

Global Scope of Hitachi's Power Distribution Systems Business and its Role in Building Strong Grids

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OVERVIEW: While the electric power distribution market is expected to continue to grow in pace with the ongoing economic development of emerging nations, factors such as falling market prices resulting from the entry of manufacturers from emerging economies and the loss of cost-competitiveness caused by appreciation of the yen also demand an urgent response. Reacting to this situation, Hitachi is drawing on its past experience with overseas manufacturing to expand overseas procurement, reestablish a global supply chain, and implement monozukuri manufacturing practices with a fresh approach to process and quality management. In addition to introducing knockdown production factories in key markets so that activities such as sales, engineering, and product distribution can be handled in ways that are closely integrated with the market, Hitachi also aims to establish a global business model through direct transactions with factories, and to become a major player in the international power transmission and distribution business.

INTRODUCTION

AGAINST a background that includes vigorous economic growth in Asia, in particular, and a need to make grids stronger to cope with increasing demand for electric power around the world, the size of the worldwide electric power distribution market is forecasted to grow from 6 trillion yen in 2010 to 12 trillion yen in 2020 (see Fig. 1).

Hitachi, meanwhile, faces a situation in which it urgently needs to respond to a loss of cost-competitiveness caused by appreciation of the yen and to falling market prices prompted by the aggressive entry of emerging contenders, China and South Korea in particular.

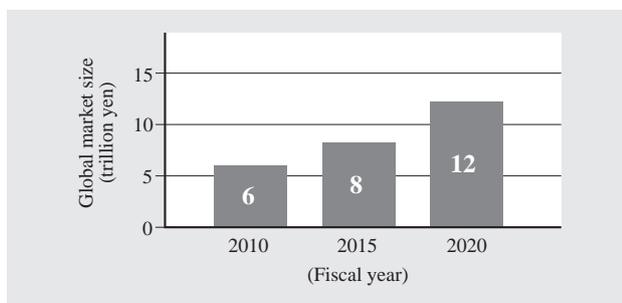


Fig. 1—Growth in Size of Electric Power Distribution Market (Hitachi Estimates).

The global market is forecasted to grow to 12 trillion yen by 2020.

This article describes Hitachi's activities in the power transmission and distribution business as it seeks to become a major player in the global market.

PAST ACTIVITIES AND SITUATION

Japan AE Power Systems Corporation was involved in the power transmission and distribution business during the period between its establishment in July 2001 and March 2012, supplying electric power switchgear such as gas circuit breakers (GCBs) and gas-insulated switches (GISs), power transformers and other equipment, and substation systems that used these devices (see Fig. 2).

Activities Targeting Overseas Business

To date, Hitachi has established overseas operations in four main markets, with two overseas factories playing a central role.

(1) Near East and Middle East market

After previously focusing on turnkey business, primarily in the Kingdom of Saudi Arabia and State of Kuwait, Hitachi has subsequently expanded its operations to include standalone sales of GISs, power transformers, and other equipment, particularly to countries such as the United Arab Emirates. Prospects for the future include capital investment backed by oil money and economic development flowing on from greater democratization.

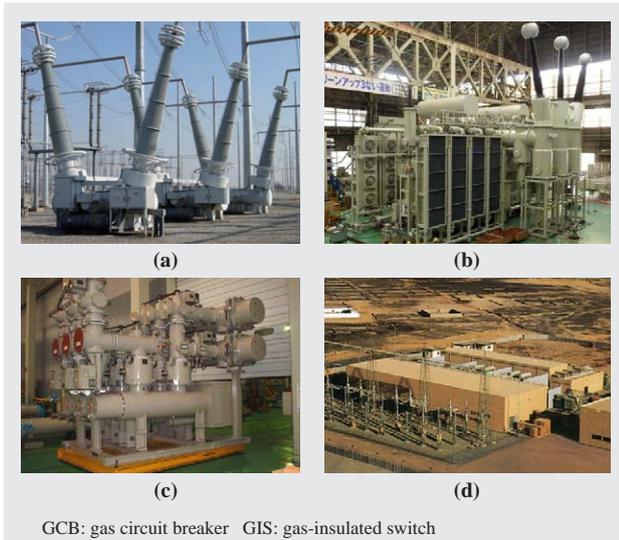


Fig. 2—Typical Products of Electric Power Distribution Business.
The photographs show 550-kV GCBs (a), a 380-kV power transformer (b), a 245-kV GIS (c), and a 380-kV substation system in the Kingdom of Saudi Arabia (d).

(2) Chinese market

Business activities include sales of equipment through technical collaborations with local companies and a joint-venture company with the State Grid Corporation of China, and parts sales involving the supply of main components for equipment from

Japan. Demand from the electric power distribution sector is anticipated to continue growing along with the expansion of the Chinese economy.

(3) North American market

Hitachi sells GCBs through a local subsidiary. Ongoing demand is anticipated from the replacement of aging equipment and investment in stronger grids.

(4) Southeast Asian market

Hitachi operates a maintenance business along with GIS sales through a sales and engineering office in the Republic of Singapore and a factory in the Republic of Indonesia. Growth in demand driven by economic development is forecasted to continue.

(5) Overseas factories

Plants in Indonesia and China manufacture parts and components for GIS and GCB products. The components are first sent to plants in Japan for assembly and final testing prior to delivery to various markets.

Market Conditions

Market prices have fallen significantly since 2009, driven by factors such as the bursting of the Middle East bubble that followed on from the sub-prime loan crisis in the USA, and the entry into overseas markets of emerging manufacturers from countries such as China and South Korea. Amid a loss of cost-

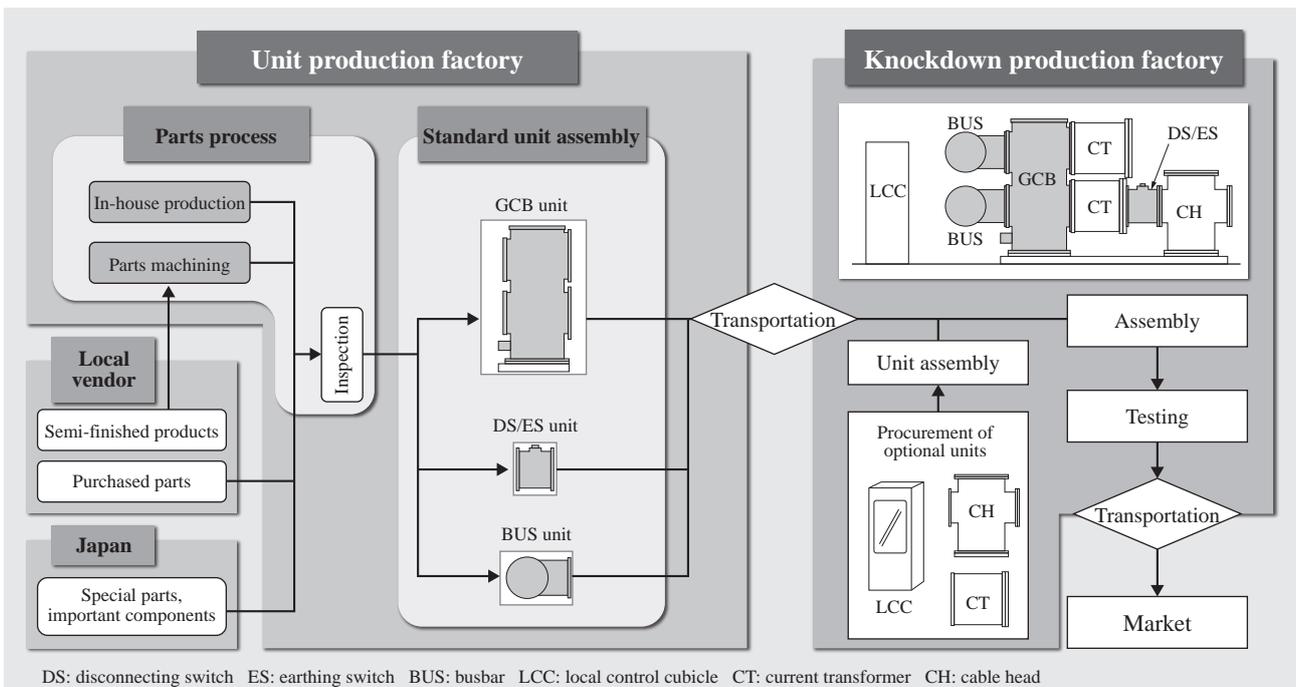


Fig. 3—Knockdown Production of GISs.
Production of standard units is centralized at part production factories. Knockdown production factories are used to procure optional units, assemble finished products, and handle testing and delivery.

competitiveness caused by appreciation of the yen, manufacturing practices capable of producing a large number of models to suit the varying specifications demanded by different markets or customers have become a challenge for overseas factories. Also needed is a shift toward business practices that are more closely integrated with markets, instead of operations being based primarily out of Japan, as in the past.

CONSTRUCTION OF GLOBAL PRODUCTION SYSTEM

Supply Chain Reconstruction

To overcome the difficulties described above, Hitachi revised its range of export-market GISs with the aim of improving productivity to reduce costs without compromising quality, rationalizing the range from 33 down to six main models. In addition to defining the main components not subject to customer-specific specifications as standard units, the existing facility at AE Power (Suzhou) EHV Switchgear Corporation in China was designated a part production factory and made to specialize in the production of standard units.

PT. Hitachi Power Systems Indonesia in Southeast Asia, Hitachi HVB, Inc. in North America, and CET AE Power (Shandong) High-Voltage Switchgear Co., Ltd. in China were each designated knockdown production factories. Based around these plants, Hitachi has

implemented a knockdown system that includes the manufacture and procurement of components other than standard units, the customization of products to specific customer specifications, the assembly of these along with standard units imported from a part production factory, and their shipment and testing (see Fig. 3). This provides each factory with a clear mission, reduces exchange rate risk through local production for local supply, and allows technical support from Japan to be delivered in a focused and efficient manner.

Regarding the flow of products and contracts that went through Japanese factories in the past, improvements to the supply chain to allow direct dealings between part production factories and knockdown production factories have made transactions and the flow of goods more efficient (see Fig. 4). Furthermore, Hitachi is proceeding with the implementation and construction of a new global supply chain in which the Japanese side handles tasks such as management of each factory, management of the overall supply chain, and technical guidance and operational support for each part production factory and knockdown production factory.

Greater Use of Overseas Procurement

As well as seeking to make its switchgear products more competitive through reconstruction of the global supply chain, Hitachi is also aiming to improve the

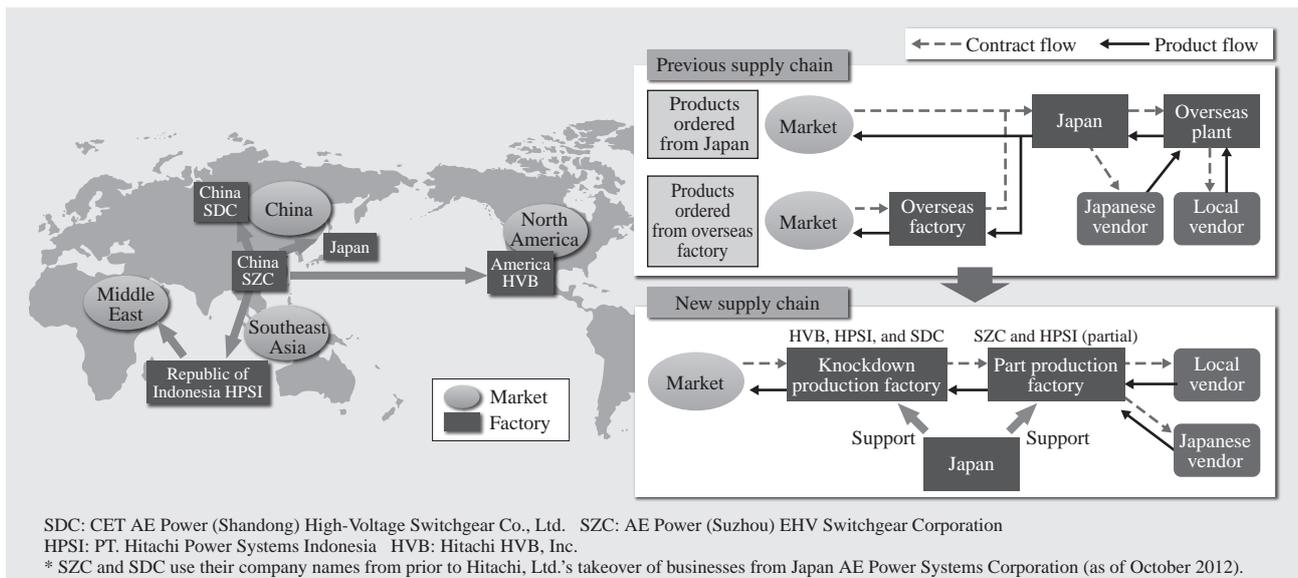


Fig. 4—Reconstruction of Global Supply Chain for GIS.

Hitachi aims to service key markets from knockdown production factories in China, Indonesia, and USA. In addition to making transactions more efficient through the construction of new supply chains with direct transactions between knockdown production factories and part production factories, Hitachi will also provide each factory with support from Japan.

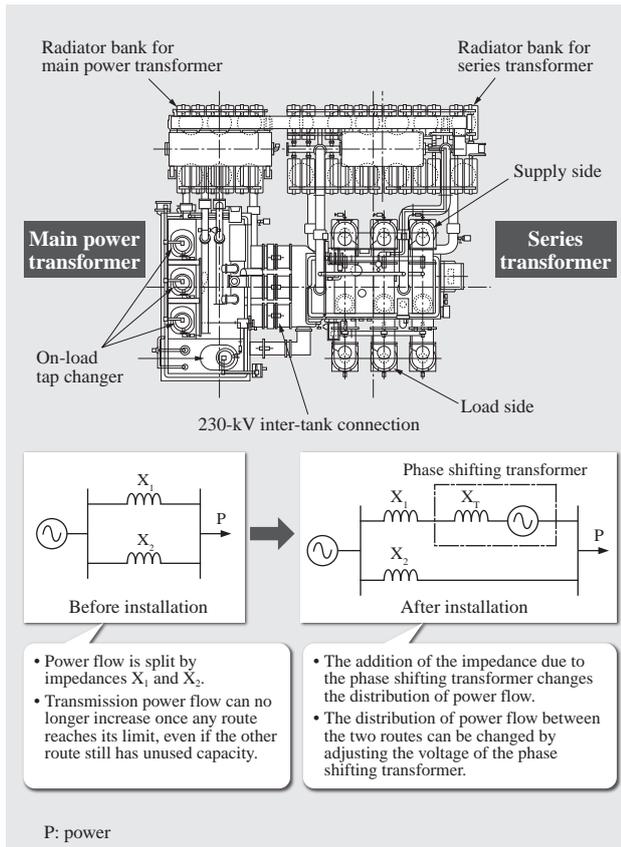


Fig. 5—Structure Diagram and Benefits of Phase Shifting Transformers Intended for Overseas Markets. Phase shifting transformers increase overall power transmission capacity through the control of power flow in systems with a loop configuration, and improve reliability and reduce power loss across entire loop systems.

competitiveness of its power transformers, especially those intended for export markets, by taking active steps to use overseas parts and materials without compromising the high product reliability built up through past experience. Hitachi also expects to gain a further increase in orders through the overseas marketing of high-added-value products that demand a high level of engineering capabilities, such as the phase shifting transformers that are one of Hitachi’s strengths (see Fig. 5).

One example is the use of overseas-made on-load tap changers, radiators, cores, and other key power transformer components in phase shifting transformers intended for overseas markets. Phase shifting transformers are particularly effective devices for the efficient operation and stabilization of power systems. They increase overall power transmission capacity through the control of power flow in systems with a loop configuration, and improve reliability and reduce power loss across entire loop systems.

As it is anticipated that greater use will be made of these transformers in the future, both in Japan and elsewhere, Hitachi is seeking to strengthen its competitiveness by taking active steps to use overseas products as well as supporting detailed engineering.

Efficiency Improvement for Overseas Production Processes

To make the provision of production instructions to each factory more efficient, maintain consistent quality, and strengthen management of the global supply chain, Hitachi is proceeding with improvements to the production processes that utilize information technology (IT). In the past, most work instructions and records at factories have been paper-based. Hitachi is currently working on introducing the implementation of work management and navigation systems to GIS, GCB, and other assembly work. The systems use tablet personal computers and other mobile devices for paperless work instructions with three-dimensional (3D) models of each operation step and the collection of realtime work records. They facilitate more efficient provision of technical instruction, training, and quality management to overseas factories (see Fig. 6). In the future, it is anticipated that the systems will also be used for applications such as work at remote sites or support for working at user sites.

GLOBAL BUSINESS OPERATIONS

In addition to building a global production system, Hitachi is also taking steps to operate globally with overseas facilities taking a central role. This includes

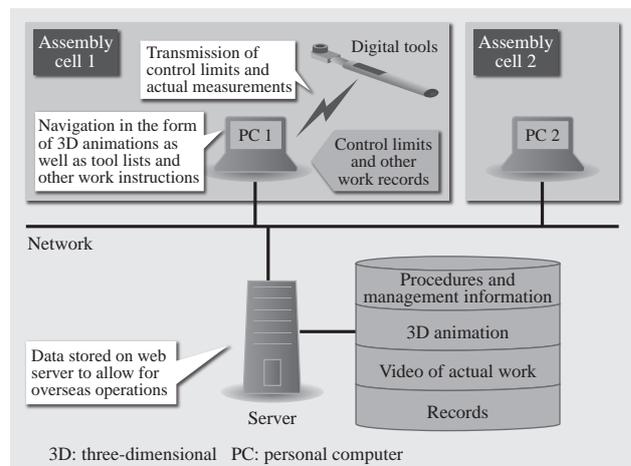


Fig. 6—Structure of Work Management and Navigation System. The system performs realtime work navigation and recording, and uses touch-panel PCs to display information that includes a 3D animation for each action, which tools to use, and control limits.

activities that were based in Japan in the past, such as sales and pre-engineering, as well as on-site work such as installation, commissioning, and maintenance.

Increasing Number of Local Installation and Inspection Supervision Staff

It is already Hitachi's practice at each factory to use local staff who have received factory training and certification to work as installation and inspection engineers. To expand this in the future, Hitachi is planning to establish site work coordination centers located close to overseas markets.

These site work coordination centers are located close to sites, and having them play a central role allows the timely dispatch of people and equipment while also cutting the cost of personnel and transportation. Delicately managed activities that are closely integrated with the customers are likely to expand opportunities for business, such as inspection and maintenance, and increase participation in business at locations that are difficult to visit from Japan (due to religious reasons or nationality-related restrictions on movement, for example).

Globalization of Engineering and Sales

Taking advantage of the fact that knockdown production factories have close ties to their markets leads to benefits that include pre-engineering that

satisfies specific customer needs and sales activities that are closely integrated with customers, while also maintaining an awareness of market trends. Having individual knockdown production factories respond to the variety of requirements and equipment specifications required by different markets and customers allows for a more efficient and fine-tuned response than would be possible if everything was handled from Japan. Hitachi is also moving toward more global engineering for product production design, utilizing overseas engineering facilities such as Hitachi Industrial Machinery Philippines Corp. in the Republic of the Philippines.

CONCLUSIONS

This article has described Hitachi's activities in the power transmission and distribution business as it seeks to become a major player in the global market.

Drawing on the experience that Japan AE Power Systems Corporation acquired over approximately 10 years of overseas operations, Hitachi intends to establish a new global supply chain that takes advantage of its technology and resources. With the aim of becoming a major player in the international power transmission and distribution business, Hitachi is creating a global business model with an eye to future markets and other changes in the business environment.

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