HYUNDAI Electro Electric Systems
Keeping a Green Step

As an integral division of Hyundai Heavy Industries, Electro Electric Systems ("HHI") has been designing, engineering and manufacturing electrical equipment for more than three decades in collaboration with world-renowned technical partners in the industry.

We have developed HHI’s own quality assurance program complying with the requirements of ISO9001-1994 to assure that HHI products are designed, manufactured, inspected, tested, and delivered according to global standards. Our focus is also on the human element, which we consider the most important in our efforts to enhance safety as well as environmental protection in accordance with ISO 14000.

We will dedicate our efforts to the supply of the best quality products and services for a green future.
We are greatly pleased to present our company’s general brochure, to help you gain a better understanding of our core business activities.

As you will see in the following pages, our product lines cover a wide range of electrical equipment, such as transformers, gas insulated switchgear (GIS), switchgear, LV & MV circuit breakers, motors, generators, integrated control & monitoring systems, and power electronics.

For more than 30 years Hyundai has accumulated an enormous amount of experience in power industries enabling us to provide turnkey solutions for our clients.

In order to satisfy our clients with the best quality products and services, we have established a complete quality assurance program, from marketing to after-sales service, to comply with the requirements of ISO 9001 and ISO 14001.

Through our assurance program we have an exceptional reputation and performance record for products and services provided to our clients around the world.

We look forward to serving your interests the best way we can.

Yours sincerely,

Oh-Shin Kwon
Chief Operating Officer
Your green partner for a better future!

Total Solution for Electrical & Automation Equipment

With a variety of products and proven engineering capabilities in every field of the electrical industry, we are fully prepared to meet the most demanding requirements and to provide turnkey solutions. Our high quality products and services will satisfy our clients whenever and wherever they need us.
1970

1977 Feb. Established Electrical Engineering Division (EED) as a new division of Hyundai Heavy Industries
1978 Jan. Switchgear Factory Completed
1978 Nov. Incorporation of the Company as Hyundai Electrical Engineering (HEECO)
1979 Aug. Completed Rotating Machinery Factory
1979 Sep. Dedicated High Voltage Transformer Test Laboratory

1980

1982 Dec. Established Hyundai Industrial Research Institute
1984 Dec. Completed Power Electronics Factory
1989 May Completed High Voltage Switchgear Factory
Brief History

In the face of a great challenge and with an unyielding will to become one of the world’s top industrial leader, we have made significant strides in the field of modern electric technology.

1990

1994 Jan.  Merged with Hyundai Heavy Industries
1996 Nov.  Completed Turbine & Generator Factory
1997 Jul.  Acquired Elprom Trafo Co. in Bulgaria
1998 Oct.  Established Research & Development Company in Hungary, named HUNELEC Engineering & Technology Co. (The current name is Hyundai Technologies Center Hungary)
1999 Nov.  Completed 800kV Transformer, GIS Factory & Test Facility

2000

2001 Jun.  Developed 800kV Gas Insulated Switchgear
2003 Oct.  Incorporated Jiangsu-Hyundai Electrical Company in China [The current name is Hyundai Heavy Industries (China) Electric]
2008 May  Completed Solar Cell / Module Factory
2009 Aug.  Completed Wind Turbine Factory
2010 Dec.  Achieved total 700,000MVA production in Transformers
Business Divisions

Transformers
- Power & Distribution Transformers
- Cast Resin Transformers
- Special Purpose Transformers
- Shunt Reactors

Gas Insulated Switchgear
- 24 kV, 72.5 kV, 145 kV, 170 kV, 245 kV, 362 kV, 420 kV, 550 kV, 800 kV

Rotating Machinery
- Induction Motors & Generators
- Synchronous Motors & Generators
- Diesel Engine Generator Sets
- Wind Turbine Generators
- Co-generation Systems

Electrical Marine Equipment
- Main Switchboards
- Ship Automation Systems
- Control Consoles
- Synchronous Generators
Switchgear

- Medium Voltage Switchgear
- Cubicle-type Gas Insulated Switchgear
- Low Voltage Switchgear & Motor Control Centers
- Intelligent Measuring & Protection Devices

LV & MV Circuit Breakers

- Vacuum Circuit Breakers
- Air Circuit Breakers
- Molded Case Circuit Breakers
- Magnetic Contactors & Overload Relays
- Miniature Circuit Breakers

Integrated Control & Monitoring Systems

- SCADA System
- DCS

Power Electronics

- General Purpose Inverter
- Solar Inverter
- Rolling Stock Propulsion Systems
- Electric Vehicle Propulsion Equipment
- Battery Chargers
01 Transformers
Using modern designs, state-of-the-art manufacturing facilities and innovative production technology, we manufacture high-quality power and distribution transformers with a rated voltage of up to 800 kV and a capacity of up to 1,500 MVA.

HHI’s transformers are in service around the world and meet international standards such as IEC, ANSI, NEMA, CSA, AS, and ES.

Prominent Features / Benefits:
- Suitable for various site conditions and sufficient supply records proven by worldwide end-users
- Environmentally friendly with low loss, low noise and compact design
- High reliability and long service life

Production Range:
- Power Transformers up to 800 kV Class
- Distribution Transformers
- Cast Resin Transformers
- Special Purpose Transformers such as Dry Type Transformers, Shunt Reactors, Gas Insulated Transformers, etc.

A 765 kV Power Transformer  
B 500 kV Power Transformer  
C 362 kV Power Transformer  
D TPRS (Tank Pressure Relief System) Transformer  
E Cast Resin Transformer  
F Gas Insulated Transformer
02 Gas Insulated Switchgear
SF₆ Gas Insulated Switchgear (GIS) is a major piece of electrical equipment used in a substation. It contains a gas circuit breaker, disconnecting switch, earthing switch, voltage transformer, current transformer, and lightning arrester in a grounded metallic enclosure. The switchgear is filled with SF₆ gas, which has the best insulation and arc-quenching capability.

With its outstanding technical features, Hyundai GIS can meet all your requirements.

**Prominent Features / Benefits:**

- Space saving compact design
- Easy installation
- Simple maintenance
- Full protection against contact with live parts
- Protection against pollution
- Visual harmony with surroundings

**Production Range:**

SF₆ Gas Insulated Switchgear (GIS)

- Rated voltage: 24 kV, 72.5 kV, 145 kV, 170 kV, 245 kV, 362 kV, 420 kV, 550 kV, 800 kV
- Rated short-circuit breaking current: 20-63 kA
03 Switchgear
HI’s switchgear offers the best solutions in the field of electric power distribution, protection, measuring, control and communication in power plants as well as industrial and public facilities.

Combined with advanced software and hardware, our products are designed, manufactured and tested in accordance with industrial standards including IEC, ANSI, NEMA, BS, and IEEE.

Prominent Features / Benefits:
- Hyundai Metal-clad Switchgear provides maximum circuit separation and safety with an isolated and grounded metal compartment.
- Able to withstand high levels of seismic vibration without service interruption.
- Space-saving compactness helps simplify a layout.
- Qualified for all aspects of applications, including nuclear power plants.

Production Range:
- Air Insulated Medium Voltage Metal-clad Switchgear up to 38 kV
- Cubicle-type Gas Insulated Switchgear up to 40.5 kV
- Low Voltage Switchgear & Motor Control Centers.
- Non-segregated Phase Bus & Bus Way.
- Intelligent Measuring & Protection Devices.
- Intelligent Power Management Systems.
- Intelligent Preventive Diagnostic System for Transformers.
- Current Transformers & Potential Transformers.
LV & MV Circuit Breakers
HI’s circuit breakers and contactors offer the best circuit protection and switching performance for low and medium voltage power systems. Our products cover a wide range of breaking capacities and provide innovative solutions that satisfy your safety needs.

Pursuing flexibility, safety and reliability, our products are type-tested by internationally recognized test authorities such as KEMA, KERI, and CESI.

**Prominent Features / Benefits:**
- Wide and powerful range for various applications such as construction, industrial, nuclear power plants and shipyards.
- Modern and customized design for easy installation and maintenance.
- High reliability based on advanced technology and R&D.
- Satisfaction of international standards like IEC, ANSI, and NEMA.
- Standardized process for local standards and approvals that requested by customers.

**Production Range:**
- Vacuum Circuit Breakers (VCB) up to 36/38 kV, up to 50 kA, up to 4,000 A
- Vacuum Contactors (VC) up to 12 kV 400 A
- Air Circuit Breakers (ACB) up to 6,300 A, up to 130 kA
- Molded Case Circuit Breakers (MCCB) up to 1,600 A, up to 150 kA
- Magnetic Contactors (MC) up to 800 A
- Digital & Thermal Type Overload Relays up to 800 A
- Miniature Circuit Breakers (MCB) up to 10 kA, 125 A
Rotating Machinery
HI supplies high quality rotating machines attested by international rules and authorities such as IEC, NEMA, CSA, IEEE, KS, JEC, PTB and KOSHA for industrial applications and LR, ABS, DNV and KR for marine use.

We have a rich performance record of providing the latest technology for motors and generators in the fields of power, desalination, chemical, oil & gas as well as ocean-going vessels.

Prominent Features / Benefits:
• Low vibration and noise through precise rotor dynamic balancing and electromagnetic noise analysis
• Robust frames to satisfy various load conditions by FEM and vibration test
• Optimized insulation system to guarantee durability against severe environmental conditions
• Customized engineering to clients’ various specifications

Production Range:
• Medium & High Voltage Induction Motors up to 25,000 HP 14 kV
• Standard Low Voltage Induction Motors up to 1,000 HP
• Premium Efficiency Low Voltage Motors from 1 HP to 250 HP
• Synchronous Generators up to 50,000 kVA 14 kV
• Wind Turbine Generators
• Co-generation Systems
06 Electrical Marine Equipment
HI’s marine electrical products include dry-type transformers, generators, main switchboards, engine control room consoles, bridge control consoles, automation systems and various panels. These equipments have been installed on a large number of ocean-going vessels and are highly regarded for their economy, efficiency, and outstanding performance.

These products have been widely recognized by not only the major classification societies of LRS, ABS, DNV, GL, BV, NK and KR but also by leading shipowners around the world.

**Main Switchboards**
HHI has accumulated decades of experience with marine electrical power distribution and control systems. Reliable designs of power distribution systems and coordination of protective devices ensure continuity of service.

**Ship Automation System**
HHI’s ACONIS series offers the operator full integration of all control & automation functions in combination with several systems, such as integrated bridge system, CCTV, Internet and ship’s computer systems.

**Control Consoles**
Both conventional and microprocessor-powered automation control systems prevent every possible malfunction caused by ship motion.

**Synchronous Generators**
For its outstanding performance, Hyundai Synchronous Generators received wide recognition from shipowners and have been installed on many ocean-going vessels.
HI supplies various kinds of computerized control systems. The major products for industrial computer systems are Distributed Control System (DCS) and Supervisory Control and Data Acquisition (SCADA) System.

Both are very flexible and easy to access systems in terms of portability, scalability, interoperability and connectivity.
SCADA System

To provide a truly open SCADA platform for efficient integration of third-party software applications and system standard software / hardware, all software generation and hardware selections are designed and manufactured to meet industry standards.

Features and Design Criteria of SCADA:
- Fully redundant data highway
- Distributed processing architecture
- X-Window or Windows based HMI
- Open System Network
- Support of multiple major RTU protocols (Modbus, DNP V3.0, IEC60870-5)
- Easy upgrade of modular software design
- Multi-level client/server structure
- Guarantee to create any up-to-date system structure
- Facility of migration to any structure in the future without upgrade costs
- Web-based user interface

DCS

HHI’s HiMAX-2000 DCS comprises a full range of state-of-the-art distributed control systems for applications of CCPP, water & waste water treatment, and incinerator plants. HiMAX-2000 DCS features powerful and versatile functions for various kinds of plants and is easily used in HMI and configuration tools. HiMAX-2000 DCS can be ported on multiple hardware platforms and operating systems to suit clients’ specific requirements.

Features and Design Criteria of HiMAX-2000:
- Distributed processing architecture
- Open system network
- Fully redundant data highway
- Embedded control blocks for dedicated control
- Windows based HMI
- Complies with industry standards including OPC.
- Web-based user interface
HI’s inverters feature sensorless vector controls and intelligent controls that allow motors to operate more efficiently. We also offer you a full range of inverters from 0.4kW to 6,400kW with international certificate as CE, UL.
Inverter

General Purpose Inverter
- Precise operation using sensorless and sensored vector control
- Quick response through a built-in DSP
- AVR function to ensure high starting torque
- Auto-tuning function for convenient start-up
- 220 V & 440 V Class: 0.4-380 kW
- 3.3 kV, 4.16 kV & 6.6 kV Class: 155-6,400 kW

Solar Inverter
- Compact design, lightweight, and easy installation
- Maximum efficiency with high performance MPPT control
- Increased flexibility due to a wide range of MPPT tracking
- Remote and local data monitoring
- LCD display of operating status
- Over-/Under-Voltage and frequency protection
- Solar inverter from 3 kW to 500 kW

Rolling Stock Propulsion System

Prominent Features / Benefits:

Traction Power Supply / Auxiliary Power Supply
- Fully integrated digital circuit using 32 bit DSP
- Advanced algorithm adoption
- Self-diagnosis on operation
- More convenient human-machine communications
- Heat pipe cooling method

Traction Transformer
- Compact & light-weight
- High temperature insulation system
- Vibration-proof / Impact-proof
- High efficient cooling design

Train Control & Supervisory Control System
- Easy manageability
- Fail-safe control data transmission
- Highly reliable system
- High speed data transmission
- Improved display device
- Easy to draw out failure record

Medium Voltage Inverter Panel
- N700E Inverter
- Solar Inverter (250 kW)
- Solar Inverter (4 kW)
- TractionPower Supply
- Traction Transformer
Turnkey Substations
Drawing on three decades of successful performance in engineering and manufacturing a variety of electrical equipments, HHI provides turnkey substations as well as AC system solutions.

Our scope of supply covers project development, manufacturing and erection of substations on a turnkey basis, including civil works. Hyundai is able to comply with our customers various requirements and meet their needs of tomorrow.

Our proven technical expertise and industry experience have resulted in achieving an internationally recognized position as a total solution provider in the field of turnkey substations ranging from 72.5 kV up to 800 kV.
Our commitment to research and development has been a motivating factor in our company’s technical achievements and it will be vital to our continued success in the 21st century.

We operate three renowned in-house research institutes: HMRI (Hyundai Maritime Research Institute), HIRI (Hyundai Industrial Research Institute), and HEMRI (Hyundai Electro-Mechanical Research Institute), as well as an overseas institute in Budapest, Hungary.

These institutes are fully equipped with state-of-the-art R & D equipment used by specialists to explore the possibilities of the future.
TDI (Techno Design Institute)

TDI was established in October 2000 and plays a major role in coordinating design development. The institute supports optimal design technologies by supplying new designs for various products and constructions. The Visual Communication Design Department is creating and refining colors, web based design, and corporate or brand identities, and the Product Design Department develops and defines products' identities. TDI resolves problems quickly and improves design processes. It also contributes to the creation of a new culture of enterprise and works to actualize high value business by obtaining its own design technologies.

Quality Assurance

HHI's policy is to meet all contract specifications and requirements. Our quality assurance programs are designed, organized and implemented to ensure its strict standards for quality. All of our divisions have received ISO 9001 Quality Management Certification, as well as ISO 14001 Environmental Management System Certification.

Our well-developed resources for training enable HHI to continue to provide you with high quality, reliable products and better services.

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<th>Authority</th>
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