



COMPANY PROFILE

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Design Smart Energy **KTE**





Message from KTE

KTE Co., Ltd. has successfully been providing the electrical equipment and engineering service to the global marine, offshore and industrial field since 1979.

All the employees of KTE never forget that the success has so far been due to customers' invaluable supports and thoughtful considerations. In order that your selection of KTE products ensures the best quality and service we pledge our commitment to making the precious customers the top business priority.

Keep your eyes on KTE.

You will find how sincerely KTE is making efforts to fulfill all the requirements of various classification societies and customers.

Thank you very much.



Aiming at being a world's leading supplier of electrical equipment,
we are always dedicated to developing and innovating our products and services.



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'70-80 Early growth period

- 1979**
Establishment
- 1984**
Localization of Switchboards for KOREAN NAVAL VESSEL
- 1985**
Technical Licence Agreement with NORCONTROL A/S Norway
- 1986**
Technical Assistance Agreement with NMP Corp. USA
- 1988**
Member of I.S.E.S. (International Ship Electrical and Engineering Service Association)

'90 Take-O period

- 1990**
Service Agency Agreement with Nakashima Propeller Co., Ltd. Japan
- 1993**
Awarded a prize of technological excellence from the society of naval architects of Korea
- 1994**
Moved into Dadaepo factory, Busan
- 1995**
Korean Presidential Award of Silver Tower Order of Industry
- 1996**
Acquisition of KT Mark (Korean New Technology) from Korean government
- 1997**
Designation of the factory of Vision 21, the Advanced Technology by Korean government
- 1999**
Designation of the Company of Technology Competitiveness by Korean government
Acquisition of ISO 9001 from DNV



'00-10 Transformation period

HISTORY

2000

Acquisition of KOSHA 18000 from Korea Occupational Safety & Health Agency

Licence Agreement with Nakashima Propeller Co.,Ltd. for Thruster

2001

Acquisition of ISO14001 from DNV

2003

Acquisition of OHSAS 18001 from DNV

Change the name of company to KTE Co., Ltd.

Licence Agreement with Schneider Electric for MCset HV Switchboard

2004

Moved into a new factory in Noksan Industrial Complex

2006

Designation as a Main-Biz enterprise for management innovation by Korean government

Designation as a Inno-Biz enterprise for technology innovation by Korean government

2007

Awarded a prize of \$30 Million Export Tower from Korean government

2009

Licence Agreement with Schneider Electric for Okken

Awarded a prize of \$50 Million Export Tower from Korean government

2013

Release new High Voltage Switchboard(KHMS-25A) and Low Voltage Switchboard (KMCC-80A)

2015

Awarded a prize of \$70 Million Export Tower from Korean government

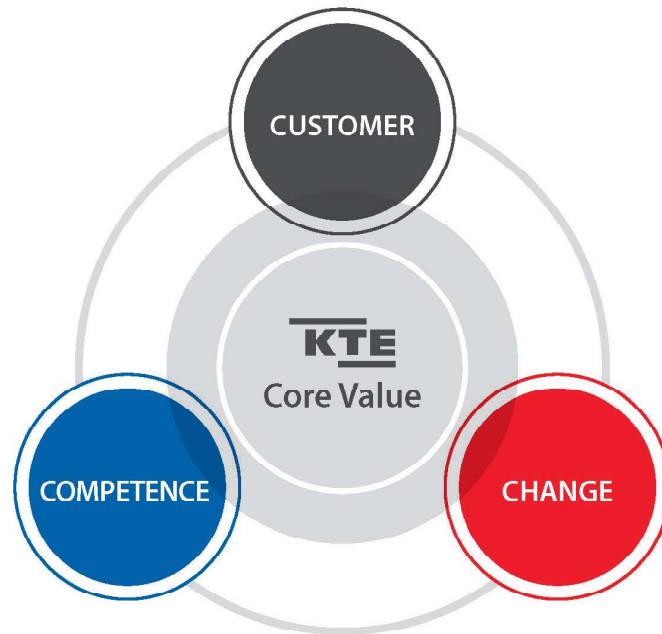
2016

Release new High Voltage Switchboard (KHMS-40B)



VISION

Being a world leading marine application provider to prosper with customers by value creation



Customer oriented

KTE firmly believes that the prosperity of customers will finally bring KTE success. To maximize customers' satisfaction, KTE will try to provide faithful services and superior products based not only upon advanced technological capabilities and reliable quality but also upon sincere and trustful relationships with customers.

Change for progression

The business environment today becomes more complex due to the rapid changes in the world economy, technologies, severe competitions etc. To keep pace with these changes KTE will continuously employ various process innovation into the organization as well as developing human-resources while maintaining KTE's stable labor-management culture. KTE is convinced that passion of change can generate energy that enables KTE to reach the goals.

Competence to sustain

Maintaining and developing strong competitive advantages are of the utmost important part for KTE's business activities. To sustain its competitiveness KTE will emphasize the technological innovation which can lead the new market trends through the persistent R&D activities, simultaneously creating the brand value for the solid recognition in the global market.



Marine and Offshore

- High Voltage Switchboard
- Low Voltage Switchboard
- Motor Control Center
- Distribution Board
- Engine Room Control Console
- Wheel House Control Console
- Wing Control Console

Naval Equipment

- LV Main Switchboard
- I.C.Switchboard
- Power Load Center
- Integrated Platform Management System
- Fuel Cell Control Board

Industrial Plants

- High Voltage Switchboard
- Low Voltage Switchboard
- Motor Control Center
- Distribution Board

Side Thrusters

- Controllable Pitch Propeller
- Fixed Pitch Propeller
- Propeller Controller

Engineering Service

- Member of I.S.E.S
- TAIYO's Shaft Generator
- NAKASHIMA Propeller's Thruster
- Thruster Control System

Ship Automation

- Control and Monitoring System
- Power Management System

Renewable Energy

- Fuel Cells & Hydrogen Control System
- Energy Storage System

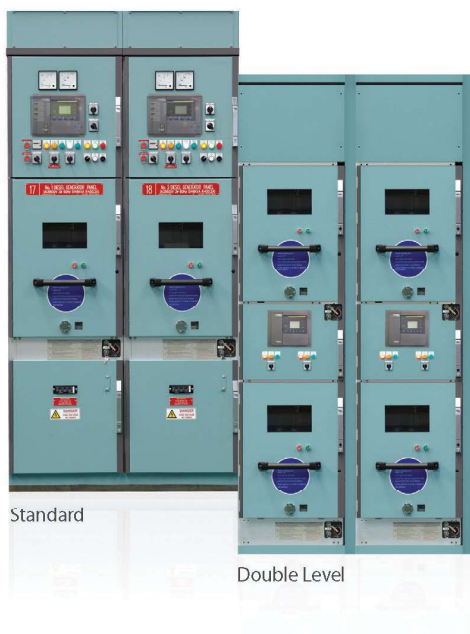


MAIN BUSINESS

KTE Technology

HV SWITCHBOARD

KHMS Series



High Voltage

The **KHMS Series** is a high voltage metal-clad switchboard commonly used for protection and switching of transformers, motors, generators, capacitors, buses, distribution feeder line and, in general, for protection of any high-voltage power circuit.

KHMS Series's high quality and compact design with easy installation at low cost, for new buildings, are important factors for ensuring complete customer satisfaction. We are dedicated to designing, manufacturing and marketing **KHMS Series** for the safe and securing customer requirements.

KHMS Series switchboard with withdrawable circuit breaker fully meets the latest standards of IEC and also provides a superior solution for increased worker safety, enhanced reliability and ease of use.

Features

- Metal-clad construction
- Horizontal isolation, horizontal draw-out
- Mechanical interlock
- Removable(drawout) circuit breaker
- Fully compartmented construction

User Convenience

- Adaptable solutions tailored to your specific requirements
- Enhanced safety for your personnel and operations
- Effective space utilization
- Significantly reduced maintenance
- Easy installation

Benefits for you

- Low installation cost
- Compact design
- Easy installation
- Type approved
- Technical support
- Fastest engineering service worldwide





High Voltage Starter(Auto transformer)

General Solutions

- Line current lower than motor current
- Provides high torque per Ampere of line current
- Medium or heavy duty
- 50/60Hz
- 3 Contactors Main, Run, Start
- Includes surge protection switching transient protection for autotransformer
- Taps 50, 65 and 80% or as required
- Internal arc classified(IEC62271-200)



Internal Arcing Protection

In conformity with IEC 62271-200
 No opening / No projection / No tearing
 No combustion of vertical indicators
 No combustion of horizontal indicators
 Operational earthing
 KHMS-25A : 25kA-1s
 KHMS-40B : 40kA-1s
 3 compartments tested (cables, CB, busbar)
 1 Tunnel closed at the two ends



Certifications

(certificate of Type test with IEC62271-200Bstandard)



1250A Incoming Panel



1250A Bus-Tie and Bus-Riser Panel



2000A Bus-Tie and Bus-Riser Panel



1250A Internal Arc



2000A Internal Arc



3150A Internal Arc

- High Voltage Metal-clad Switchboard up to 7.2kV 25kA
- High Voltage Metal-clad Switchboard up to 12kV 40kA

Authorized Certificate

Complies with the following IEC standards :

- IEC 60694 : Common clauses for HV switchgear
- IEC 62271-200 (60298) : AC metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52kV
- IEC 62271-100 (60056) : HV AC circuit-breakers
- IEC 60470 : HV AC contactors
- IEC 60265-1 : HV switches
- IEC 60282-2 : HV fuses
- IEC 62271-102 (60129) : AC disconnect and earthing switch
- IEC 60255 : Measurement relay and protection device
- IEC 60044-1 : Current transformers
- IEC 60044-2 : Voltage transformers
- IEC 60044-8 : Electronic current transformers



KTE Technology

HV SWITCHBOARD

MCset

High Voltage

KTE has obtained a MCset license through a technical partnership with Schneider Electric and we have carrying out design, production, and delivery.

MCset series for marine and off-shore applications is a complete range of High Voltage standardized units, insulated air metal-clad type ones, for the performing of the following functions.

- Electrical power distribution
- Generator set coupling
- Transformer feed and motor feed

In choosing MCset, you have the key advantage of :

- the extensive experience of the world leader in high voltage
- the host of solutions derived from the most modern concepts



Application

The standard units are

- Incoming and outgoing units with or without voltage transformer(VT)
- Bus-tie with or without voltage transformer(VT)
- Bus riser with or without voltage transformer(VT)
- Motor units.

The staff's safety is ensured by

Availability of an internal arc proof version according to IEC 60298

- Earthing switches with making capacity
- Authorization for the handling of the circuit breaker only with the door closed
- Complete metallic insulation of the functional units
- All the controls on the front of the unit

Features

Marine MCset is a range of modular functional units, each one dedicated to a specific application

Each unit includes

- A metalclad cubicle, composed of several metallic compartments
- A withdrawable breaking device (circuit-breaker, contactor-fuses)
- A dedicated protection and control unit

Easy installation

Several assembling solutions meet all Marine requirements and lay out or location constraints.

- Ground surface savings : reduced width of cubicles without rear access
- Easy front access to busbars and cables connections
- Easy on site extension
- Standardized ground bolting



ALTERNATE MARITIME POWER SYSTEM

Alternate Maritime Power System (AMP)

While berthing at harbor for long period for operations which require high power such as loading and offloading of cargos, diesel engines are operated to supply necessary power onboard.



Cable Reel

Allows cable connection between vessel to power source onshore. Reel operates automatically with adjustable speed.



High Voltage Switchboard

Supply and shuts off of power from onshore and protection against accidents.

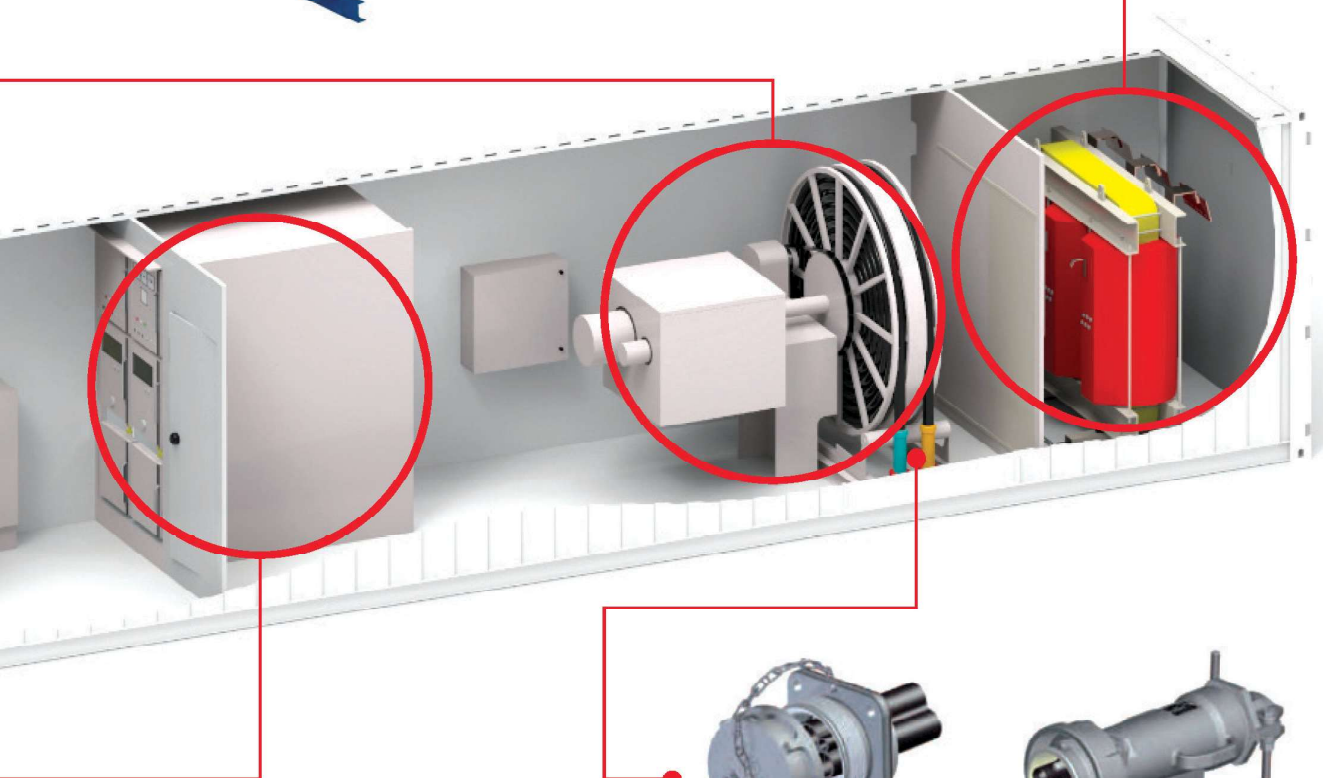


Diesel engines generate air polluting carbon gas while operating, and IMO is strengthening carbon gas emission regulations. KTE is providing eco-friendly AMP solution which allows user to receive high voltage power from onshore power source instead of diesel engines while berthing.



Transformer

Provides stable power by stepping down high voltage power received from onshore to suitable power level for vessels.



Socket & Plug

Installed on cable, enables power supply from onshore to vessel through physical contact. Various products can be applied according to onshore power source's socket or plug.

KTE Technology

LV SWITCHBOARD

Low Voltage

Main switchboards are not only recognized as useful means of power source protection but also highlighted as central means for controlling power. Specializing in the manufacture of marine electrical equipment, KTE has so far developed various products adapted for the users' needs on the basis of our long year and the latest technology.

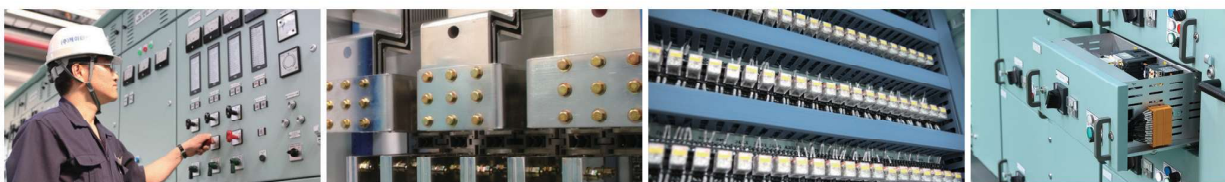
Close co-operation with classification societies and maritime authorities combined with innovative design, quality products and worldwide lifetime service makes KTE the perfect partner for your marine projects.



Front Maintenance Type



Emergency Switchboard



Application

Draw-out unit

Draw-out unit is divided into main circuit instrument room and control circuit instrument room, both of which are safe and enable easy maintenance inspection.

Rules and regulations

KTE has acquired Type Approval Certificate for Low Voltage Switchboard System from Germanischer Lloyd. KTE maritime switchboards also meet the rules and regulations of the classification societies of various countries including ABS, BV, CCS, DNVGL, RINA, NK and, KR.

Features

Long-life span and reliability

KTE marine switchboards are adaptable to all possible ship conditions as the most reliable components have been chosen on the basis of years of accumulated experiences.

Excellent anti-corrosive coating, baked melamine finish and orderly device arrangement make the switchboards more reliable.

Rigid construction and safety

The switchboards are sufficiently drip-proof and durable against vibration, moisture, heat and shock. From design stage of the products, KTE thoroughly reflects all the safety rules and regulations of international standards and classification societies to the switchboards.

Best suited arrangement

Almost all type of marine switchboards have already been delivered in large quantities. Which means that system satisfies various user requirements and is ready for immediate applications

KTE Technology

LV SWITCHBOARD

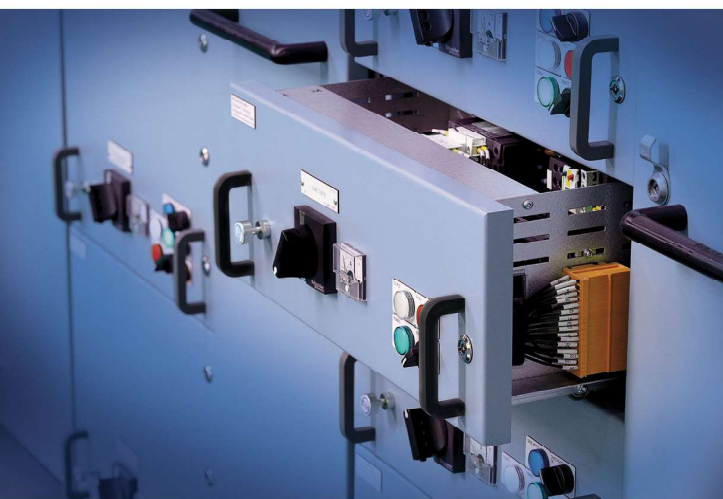
KMCC Series

Low Voltage

KMCC Series is a withdrawable low voltage switchboard in accordance with IEC 61439-1 standards.

The system provides motor control and power distribution functionality.

KMCC Series is a compact, flexible and reliable Low Voltage solution for applications where the supply of energy is vital for your business process.



Safety

- Reliable interlocking mechanisms to ensure operational safety / disconnection / test positions.
- Withdrawable in operation to ensure the safety of your operating personnel : safe modification under energized conditions.
- Separated and isolated bus bar compartment to increase operation safety
- Separated and isolated cable compartment
- Upgrade / exchange of functional units without service interruption

User Convenience

- Slide and guide design for optimal compartment guidance
- Applicable to the Intelligent MCC
- High stacking density of motor control and / or power distribution units (Max. 13 units in 1 vertical column)
- Intuitive withdrawal mechanics of the compartments
- Modular and flexible design



Front Maintenance Type

Application Standard

IEC 61439-1 : Low-voltage switchgear and control-gear assemblies

IEC/TR 61641 : Testing under conditions of arching due to internal fault

Rated currents

Main bus bar(3/4 poles) : Up to 4000A

Vertical bus bar(3/4 poles) : 1000A, 1500A

Short time withstand current : 85kA, 1s

Peak withstand current : 176kA

Arc fault withstand current : 80kA, 300ms

Degree of protection

IP22, IP44

Forms of internal separations

Form : Up to 4b



Front & Rear Maintenance Type

KTE Technology

LV SWITCHBOARD OKKEN

Low Voltage

KTE has obtained a Okken license through a technical partnership with Schneider Electric and we have carrying out design, production, and delivery. Okken is a low voltage switchboard designed for use in critical largesite applications:

off-shore platforms, large industrial plants. Okken's safety and high operational dependability are essential for your applications in critical processes, in power distribution as well as for motor control.

Okken is a totally type-tested switchboard, in accordance with IEC 60439-1, and certified by independent labs: LOVAG, ASEFA, CESI and VIRLAB.



A wide range of solutions

Withdrawable device for high power incomers or feeders up to 6300 A

Fixed for economical low-power feeder applications.

Disconnectable up to 630 for a high upgradability

Plug-in up to 630 for fast interchangeability without handling the power cables

Drawers for highest availability and safety of electrical distribution and motor



Okken High Safety and Availability Switchboard up to 6300 A

Okken's modular design makes it easier to use for main switchboard power distribution up to 6300 A, as well as for the control and monitoring of motors up to 250 KW. It allows a combination of different types of feeders in the same column.

High dependability and low voltage switchboard

Okken is a low voltage switchboard designed for use in critical large-site applications:

- Off-shore platforms
- Large industrial plants



Okken offers different protection levels: IP31 / IP41 / IP54, appropriate to the environmental characteristics of your installation.



Drawers



Disconnectable or Plug-in Polyfast



Fixed type cubicle



Variable speed drives



Power factor correction



Fuses cubicle

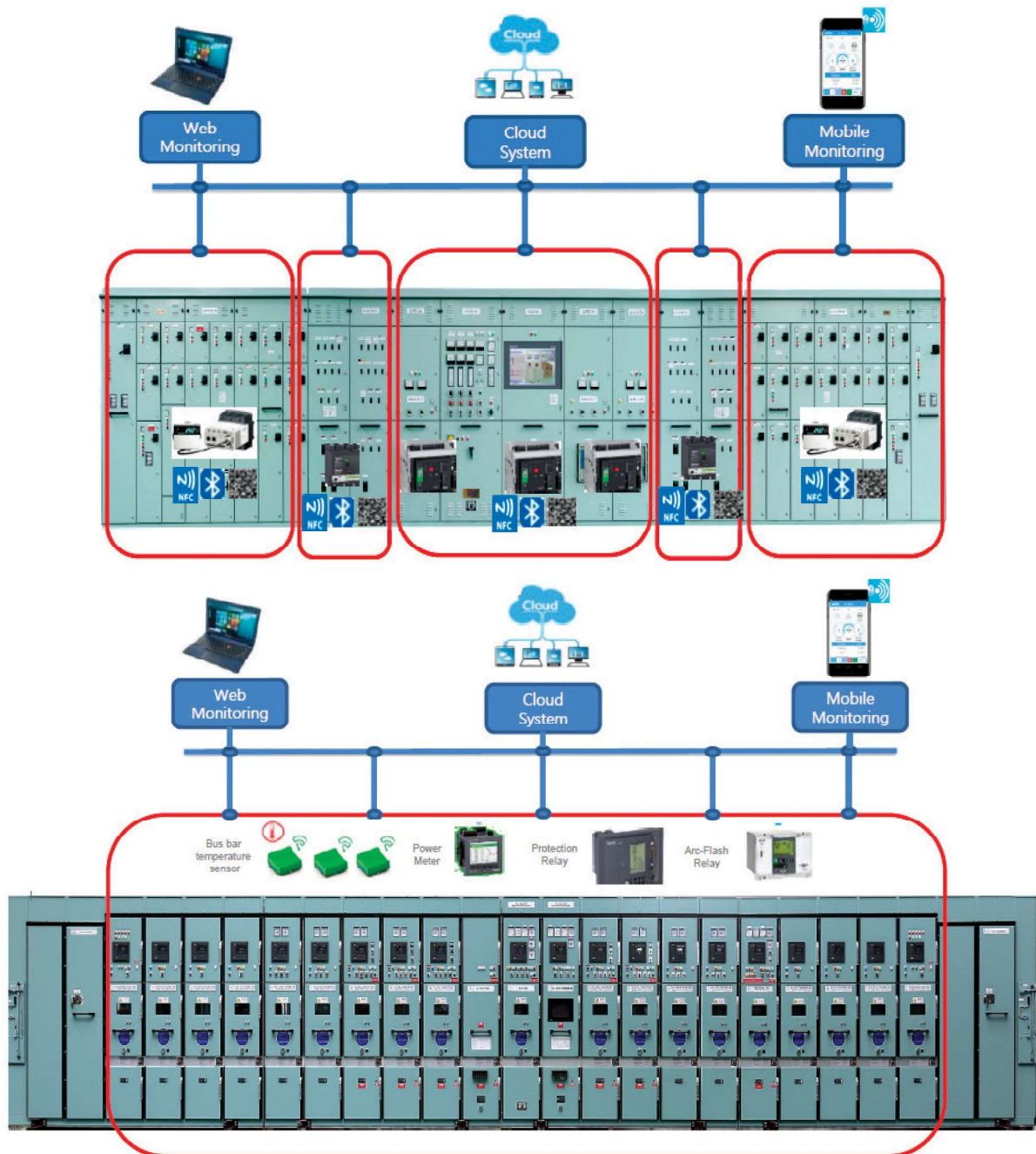


230 and 115 Masterpact cubicle

SMART SHIP SOLUTION

Smart Ship Solution

Smart ship solution project is for the On-line monitoring system establishment through the network configuration and digital device selection for power monitoring and analysis.



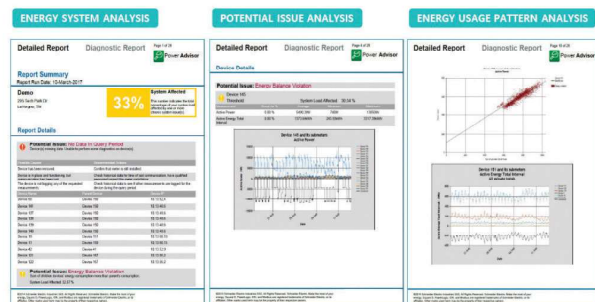
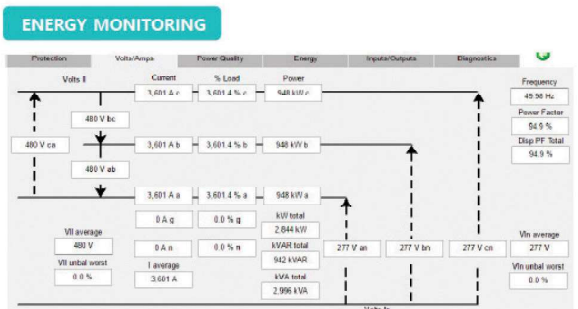
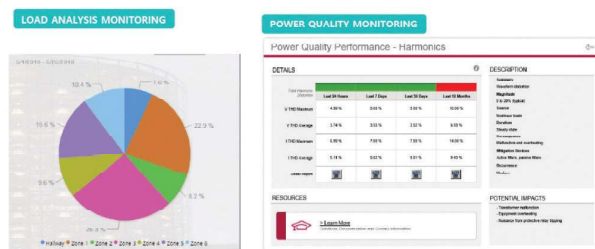
Smart ship solution improve power reliability in a simpler and more effective way while reducing energy-related capital and operating cost. KTE's Smart switchboard power management system provides the balanced and stable solution for ship's power network management, energy cost management and electrical asset management

Real-time monitoring data

- Active, reactive power
- 3 phase currents and voltage
- Number of operation : Trip, Draw out
- Time for operation : tripping, charging
- Level for corrosive gas, Salty atmosphere
- Cumulative breaking current
- Trip circuit, auxiliary voltages
- Output velocity and torque
- Driver thermal state
- Temperatures: Cables, bus bar, winding, oil
- Ambient temperature and humidity
- Status information : diagnosis on edge point
- Channels and signal from specialized devices

Feature

- Remote operation and energy management system
- Cloud-based energy usage and device status analysis
- Field operation and monitoring LCD display
- Internet connection and web service devices
- Smart devices capable of mobile operation
- Smart circuit breaker equipped with energy measurement and communication functions
- Load line remote operation and wireless energy measurement sensors



KTE Technology

MARINE CONTROL CONSOLE

From Design Features to Operational Efficiency

KTE, a highly-specialized manufacturer of marine equipment, produces control consoles which assure safe ship navigation along with switchboards and starters.

With splendid appearance and simplified arrangement several hundreds of Control Consoles have been delivered to vessels sailing all over the world.



Features

Long-life span and high performance

KTE marine control consoles are adaptable to all possible ship conditions. They are highly resistant to vibration, moisture and temperature, employing parts chosen on the basis of our high technology and accumulated experience. Thus, long-life span and high performance are ensured.

Optimum arrangement

For easy monitoring and operation, the layout of the panel surface is sectioned for separate group apparatuses, such as the main engine, the boiler and the auxiliary machinery. This arrangement can fully meet user's requirements.





Rigid construction and good appearance

Designed for marine applications, the consoles are sufficiently drip-proof and durable against vibration and shock and are constructed for easy installation. Excellent anti-corrosive coating, baked melamine finish and orderly device arrangement produce a superb appearance.

Easy inspection and maintenance

The arrangement of the parts in the console and the wiring facilitates inspection and maintenance.



To work closely together with our precious customers, people in KTE will devote themselves. KTE is well aware of the fact that a company's future is under customers' thumbs. Therefore, CUSTOMER SATISFACTION should be taken into account FIRST in all matters.

CONTROL AND MONITORING SYSTEM



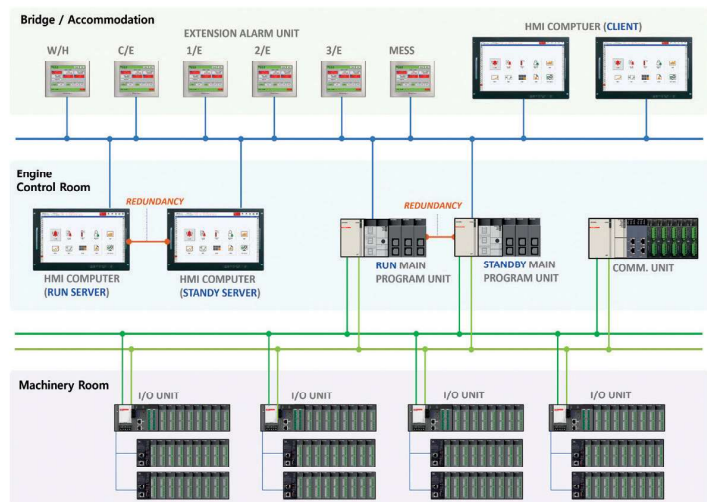
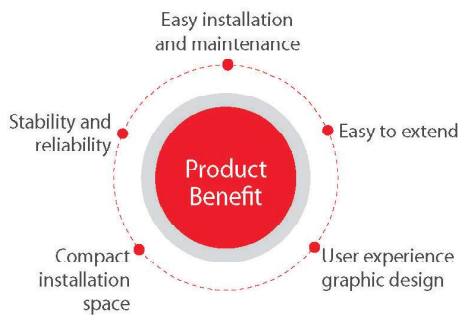
UNOSYS-C200

UNOSYS-C200 is a control and monitoring system.

This system is designed by standard modules communicating on serial instrument net, local area network and local operator network. It is adaptable for all types of ships. The main purpose of the system is to give ships all the basic alarms and status information they require in order to maintain safe and efficient operation of the machinery. The system is designed as a redundant system for the sake of stability and reliance. The system is designed to meet the classification society's requirements. The design conforms to all rules and regulations and all modules are type approved.

Product Benefit

- User-friendly graphic interface.
- Support the interface for other shipboard system using serial and Ethernet line.
- Cost effective solutions that can be tailored to owner requirements.
- Stability and reliability.
 - Distributed control process and I/O acquisition and external communications.
 - Support the redundant process network and CPU.
- Easy installation and maintenance.
 - Reduce the cabinet size using small size I/O module.
 - Provide the easy maintenance.
 - Easy Installation and extension.



Graphic interface

UNOSYS-C200 provides user-friendly graphic interface.

- Alarm display shows the alarm list and control for each alarm setting parameters.
- Mimic display shows the P&ID for each ship and apply owner requests.
- Easy control trend display shows log data for analog and digital data.
- View display supports text box view, gauge view and bar view for user selected alarm point.
- Display mode supports day and night mode.



POWER MANAGEMENT SYSTEM



UNOSYS-P100

UNOSYS-P100 Power Management System is a Digital signal controller for switchboards, generators and circuit breakers control. The system performs normal functions necessary to manage each generator in order to balance power generations and power consumptions. The PMS is interfaced with the main switchboards through hardwire (digital inputs or outputs and analog inputs) and interfaced with a external system through serial communication link or Ethernet.

Power Management Function

Load dependent start/stop

Auto parallel running by heavy load
Auto parallel running cancellation by light load

Auto load sharing

Proportional load sharing (Default)
Optimum load sharing
Fixed load sharing

Power control

Bus frequency control
Load sharing control
Active/Reactive power control
Power factor control

Standby generator start/stop

Generator start by heavy consumer handling
Standby generator start following alarm
Auto changeover by bus abnormal

Generator protection

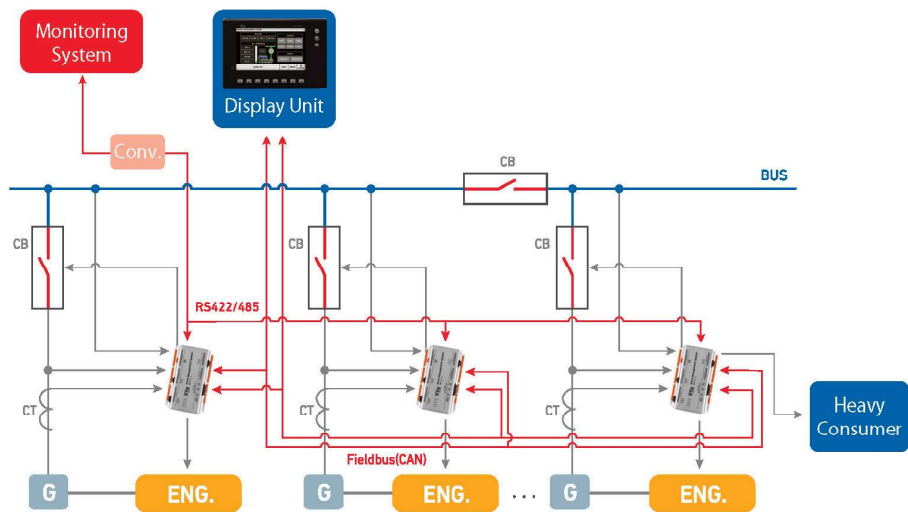
Over current protection
Reverse power protection
Short circuit protection
Preferential trip

Bus tie control

Bus tie open according to ACB abnormal trip
Bus tie recovery according to power restoration



System Overview



KTE Technology

SIDE THRUSTER

TCT Type
TFT Type

Greater thrust while being more compact in size.

Our model is completely newly designed thruster based on our vast experience and achievements.



Features

Greater thrust

As a result of tank tests and improvements in both design and strength of the blades, we have created a thruster with much greater thrust than conventional ones of the past.

Easy installation

Reduction in the thruster length has made it possible for the thruster to be installed to the forward part of the bow section of the ship compared to conventional ones. This gives the ship a great turning moment.

Minimum vibration and low noise

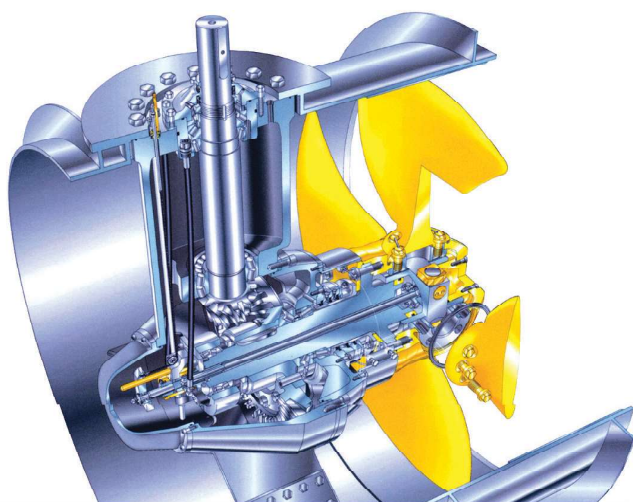
Utilizing our unique forward-skew design for the thruster's blades and the results of many tank tests enabled outstanding progress in low noise and reduced vibration.

Easy maintenance and inspection

Propeller blade replacement can be conducted in the duct easily by removing the blade bolts.

The thruster body can be dismounted in the duct, shifted outside and inspected on shore.

Adoption of the same oil for lubrication and pitch control brings easy maintenance for the thruster.



Thruster Control System

This product is an exclusive controller to control a thruster when a ship is coming or going alongside the pier. The main function of this product is to control a blade angle of thruster to control signal which is detected control command and feedback value. And it can provide an automatic control for a thruster optimized using a follow-up control algorithm.



User Convenience

Auto blade angle control (Follow up control)

Main function of this system is to control blade angle with command value. That is to say, this system controls blade angle automatically with command when follow up control algorithm is used.

Manual control (Non-follow up control)

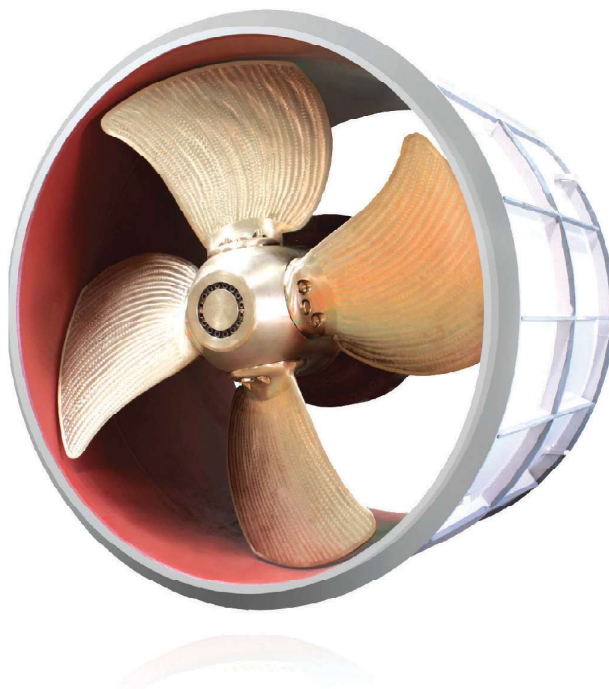
In this system, blade angle can be basically controlled by means of recognizing angle that users input with CPU and controlling automatically with follow up control algorithm and another operation isn't necessary.

Auto load control

This is function to protect an overload which is made after running an electromotor. It can be controlled automatically by the limit of maximum allowed-current, Proportional gain and Integral gain.

Zero pitch system

During voyage of the vessel, sometimes the propeller is rotated by the tide(the seawater coming into the thruster tunnel) and the pitch is moved out of the zero position. In this situation, the hydraulic pump automatically will be started and the pitch is kept in zero.



KTE Technology

NAVAL EQUIPMENT

Electrical Equipment for the Navy

KTE marine electrical equipment has already been recognized not only by major classification societies but also by leading ship authority around the world. As a specialized manufacturer with many years of marine and shipbuilding experience, KTE's technology is also utilized in naval vessels such as LPX, submarines, minesweepers.

KTE has continuously provided naval equipment such as main switchboard, IC switchboard, training simulator, power converter, control system, etc. for the Republic of Korea Navy for decades.



Safety & Reliability

KTE's rigid and sturdy switchboard ensures the safe and reliable distribution of electricity on board naval vessels.

All products are specially designed in accordance with the requirements of military standards, nation & international standards and tested by means of trials and qualification tests. Also, it is made to handle harsh environments such as vibration, mechanical shocks, cold, heat, humidity, corrosion, etc. In Compliance with US-MIL-STD requirement & NATO STANAG requirement.



Main Switchboard for MSH(Mine Sweep Hunter)

Main Switchboard for LPX
(Landing Platform Experimental)



Main Switchboard for
UK MARS

SUBMARINE EQUIPMENT

INTEGRATED PLATFORM MANAGEMENT SYSTEM (IPMS)

The IPMS is a computer system used for one man control and monitoring of the plants and devices of the submarine in an easy way.

AUXILIARY SWITCHBOARD WITH PROPULSION CONTROL UNIT

AUX. Switchboards distribute the electrical energy to the entire consumers on board and contain all necessary electrical devices for a safe and reliable power supply.

Propulsion Control Unit contains all electrical equipments and functional groups, necessary to activate, control and monitor the Propulsion Motor and its auxiliary systems.

POWER CONVERSION EQUIPMENTS (PCE)

PCE converts high voltage DC to low voltage DC or AC in order to supply electrical power to the necessary devices.



● Fault Current Limiter



● DC220V Converter



● AC400HZ Inverter



● AC60HZ Inverter



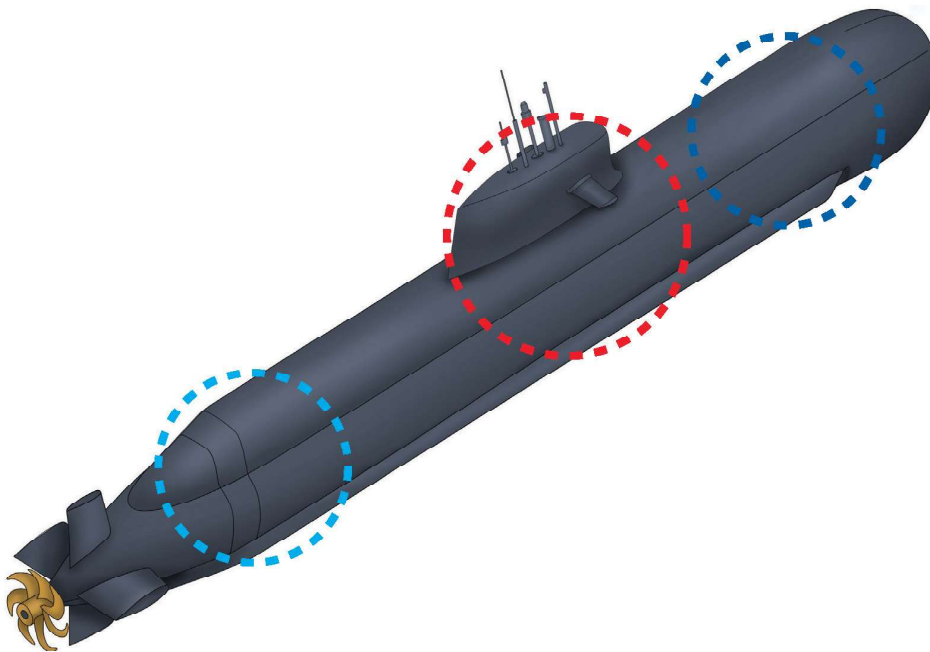
● Intergrated Mast Control Unit



● Fuel Cell Control Board (FCCB)



● Auxiliary Switchboard with Propulsion Control Unit



● Integrated Platform Management System(IPMS)

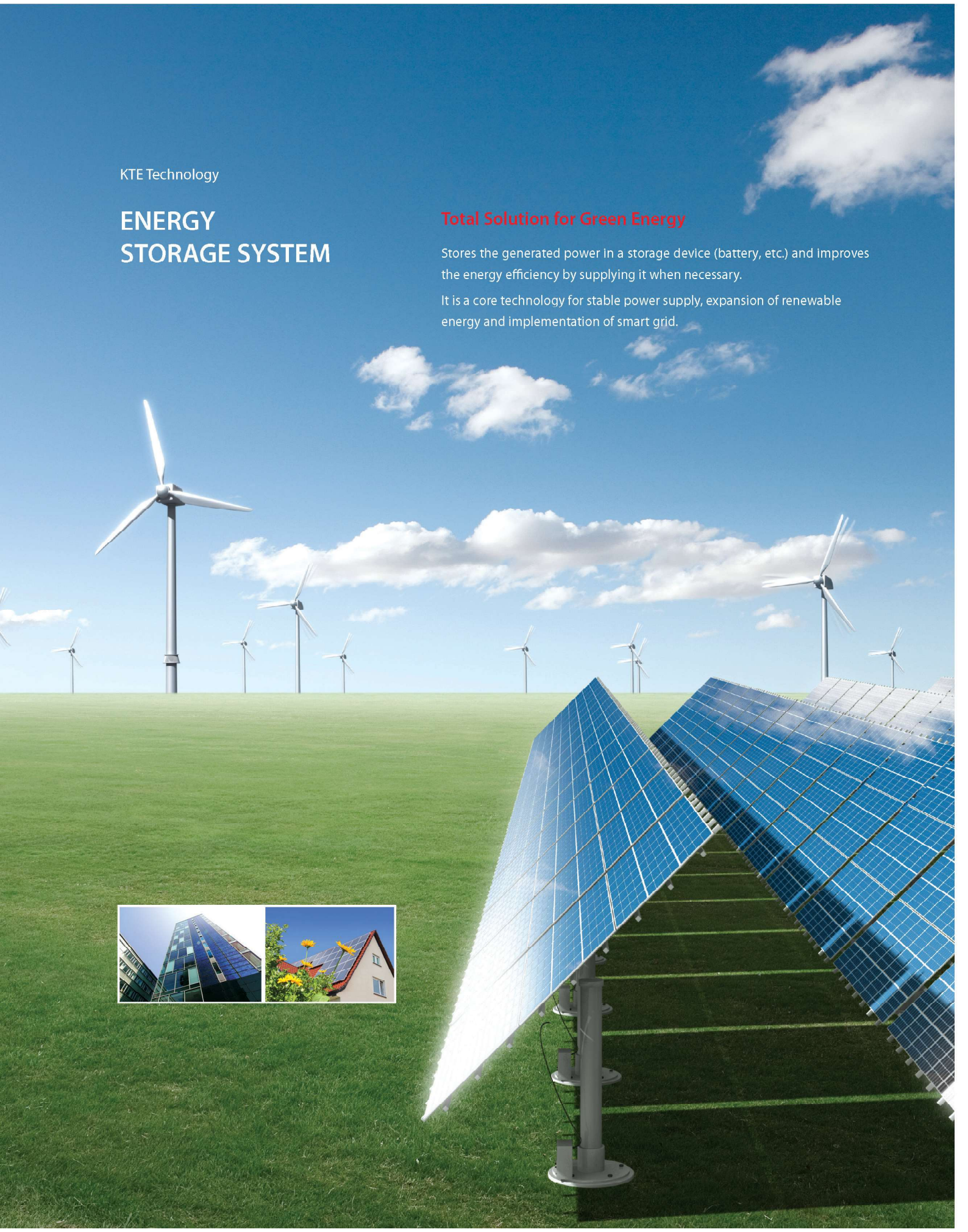
KTE Technology

ENERGY STORAGE SYSTEM

Total Solution for Green Energy

Stores the generated power in a storage device (battery, etc.) and improves the energy efficiency by supplying it when necessary.

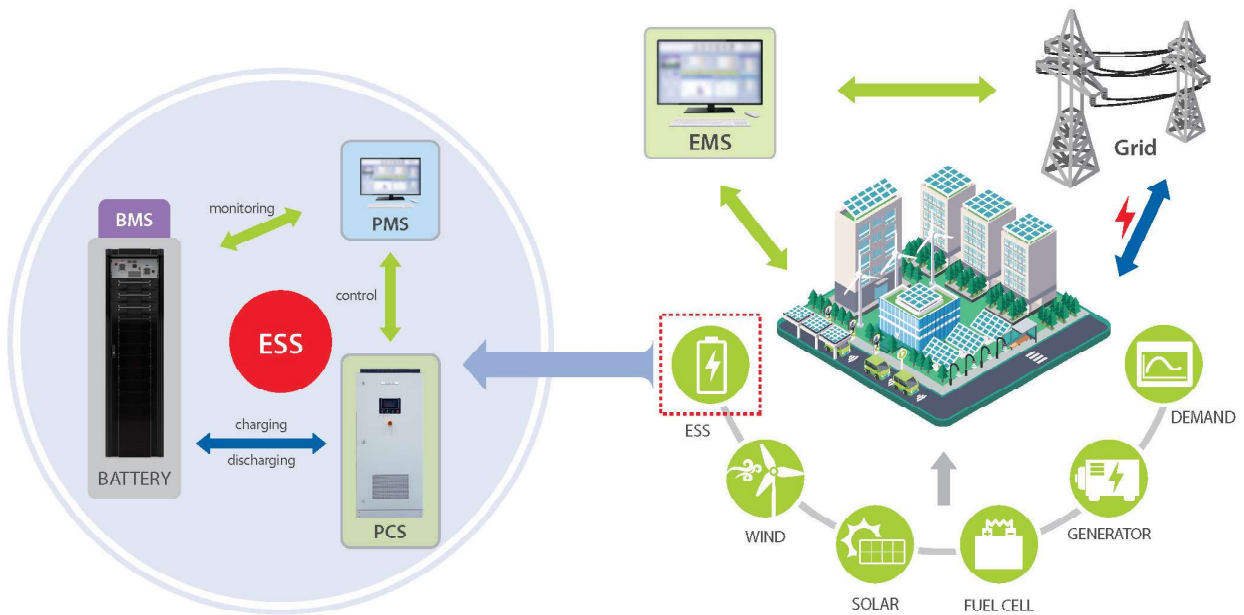
It is a core technology for stable power supply, expansion of renewable energy and implementation of smart grid.

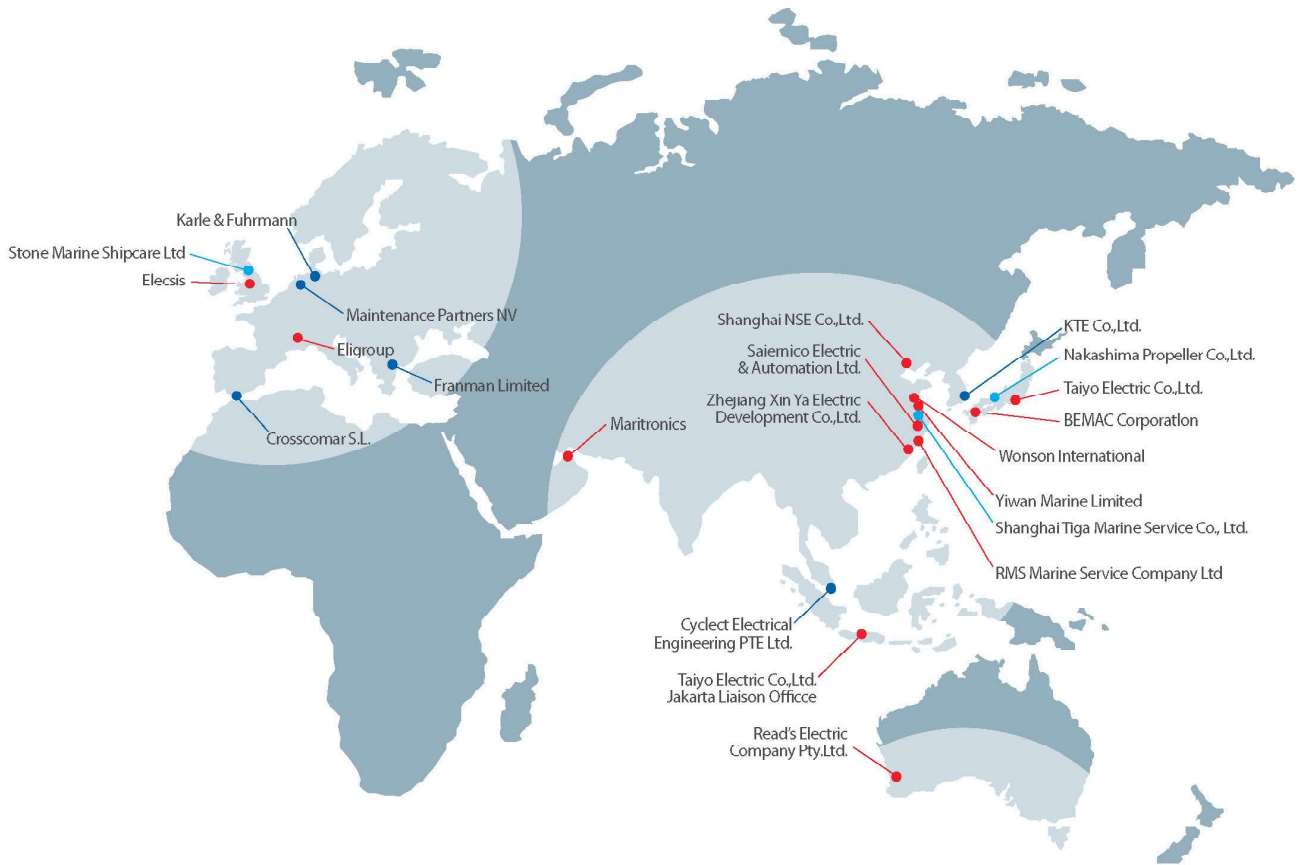




Division	Contents
Application	<ul style="list-style-type: none"> - Demand Response (DR) : Reduce the peak load. - Renewable Integration (RI) : Stabilize output of new & renewable energy sources.
Configuration	<ul style="list-style-type: none"> - Battery : Li-ion Battery for storage power. - PCS(Power Conditioning System) : The power between the energy source and the battery and the grid is converted to enable charging and discharging. - EMS(Energy Management System) : Integrally manages the status and information of the battery, PCS and watt hour meter.

Microgrid





* I.S.E.S(International Electrical & Engineering Services Association) network available.

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