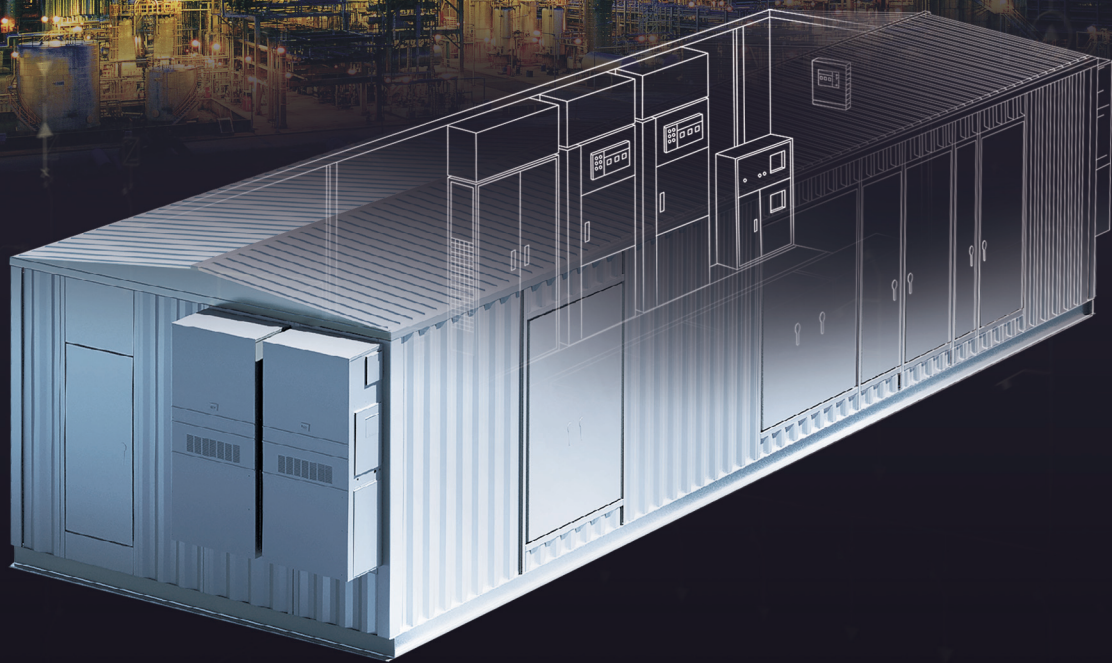


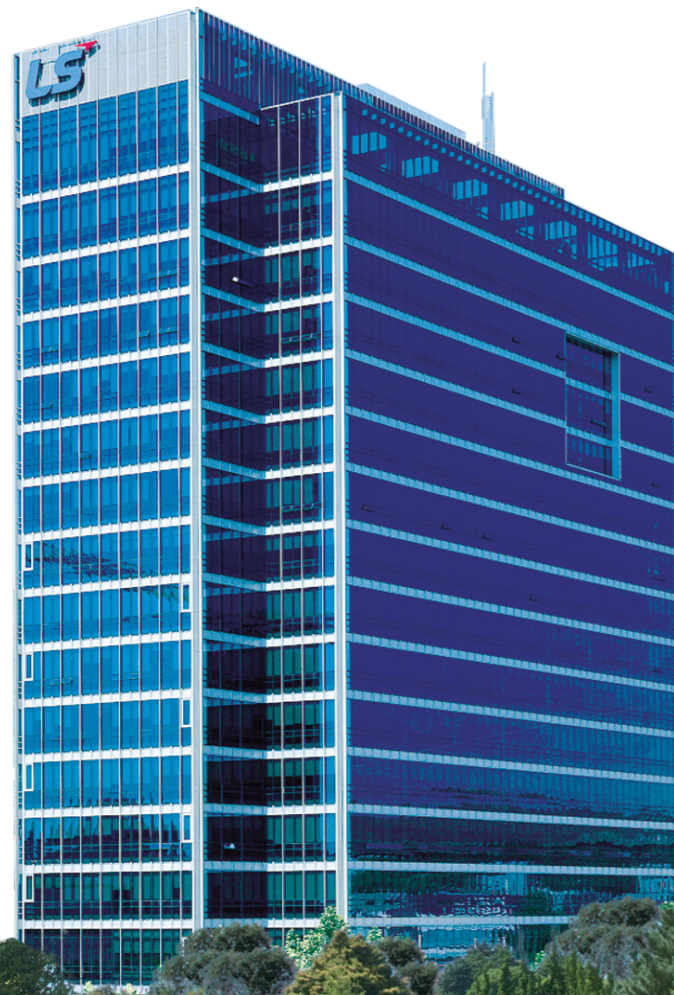
Smart E-House

Modular type electrical house



LS, a leader of key Industries in Korea, is ranked 14th among domestic business groups

- **No. of executives /employees** : approx.13,000
- **No. of affiliates** : 45 companies
- **Sales** : KRW 22,510 bn
- **Operating profits** : KRW 746 bn
- **Total assets** : KRW 21,483 bn
(as of 2017, including SPSX)



- LSIS**
- LS** Cable & System
- LS**-Nikko copper
- LS** Mtron
- LS** Networks
- G&ON**
- E1**
- yesco**

LSIS is taking off as a global leader beyond being the best power solution's company in Korea.

LSIS has grown to become one of Korea's largest heavy electric equipment manufacturers since 1974. LSIS spun off from the LG Group in 2005, starting as the LS Group. LSIS wishes to become the 'global leader for smart energy solutions providing unparalleled efficiency and convenience'.

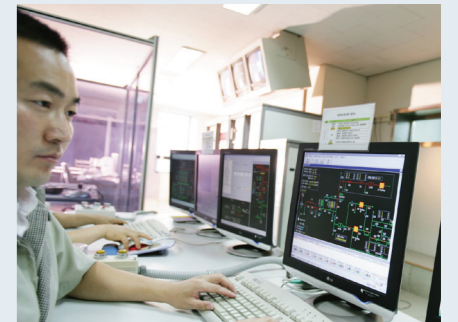
Power Grid Solutions

LSIS is a leader in the field of electric power solutions, facilitating a stable supply of power through a wide range of electric equipment & systems, from low voltage to ultra-high voltage. LSIS is also a trailblazer that makes the existing electric power industry more intelligent by fostering the power IT field as a new growth engine.



Quality Management of Global Standards

LSIS operates development testing centers to ensure a high product quality through production environment inspection and competitor comparison tests. Such quality management efforts made by LSIS are being recognized by a number of certifications and awards, forming the basis of the global standards required to compete at a global scale.



Global Management

LSIS is engaged in business all over the world. Currently, LSIS global network includes 7 overseas corporations and 12 foreign branches. With 224 clients in 77 countries, the volume of LSIS export is increasing by the day.



Flexible solution for your power grid

Smart E-HOUSE

- E-House is a prefabricated modular enclosure to house a medium and low voltage switchgear as well as auxiliary equipment in accordance with the customers' requirements.
- E-House allows cost savings, reduced lead time, risk reduction through the modular design.



Application

1. Oil & Gas, Mining Industry / Substation
2. Power Generation / Substation
3. Renewable Energy / Distribution
4. Outdoor Substation / Distribution
5. Mobile Substations



Why LSIS?

LSIS is able to perform successful PJT based on various EPC / turn-key substation experiences.

Optimized Design

- Complete LSIS portfolio of high and low-voltage switchgears
- Thorough technical analysis of the E-House design

Easy Installation

- Reduced installation time, low risk
- Pre-verification of installation
- Convenient connection

Customization

- Protection from combustion hazard
- Application of heat prevention paint
- Heating, Ventilating, and Air conditioning (EC-Fan)
- Fire Fighting System
- Interlocking type structure

Total Project Management

- Supply management for LSIS and third party equipment
- Cost savings, reduced total lead time



Project references

Canada E-House PJT

Project Description	Canada E-House
Delivery	2017.09
Specification	Traction Power Substation
Project Features	Container Size(mm) : 15,000(W) x 5,000(D) x 4,300(H) – 9ea : 16,500(W) x 5,000(D) x 4,300(H) – 2ea HVAC(Heating, Ventilation, Air conditioning) Temperature conditions : -40°C ~ +40°C Applied steel plate : ASTM A36 & KS SGC340



Iraq Mobile Substation PJT

Project Description	132/33kV Mobile Substation
Project Owner	IRAQ SEC
EPC Contractor	S&P WORLD NETWORKS
Delivery	2015.10
Specification	132/33kV 3P3W
Project Features	Container Size(mm) : 13,000(W) x 3,300(D) x 2,737(H) - 10ea HVAC(Heating, Ventilation, Air conditioning) 132KV DS, CB, Power TR, 33KV MMSG, RCP Temperature conditions : -10°C ~ +50°C Applied steel plate : ASTM A36, ASTM A572



Chile Cochrane PJT

Project Description	Chile Cochrane Thermoelectric Power Plant
Project Owner	AES
EPC Contractor	POSCO Construction
Delivery	2014.04
Specification	6.9kV 3P3W
Project Features	Container Size(mm) : 12,650(W) x 5,200(D) x 3,400(H) - 1ea : 14,930(W) x 4,900(D) x 3,400(H) - 1ea Seismic UBC Code ZONE4 Temperature conditions : 0°C ~ +40°C Installation of internal pressure-proof equipment Applied steel plate : ASTM A36, ASTM A572



Others

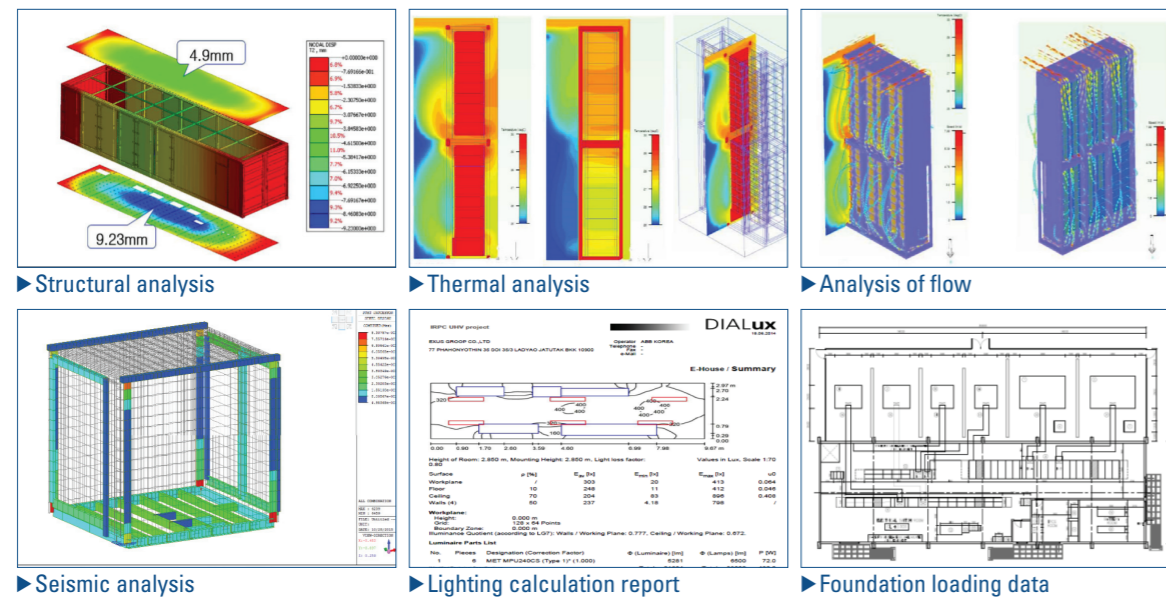
Year	Project Description	Project Owner
2017	Philippines Masinloc Power Plant	AES
2016	Iraq BNCP(Bismayah New City Project)	Iraq NIC(National Investment Committee)
2015	Saudi Arabia Yanbu Water Treatment	SECC(Saline Water Conversion Corporation)
2011	Republic of Korea JEJU Smartgrid City	KEPCO

Excellent capability for E-house solution

Engineering

LSIS performs various structural, thermal, and flow analyzes required in the E-House design by CFD(Computer Fluid Dynamics) Based on Midas's NFX and Gen Program.

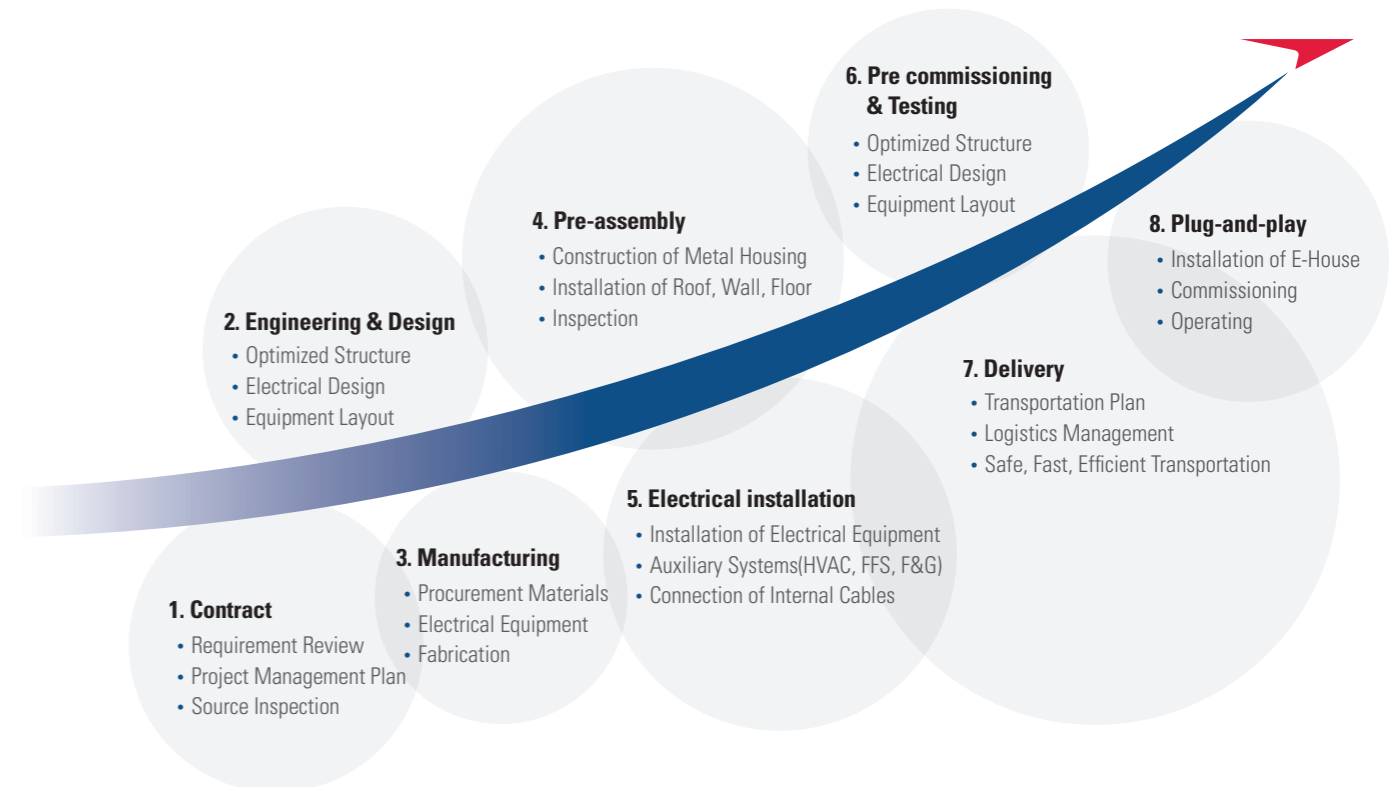
- 01 | Structural analysis** : Interpretation of structural deformation from external loads [air pressure, snow, wind, total weight with equipment]
- 02 | Thermal analysis** : Thermal deformation and thermal stress analysis of objects during temperature change.
- 03 | Analysis of flow** : Analysis of characteristic values such as velocity, temperature and pressure of liquid and gas.
- 04 | Seismic analysis** : As a method to understand the dynamic characteristics of the structure, A mounted module shape is tested to predict whether the structure is resonant or deformed by vibration.
- 05 | Lighting calculation report** : Optimized illumination design by calculating illumination volume.
- 06 | Foundation loading data** : Analysis of the foundation loading data considering the center of gravity of the container.



Procurement



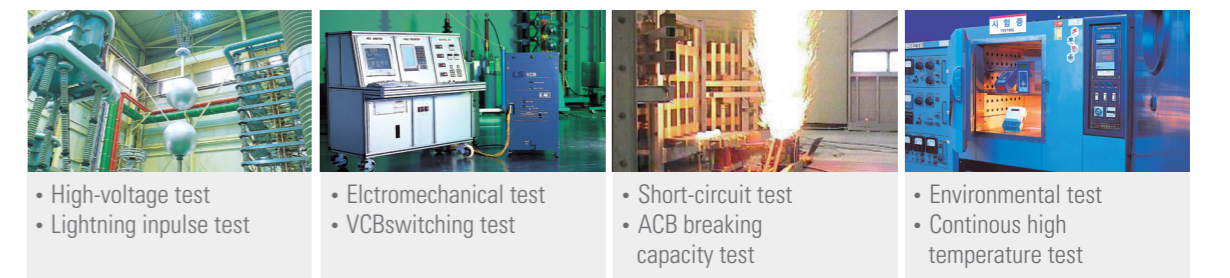
Project management



In-house testing laboratory - PT&T



The Power Testing & Technology Institute(PT&T) has been approved by KOLAS and is the first privately-owned testing center to have 2,000MVA short-circuit testing equipment, high-voltage testing equipment, and reliability testing equipment. It is an internationally-renowned testing center that has formed partnerships with the UL, CE, KEMA, ASTA and CESI.



LSIS power solutions for E-house



Digital Integrated Protection & Monitoring Devices (X GIPAM-F/B/M/T/DG/3wT)

- Protection function - 50/51, 50/51N, 67G, 67N, 59, 27, 64, 47, 46, 49, 48/51LR, 79, 87T, 37, 66
- Control and operate on screen by graphic user interface
- Hardware / Software flexibility and easy setting with PC manager
- Increasing reliability / Flexibility through Duplex communication
- Performing 0.2% measurement accuracy for Current and Voltage



Cast Resin Transformer

- Rating : 3P ~36kV ~25MVA
- The LS Cast-resin transformer has succeeded in combining the advantage of oil-filled and conventional dry transformer, which are fabricated with an epoxy resin.
- Applied for low noise and produced as high capacity and strong endurance against harmonic effect- Sag, Swell, Interruption & Harmonic analysis of 63rd orders
- Harmonics, THD, TDD, K-Factor



Oil Immersed Transformer

- Rating : 3P ~36kV ~80MVA
- LS oil immersed transformer is a static inductive device that can step the voltage up and down transfer electrical power efficiently.
- LSIS transformer factory is equipped with state-of-the-art cleaning facilities and the best testing room.
- Sag, Swell, Interruption & Harmonic analysis of 63rd orders
- Harmonics, THD, TDD, K-Factor
- Dual Communication System, IEC61850 (TE)



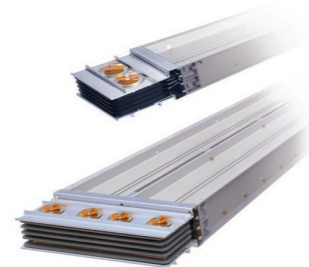
MV Switchgears

- Rated voltage : 7.2kV ~ 36kV
- Rated current : Up to 5000A
- Rated short time withstand current : Up to 50kA/3s
- Degree of protection : IP42
- Standard : IEC 62271-200
- Certification : KERI, KEMA, CESI, ASTA
- Compact & safety design
- Metal clad switchgear which compartments are divided by ground metal partitions



LV Switchgears

- Rated voltage : 690V
- Rated current : 630-5000A
- Rated breaking current : Up to 100kA/1s
- Standard : IEC 61439-2
- Compact size
- Available various options- Sag, Swell, Interruption & Harmonic analysis of 63rd orders
- Harmonics, THD, TDD, K-Factor
- Dual Communication System, IEC61850 (TE)



Busway System

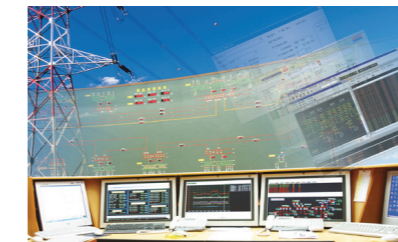
- Rated voltage : AC 1000V/DC 1500V
- Rated current : Up to 7500A
- Rated short time withstand current : 220kA/1s (Cu/4,000A)
- Degree of protection : IP54(Indoor)/IP65(Outdoor)
- Standard : IEC 60439-1, 2
- Certification : KERI
- Aluminum case plug-in busway
- Power distribution System of the optimum which substitutes cable

Customer oriented power solution with the newest digital network system integration and new trend information technology of generation, substation, transformation, distribution and customer!



EMS Energy Management Systems

- Applies open- architecture and a general database (ODBC, ADO)
- Uses real time OS to process real time data
- Supports economic dispatch and load frequency control to ensure stable power supply and operation
- Web monitoring function support (option)
- Applies the contingency analysis program which simulates the effect of separating the power line and generator in cases of accident
- Supports scenario restructuring and accident analysis in the event of an accident.



SCADA Supervisory Control & Data Acquisition

- User-oriented graphic environment with full graphic resources and working tools
- Possible to monitor and control the site in Viewport and alarm windows
- Transmits the operating information relating to I/O point in real time
- Support for making full use of IED functions through flawless communication with IEDs
- Storage of long-term data using the relational database
- Report generation with various formats reflecting user requirements
- OTS (Operator Training System) function support (Option)
- Web monitoring function support (Option)



SAS Substation Automation Systems

- Makes possible communication with various Intelligent Electronic Devices (IEDs) and analysis of the IED relay curve and accident function
- Increases the convenience of operation through the remote setting function of the IEDs, the bay-status indicating function, and others
- Provides support for large capacity data communication in real time by applying the Real time OS and TCP / IP Protocol
- Applies object-oriented technology to secure the flexibility, efficiency and reliability of data



DMS Distribution Management Systems

- Supports auto-tracing the point of accident
- Automatic decision function in breakdown mode (manual / automatic FI)
- Automatic separation and recovery support in the failed area
- Applies the SBO and CBO functions to secure the reliability of the control operation
- The composition of the hardware is designed to consider functional improvements and update functions through the downloading of the application program
- Supports various wired and wireless communication (RF, CDMA, optical)

Global Management

LSIS is engaged in business all over the world.
 LSIS global network includes 7 overseas corporations, 12 overseas branches, and 224 clients in 77 countries.



► R&D

				
R&D Campus Focuses on gaining competitive advantages through development of next generation platforms	Power Device R&D Center Leading technology in electric industry and continuously developing future-growth dynamic engines	Automation R&D Center Serves as the main Research Institute for LSIS	PT&T (Testing laboratory) Internationally-renowned testing center that has formed partnerships with the UL, CE, KEMA and CESI	Cheongju factory (Korea) Electric Products, Mold TR, MV/LV Switchgear, HV GIS

► Factory

				
Cheonan factory (Korea) PLC, AC Drive, HMI, DCS, PV Module	Busan factory (Korea) HV TR, HVDC, FACTS	Wuxi factory (China) Electric Products	Dalian factory (China) MV/LV Switchgear, MV Contactor	Hanoi factory (Vietnam) MV/LV Switchgear, Mold TR



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