Angle Type
- Pressure Range: JIS 20K Up to 40K / ANSI 600LB Up to 2500LB
- Size Range: 6A Up to 40A
- Standard Materials: SF440, A105, F304, F316, F316L
- Used for Marine & Industrial Field
- Painting: Optim 300℃ or 600℃ / Order Requested

Safety & Control Valve (Casted)
- Pressure Range: As Requested
- Size Range: As Requested
- Standard Materials: As Requested
- Used for Marine & Industrial Field

Butterfly Valve (Casted & Welded)
- Pressure Range: As Requested
- Size Range: As Requested
- Standard Materials: As Requested
- Used for Marine & Industrial Field
Valves Relevant to Doppler Speed Log Transducer

**Gate Valve**
- **Pressure Range**: JIS 10K
- **Size Range**: 50A Up to Requested
- **Standard Materials**
  - Body: SC480
  - Disc: SC480+Stellite Welding
  - Stem: SS410
- **Used for Marine & Industrial Field**

**Transducer Unit**
- **Pressure Range**: Make to Order
- **Size Range**: Make to Order
- **Standard Materials**: Make to Order
- **Used for Marine & Industrial Field**

**Tank for Doppler Speed Log**
- **Pressure Range**: Make to Order
- **Size Range**: Make to Order
- **Standard Materials**: Make to Order
- **Used for Marine & Industrial Field**

**Ball Valve**
- **Pressure Range**: JIS 5K - 10K - 20K or Requested
- **Size Range**: 15A Up to Requested
- **Standard Materials**
  - Body: SC480, A214-WCB, SCS
  - Stem / Ball: SUS304
  - Seat: PTFE, RPTFE
- **Used for Marine & Industrial Field**
Valves for Power Plant

Cast Iron Valve
- Pressure Range: JIS 5K - 10K - 16K
- Size Range: 50A Up to Requested
- Standard Materials: FC200
- Used for Marine & Industrial Field

Ductile Iron Valve
- Pressure Range: JIS 5K - 10K - 16K
- Size Range: 50A Up to Requested
- Standard Materials: FCD400, FCD450
- Used for Marine & Industrial Field

Cast Steel Valve (Gate, Globe, Swing Check)
- Pressure Range: JIS 10K - 20K / ANSI 150LB Up to 600LB
- Size Range: 50A Up to Requested
- Standard Materials: SC480, A216-WCB, as Requested
- Used for Marine & Industrial Field

Ball Valve
- Pressure Range: JIS 10K - 20K / ANSI 150LB - 300LB - 600LB
- Size Range: 15A Up to Requested
- Standard Materials: A216-WCB, 5Cr, as Requested
- Used for Marine & Industrial Field
### Valves for Marine

#### Cast Iron Globe, Angle, Gate Valve
- **Pressure Range**: JIS 5K up to 30K
- **Size Range**: 50A up to Requested
- **Standard Materials**
  - Body: FC / FCD
  - Disc: Brass, FC, SS
  - Stem: Brass, FC, SS
- **Material Can Be Changed According to Product Spec.**
- **Used for Marine & Industrial Field**

#### Cast Steel Globe, Angle, Gate Valve
- **Pressure Range**: JIS 5K up to 30K
- **Size Range**: 50A up to Requested
- **Standard Materials**
  - Body: SC / WCB
  - Disc: Brass, FC, SS
  - Stem: Brass, FC, SS
- **Material Can Be Changed According to Product Spec.**
- **Used for Marine & Industrial Field**

#### 2-Way Ball Valve
- **Pressure Range**: JIS 5K, 10K, 16K / as Requested
- **Size Range**: 50A up to Requested
- **Standard Materials**
  - Body: SUS or Requested
  - Disc: SUS or Requested
  - Stem: SUS or Requested
- **Used for Marine & Industrial Field**

#### 3-Way Ball Valve with Actuator
- **Pressure Range**: As Requested
- **Size Range**: As Requested
- **Standard Materials**
  - Body: SUS or Requested
  - Disc: SUS or Requested
  - Stem: SUS or Requested
- **Used for Marine & Industrial Field**

#### EMI (Emergency Shut-Off Valve)
- **Pressure Range**: JIS 5K up to 16K
- **Size Range**: 15A up to 350A
- **Standard Materials**
  - Body: SC, BC
  - Disc: SCS, BC
  - Stem: SUS, BRASS
- **Used for Marine & Industrial Field**

#### Storm Valve
- **Pressure Range**: JIS 5K, 10K
- **Size Range**: 50A up to Requested
- **Standard Materials**: SC480 or Requested
- **Used for Marine & Industrial Field**
**Valves for Marine**

**Bronze Valve**

**Hose Globe, Angle Valve**
- **Pressure Range**: JIS 5K, 10K, 16K or Requested
- **Size Range**: 1½” Up to 48”
- **Standard Materials**
  - Body: BC6 or Requested
  - Disc: BC6 or Requested
  - Stem: Brass or Requested
- **Used for Marine & Industrial Field**

**Gate Valve**
- **Pressure Range**: JIS 5K, 10K, 16K or Requested
- **Size Range**: 1½” Up to 48”
- **Standard Materials**
  - Body: BC6 or Requested
  - Disc: BC6 or Requested
  - Stem: Brass or Requested
- **Used for Marine & Industrial Field**

**Globe Valve**
- **Pressure Range**: JIS 5K, 10K, 16K or Requested
- **Size Range**: 1½” Up to 48”
- **Standard Materials**
  - Body: BC6 or Requested
  - Disc: BC6 or Requested
  - Stem: Brass or Requested
- **Used for Marine & Industrial Field**

**Angle Valve**
- **Pressure Range**: JIS 5K, 10K, 16K or Requested
- **Size Range**: 1½” Up to 48”
- **Standard Materials**
  - Body: BC6 or Requested
  - Disc: BC6 or Requested
  - Stem: Brass or Requested
- **Used for Marine & Industrial Field**

**Check Valve**
- **Pressure Range**: JIS 5K, 10K, 16K or Requested
- **Size Range**: 1½” Up to 48”
- **Standard Materials**
  - Body: BC6 or Requested
  - Disc: BC6 or Requested
  - Stem: Brass or Requested
- **Used for Marine & Industrial Field**

**Wafer Check Valve**

The Story of Duo Disc & Spring Load Check Valve

The weight of this product is only 20% of Swing Check Valve and can be used even in confined spaces. It can be used for a long time with its long service life. It is also mainly used for small location and important industrial sites such as power plants, petrochemical plants and ships.

- **Size**: 1 ½” Up to 48”
- **Material**: FC, SC, SS, ALBC & Requested
- **Standard**: ANSI, JIS, KS & Requested
- **Type**: Wafer, Lug, Flange

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**Flange**

We design various flanges for customer’s requirements and supply them through safe inspection.

- **ANSI Flanges**: 1 1/2” Up to 48”
- **Long Welding Neck Flanges**: FC, SC, SS, ALBC & Requested
- **ANSI / ASME B16, 47 Series B Flanges (API605)**: FC, SC, SS, ALBC & Requested
- **ANSI / ASME B16, 47 Series A Flanges (MSS SP44)**: 1 1/2” Up to 48”
- **AWWA Flanges**: FC, SC, SS, ALBC & Requested
- **ANSI / ASME B16, 48 Steel Line Blanks (API Standard 590)**: FC, SC, SS, ALBC & Requested
- **DIN Flanges**: FC, SC, SS, ALBC & Requested
- **JIS & KS Flanges**: FC, SC, SS, ALBC & Requested
We are a wise challenge for Electric Control and Energy Division

Valves for Marine

MFC
Mass Flow Controller

- How it works: Operation Principle: Differential Pressure Mass Flow Controller consists of core internal accessories, such as Control Valve, Control Board, Differential Pressure Sensor, F Flange, Inlet Body, Outlet Body, Bypass Parts, Electric Actuator, RS-232 COM Port, PLC Program. Previously, there had to be a combination of separate products called Control Valve and Flow Meter. But this product can do all its jobs as one. Also, this product can perform all parts that needed to be configured for Pneumatic line and PID Controller, which means the product is very innovative.

Used Place: All systems of Semi Conductor Line, Gas Line, Nuclear power and Hydrogen Electric Generation and Fluid Process.

Using for: All fluid processing systems, semiconductor lines, gas lines, nuclear power generation, and hydrogen power generation.

- Block diagram

  - Block diagram 1
  - Block diagram 2

- Principle diagram

- Example

Schematic diagram of low arc plasma system for the treatment of PFCs under atmospheric pressure

- Measuring Principle
  - Sensor
  - P1 : Pressure Sensor 1
  - P2 : Pressure Sensor 2
  - T1 : Temperature Sensor

- Measuring Principle
  - Qv = f(P1-P2) : Hagen-Poiseuille Equation

- Mass Flow Rate
  - Qm = Qv*p(P1,T1) : Equation of State, Ideal Gas

- Flow Control Process
  - The flow set value is transmitted to the board. Calculate the current flow value according to the pressure and temperature measured by the sensor. Adjust the valve by comparing the measured value with the set value on the board.
We are wise challenge for
Electric Control and Energy Division

Certifications & Awards

Awards

Certifications

Patents
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