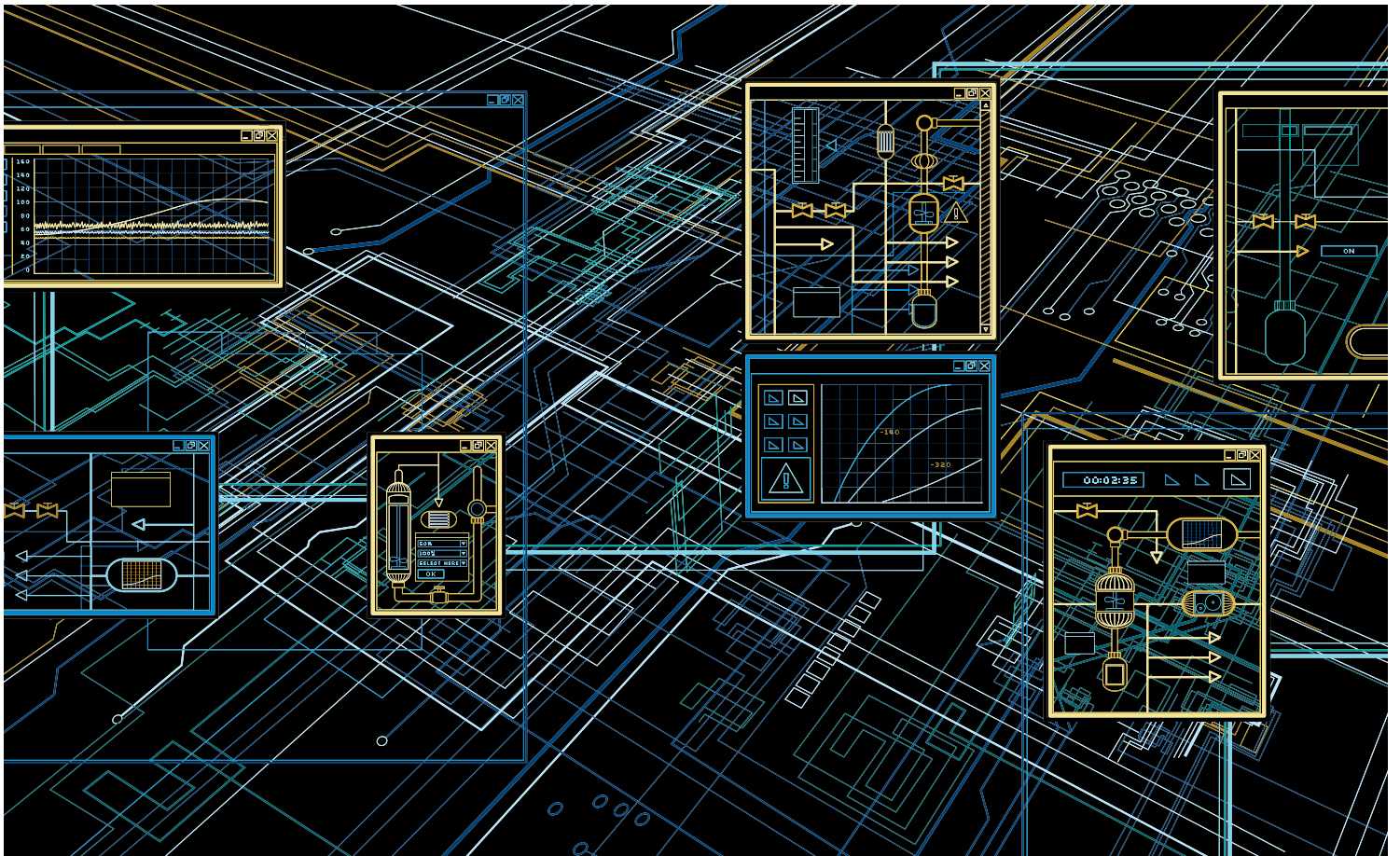


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The customer magazine
of the ABB Group
New Zealand

source



In control

Feature story 08

ABB's automation solution helps Genesis Energy take control

Retrofit for research vessel 04

Upgrade gives NIWA a New Zealand first

Fast charge transfer 12

ABB's Napier team at the forefront of electric vehicle technology

Power and productivity
for a better world™





04 Vessel retrofit
ABB's dynamic positioning system helps NIWA achieve a NZ first

08 Hydro control upgrade
ABB's automation solution helps Genesis Energy future-proof New Zealand's hydro resources

source ^{1|11}



Grant Gillard
Managing Director
ABB New Zealand

It seems that 2011 could be quite an interesting year – starting as it has with an earthquake in Christchurch which was followed by the giant tsunami in Japan. The uncertainty that these events have brought to both the local and global economy underscores the need for ABB to serve our customers more effectively.

In order to do this we have to listen to you, our customers, to understand your needs and to take on board your feedback to improve the value of our offering. One of the key tools we have for this is our Net Promoter Score (NPS) customer satisfaction survey program, which we launched in November last year.

The NPS Survey helped us to see how we are performing from your perspective. In order to improve our business we needed to understand what we are doing well, and where improvements needed to be made. We now know that the three top areas identified for improvement are all related to the timeliness of our interactions. We need better processes in our preparation of quotations; we need faster delivery and greater certainty around our delivery times. We are now addressing these areas internally.

On the other hand, we were pleased to see that our customers highly rated our technical support, our ability to provide technical services, and our willingness to work in partnership with them to achieve their business goals.

Please feel free to let us know, either by contacting me personally or via your sales contact, if we can improve our service to you. We look forward to receiving your continuing feedback in our next NPS survey later this year.

In this edition of Source we feature several projects that we have recently executed in New Zealand. Each of the projects – for Genesis Energy, NIWA and MainPower – has received very positive feedback from our customers; they showcase our capabilities and highlight how partnering with our customers produces positive results for all.

Looking forward to working with you in 2011,
Regards
Grant



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01

ABB successfully completes upgrade to New Zealand's first research and survey vessel with dynamic positioning

Photography NIWA

As part of NIWA's \$20 million upgrade to *RV Tangaroa*, ABB has successfully completed the installation of a dynamic positioning system, making it the first system of its kind in New Zealand, on the country's only deepwater research vessel.

Dynamic positioning (DP) is a computer controlled system that allows the vessel to remain fixed in a specific position at sea, despite wind, waves and currents. It also allows the boat to precisely navigate a straight path. The system installed on *Tangaroa* is a DP2 system which uses electrically powered thrusters and computerised controls to fix the vessel to a specific area, guided by satellite positioning or transponders on the seabed.

DP2 capabilities are essential for ocean science and marine operations undertaken by oil, gas and mineral industries, where new and developing technologies, including ROVs, manned submarines and seafloor observatories, often require vessels to hold a steady position.

For the retrofit project, ABB's New Zealand engineering team and Singapore marine

team worked collaboratively over the vessel's five month stay at Singaporean ST Marine Utas dockyard. ABB supplied the switchboards, power management system (PMS) and integrated automation system (IAS) according to the DP2 classification specifications. ABB New Zealand also supplied ABB ACS800 variable speed drives for the engine room as well as UPS systems and low voltage transformers.

As part of the engineering and commissioning support, ABB engineer Terry Ryan accompanied the vessel on its three-week voyage back from Singapore.

Fred Smits, NIWA's Project Director said, "We selected ABB as a supplier of choice because of their expertise in this area. From a very early start of the project, back in 2007, ABB worked together with NIWA, its marine architects, and the other suppliers of the specialist equipment required for this

most challenging project. ABB designed, built, installed and commissioned the electrical switchgear and electronic control systems.

"NIWA is delighted with the outcome and the support received from ABB. *Tangaroa* is now one of the most advanced and multi-purpose research vessels in the world and ABB has made a significant contribution to this."

01 *RV Tangaroa*, seen here sailing into Wellington Harbour in December 2010 following its refit, is a highly effective floating laboratory and oceanic sampling platform that operates in the waters around New Zealand and Antarctica. She is New Zealand's only ice-strengthened, dynamically positioned multi-purpose research and survey vessel.

Helping MainPower meet energy demands

Pioneering cold applied technology in terminations



The newly upgraded 66 kV Swannanoa line meeting the energy demands of agricultural irrigation in North Canterbury

When MainPower decided to upgrade and future-proof the Swannanoa electricity line in North Canterbury, they wanted a long-lasting, simple cable termination solution. ABB's Kabeldon range of high voltage cable accessories, along with ABB installation training, allowed them to get the job done safely and efficiently.

Electrical installations in New Zealand have to withstand extreme natural conditions. ABB's Kabeldon range is specifically designed to withstand harsh environments. MainPower were open to utilising new technology where possible, aiming for simplified installation and maintenance, while achieving cost-effectiveness. ABB Kabeldon cable terminations proved to be an excellent fit for their 66 kV requirements.

A significant feature of Kabeldon terminations is that they can be assembled on the ground under controlled conditions and then lifted into place. A further advantage is

that the accessories in the range have a modular design, utilising 'cold applied' technology – making them unusually easy to install. They are longer lasting, providing better protection against dust and water, and achieving a gap and pocket-free connection. The products also provide superior electrical field control, creepage current control, and moisture and mechanical protection.

"Because this was our first venture into 66 kV technology, and we were looking for a cold applied product," says Stuart Wilson, Network Planning Manager for MainPower, "we chose ABB for their good reputation and because their product was well supported."

ABB supplied a two-day training course utilising Australian and New Zealand expertise to up-skill the linesmen in the MainPower team. On-site, Grant Hawkins and Kirk MacDonald, jointers for MainPower, were responsible for the installation work. "We had received good training from the ABB team who knew their

stuff and had a wealth of experience," says Grant. "Once we mastered the new techniques we'd been shown, the Kabeldon termination kits were simple to assemble, have less components and are easy to use."

With the positive feedback from their installers, MainPower are planning to use Kabeldon technology again on future projects.

MainPower provides electricity to the North Canterbury and Kaikoura region, supplying line services to approximately 32,000 customers. The Waimakariri District, the rural area serviced by MainPower's Swannanoa line, has increasing energy demands mainly due to the use of agricultural irrigation. To meet future demands, the Swannanoa line has been upgraded to 66 kV capacity, however, some sections are run at 33 kV.



The floating storage and offloading vessel N'KOSSA II

The right frequency

ABB's PCS100 technology, developed in Napier, has recently been installed to improve the performance of the remote global offshore oil and gas industry operations based in the Congo.

Oil and gas operations are mostly situated in merciless locations, from the intense forces of the arctic, to the sweltering heat of deserts and hazardous conditions on the open seas. To sustain and secure operating environments in these remote areas, reliable and stable power is crucial.

ABB's PCS100 technology, developed in Napier, has recently been installed to improve the performance of the remote global offshore oil and gas industry operations based in the Congo. Two PCS100 1650 kVA static frequency converter (SFC) units were commissioned in October 2010, to shift power to and from 60 Hz to 50 Hz frequencies, linking

LPG floating storage and offloading vessel N'KOSSA II with its connecting production platform.

This multi-billion dollar industry is heavily reliant on maintaining continuous and efficient operations of its drilling equipment, pumping systems, and refrigeration functions at the production site. Equipment must be sufficiently robust to withstand extreme conditions; flexible to support multiple services; and be cost effective to lower capital expenditures and operating costs.

ABB's power converter product range represents a quantum leap in high power technology, particularly in relation to its technical performance and economic

operation. The PCS100 SFC is a proven, efficient and effective power system that is specifically designed to interconnect incompatible networks. The PCS100 SFC units installed replaced former technology to give a highly reliable system that is a more flexible, efficient, and cost competitive approach to supplying the frequency and voltage necessary. This particular application has been designed to supply power from the platform to the vessel, avoiding operation of its onboard diesel generators.

Future-proofing New Zealand's hydro resources

When Genesis Energy needed to replace the control system of a hydro electric power network covering five power stations in remote locations around New Zealand's North Island, ABB delivered an advanced 800xA control system including multisystem integration to take this crucial electricity generator into the future.

Genesis Energy owns and operates 1,996 MW of electricity generation. They are New Zealand's largest energy retailer, supplying 19 percent of the nation's electricity. A key part of their overall generation capacity is supplied by their renewable energy group consisting of Tongariro and Waikaremoana hydro electric power schemes. These two schemes consist of a total of five power stations – two in the Tongariro scheme and three in the Waikaremoana scheme – with a total capacity of just over 500 MW.

An aging system

The turbines in Genesis Energy's two hydro schemes are controlled, and monitored, from a central location at the Tokaanu Power Station. The existing control system had been installed in the early 1990s, and had reached the end of its operational life. Replacement of obsolete parts had become increasingly difficult.

The two power schemes had evolved over a number of years, resulting in a number of different technology platforms. A replacement and upgrade of the control system would provide an opportunity for Genesis Energy to rationalise the controls for each of these platforms, and allow for the system to integrate control of new power stations in the future.

Challenging locations and conditions

To add to the challenges that this upgrade presented, the upgrade work and system implementation would have to be carried out over a wide geographical area. The Tongariro and Waikaremoana schemes are situated approximately 330km apart. Within each scheme, the power plants are positioned in isolated and sometimes difficult locations. In the Tongariro scheme, the Tokaanu Power Station, with its four 60 MW turbines, is located on the slopes of Mount Tihia, near Turangi, in the central North Island. The Rangipo Power Station, with two 60 MW turbines,



The central hydro control room at Tokaanu

is situated underground in the Kaimanawa Forest Park. Meanwhile, the Waikaremoana scheme is located between one of New Zealand's most inaccessible areas, Te Urewera National Park, and Wairoa. The three stations in this scheme, the Tuai Power Station (three 20 MW turbines), the Kaitawa Power Station (two 21 MW turbines) and the Piripaua Station (two 22 MW turbines), are located along the Waikaretaheke River.

All the challenges of this project would need to be met, and the work completed, within strict operational windows. It was vital that the project be delivered on-time, with minimal disruption to generation capacity and within resource consent constraints.

ABB solutions

ABB is established as a global supplier of control systems. Through their worldwide network, ABB has an extremely comprehensive product range and knowledge base. Their ability to design and deliver operational systems is unequalled. ABB has a proven track record of creating systems that not only seamlessly integrate ABB products, but also allow for the total tight integration of existing and third-party products. With the diversity of Genesis Energy's existing platforms, ABB was an attractive option for the upgrade work.

ABB are committed to the concept of 'evolution without obsolescence' – meaning that future-proofing is a top

priority in ABB-designed systems. ABB proposed a control system for Genesis Energy's hydro electric plants that would allow for the future addition of extra features such as maintenance management systems, video integration, and remote business access; not to mention the expansion of the overall system for the addition of new power stations.

With their control system expertise, their comprehensive product offering, their local and international experience, support capabilities and competitive pricing, ABB was chosen by Genesis Energy to undertake the hydro electric control system upgrade.



01

Taking on the challenge

In 2008, ABB embarked on the three-year project. ABB were responsible for system design, electrical design, panel build, installation and commissioning.

The system comprised of a complete offering of ABB products: an 800xA control system (extended automation) with AC800M programmable logic controllers (PLC) and S800 input / output modules (I/O), multisystem integration (MSI), and an extended operator workplace control room desk (EOW). Other elements in the system included: Synchrotract 5 synchronisers, MCM800 vibration monitoring, UMC22 smart motor controllers, and variable speed drives. All motor control centres (MCC) were implemented on a Profibus communication network.

Prior to the commencement of the project, Genesis Energy were invited to visit the ABB research centre in Västerås, Sweden, to see ABB's feeder factory and the facilities there. Genesis brought with them a very low bandwidth modem that they were planning to utilise in the control system upgrade. The technicians at the research centre tested the modem with the 800xA system, achieving perfect results. During the visit, the client also

saw the ergonomically-designed EOW control console for the first time, and the advantages of the unit quickly became clear.

Ground-breaking implementation

The Genesis Energy upgrade is the first time an ABB EOW desk has been used in the South Asia region. The project was also one of the first in the world to utilise ABB multisystem integration with low bandwidth connections between remote sites.

The ABB-designed control system provides a number of new benefits. At the Tokaanu control room, information from the entire system is now available from a single interface. This interface displays real-time data from motor controllers, protection relays, vibration monitors and third-party devices such as power meters and governors across the network. The operator can easily retrieve and access secure historical plant data. The system also has integrated automatic generation control (AGC) allowing for automatic control dispatches from Transpower, the operator of New Zealand's national power grid.

Meanwhile, standardisation across all the power stations in the Tongariro and Waikaremoana schemes allows efficient maintenance and inventory management, and a reduction in the training needed for a technician to understand the overall system.

Delivering on the project

The hydro power stations in the Genesis Energy network are located in ecologically sensitive areas, and resource consent compliance was taken seriously by all involved in the upgrade. ABB were able to fulfill the conditions of the consent process.

Throughout the project, ABB were required to meet an aggressive schedule and budget. Work had to be completed within scheduled fixed window outages, and as the project progressed, additional projects were rolled out within the fixed timeframe of each outage. Despite the challenges this imposed, ABB completed all outages successfully within their allocated times.

Vetti Bala, Genesis Energy's project manager for the upgrade, had a hands-on role working alongside ABB. "From the outset, Genesis Energy worked hard to develop and foster a good working relationship with ABB. We were



02

aware the upgrade of our hydro control systems would span a number of years and that the investment would be considerable," says Bala.

"The hydro control systems upgrade provided a huge challenge for the project team from both a technical and geographical point of view. Genesis Energy designed and implemented the complex LAN and WAN infrastructure as the platform for the new control system. The challenges included constraints from resource consenting around water flow and flooding which required close monitoring. We were fortunate to have a dedicated project team from Genesis Energy with the help of the AECOM consultants who worked closely with ABB to ensure that all challenges were worked through in an effective way."

With total management of the system concept, electrical design, implementation, installation and commissioning, ABB carried complete responsibility for the project's success. Multiple subcontractors were coordinated on site, with over 85,000 estimated hours utilised over a two year installation period, without lost time for injury.

"ABB had a great team of dedicated workers and subcontractors, and we all gelled and worked well together," says Vetti Bala. "The project site implementation staff from ABB on the ground had a great attitude working in with Genesis

Energy, solving issues when and where they arose during the installation period. We were also fortunate that both Transfield Services Ltd (who was the installation subcontractor for the control system) and Electrix (who installed and commissioned the generator electrical protection scheme) worked in harmony with ABB to ensure the project deliverables were met on schedule. It is a true testimony to the entire project team that the amount of hours clocked up during the installation and commissioning phase had no health and safety related incidents."

Into the future

The new control system is already proving its worth and the careful future-proofing and ease of expansion that ABB designed into the new technology, is being put to good use. Electricity generator, Meridian Energy, are transferring their Tekapo A and Tekapo B South Island power stations to Genesis Energy's control. A project is now underway to integrate control and monitoring of these stations into the Tokaanu control room some 1000kms away – proving that ABB's system is not only equipped to handle multisystem integration between two schemes within an island, but between islands as well. Equipped with new ABB technology, Genesis Energy's hydro electric system is now ready to face the future.



03



04

01 ABB inspecting the control system situated in Tokaanu's generator hall

02 ABB's range of equipment in the control panel at Rangipo

03 The monitoring control room at Rangipo station can be controlled remotely at Tokaanu

04 ABB's system helps control the valves at Rangipo

Fast charge transfer in a matter of minutes



ABB's technology designed in Napier and showcased in Hong Kong

Renewable energy popularity and the upward demand for electric vehicles continue to develop, encouraging many sizeable car makers to expand into this new market. At the forefront of this era in technology is ultra-fast charging capabilities.

The World Electric Vehicle (EV) Symposium and Exposition series is the premier event for academic, government and industry professionals contributing to electric drive innovations. As part of this exhibition, which was held in late 2010, ABB's power electronics research and development team based in Napier installed a DC fast charger unit within the Hong Kong Science and Technology park based at the symposium.

This high tech system was developed for showcasing at the electrical vehicle rally staged at the event. This new fast charge technology looks to significantly close the existing gap in the 'fuel stop' equivalent for EVs (from 25 min to 10 min). The quick charging application is designed around ABB's PCS100 power conversion platform and has the ability to charge cars rated from 50 volts right up to 550 volts at 125 amps.

The PCS100 DC fast charger technology has recently gained CHAdeMO certification, which greatly extends the range of electrical vehicles it can be used by. Automotive industry giants such as Mitsubishi and Nissan have electric vehicle lines currently under development and both will utilise the CHAdeMO standard interface. ABB's developing system is well on target to meet market place prerequisite and full charge to 80 percent capacity in 10 minutes.

Industry watch

The future market for electric vehicle energy storage devices is expected to grow from US\$7.7 billion in 2010 to \$14.5 billion in 2015. Predicted big growth areas within the market for batteries, fuel cells, and ultra-capacitors is envisaged to come from the rise in future smart grids and not so much from increases in electric vehicles.

Emerging technologies are set to fuel a US\$44 billion opportunity for transport and the grid. The overall market will grow from \$21.4 billion in 2010 to a likely \$44.4 billion by 2015.

Smart grid storage will make up the largest portion of the energy storage market seeing growth from US\$5.4 billion in 2010 to \$15.8 billion in 2015.

There will be a prominent increase of growth in plug-in and electric vehicle battery industries. Batteries made for electric bikes and scooters will grow from a USD\$6.4 billion market in 2010 to \$10.9 billion in 2015, as vehicles increase in popularity.

It is predicted that lithium ion batteries used for utility energy storage will be a US\$1 billion industry by 2018.

US\$620 million in stimulus funds along with \$1 billion in private industry funds for 32 US smart-grid programs will be allocated. Another \$770 million from various other sources will be allocated to energy storage projects.

ABB supports power quality focus



ABB's John Penny addressing the audience

ABB was proud to support the 20th Australasian Universities Power Engineering Conference (AUPEC 2010) "Power Quality of the 21st Century" which was held in Christchurch from 5-8 December 2010. In addition to being a bronze sponsor of the event, John Penny, ABB's General Manager for the Power Electronics portfolio and leading power quality industry expert, was honoured to provide the keynote speech on day two of the event.

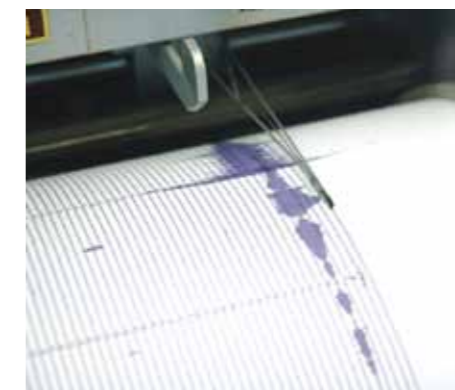
The conference was organised through the Australasian Committee for Power Engineering (ACPE) by the Electric Power Engineering Centre (EPECentre) at the University of Canterbury.

Earthquake dollar-for-dollar appeal

ABB's employees in New Zealand rallied to raise an outstanding NZ\$13,085 for the Salvation Army Christchurch earthquake appeal, which ABB matched dollar-for-dollar to help those living with the hardships and psychological effects of the quake and aftershocks.

"I feel very proud to work with such caring colleagues here at ABB", said Grant Gillard, Country Manager.

"ABB will continue to support both our employees and their families, as well as areas of our business where we can assist in the rebuild and recovery of Christchurch."



International ABB news

Large orders won in February and March 2011 (US\$)

ABB has been selected by Power Grid Corporation of India Ltd. (PGCIL) to deliver an ultrahigh-voltage transmission system, worth about \$900 million. The link will supply hydropower from northeastern India to the city of Agra over a distance of 1,728 kilometres.

ABB has won orders worth about \$19 million from Suzlon, the world's third-largest manufacturer of wind turbines for substation solutions to serve wind farms installed in the states of Ceará and Rio Grande do Norte, Brazil.

ABB has won a \$50 million order from Phenix Renewables to deliver a 24 megawatt (MW) photovoltaic (PV) solar power plant in Lazio, central Italy.

ABB has won an order worth around \$30 million from the Qatar General Electricity and Water Corporation (Kahramaa), the electricity and water operator in Qatar, to build two underground substations to help meet increasing residential and commercial demand for power in the capital city of Doha.

ABB has won an order worth \$63 million from China Southern Power Grid Co. Ltd to design, supply, install and commission 800 kilovolt (kV) ultrahigh-voltage direct current (UHVDC) transformers for a converter station that will form part of the Nuozhadu-Guangdong transmission system.

New products

Read about the latest products in the market

Medium voltage products

Relion relay series

Relion protection and control from ABB

From generation and interconnected transmission grids to secondary distribution kiosks, the Relion product family offers the widest range of products for the protection, control, measurement and supervision of power systems.

To ensure interoperable and future-proof solutions, Relion products have been designed to implement the core values of the IEC 61850 standard. You can benefit from ABB's technology, global application knowledge and experienced support network.

The IEC 61850 complaint protection and control IED manager PCM600 tool provides versatile functionalities for the entire life-cycle of all Relion protection and control IED applications, at all voltage levels.

Further info: www.abb.co.nz



Advantages

- Enhanced power system reliability
- Reducing substation wiring costs
- Fast substation busbar protection
- Extended substation life cycle

Measurement products

AquaMaster 3 – electromagnetic flowmeter

The smart new solution for remote applications

Measuring potable water has been one of the biggest challenges for the water industry. A combination of measurement inaccuracies, especially in low flow scenarios, costly chamber construction, flow interruptions, suspect product reliability, expensive installation, commissioning and maintenance, all further compounded by poor leak prevention.

The new AquaMaster 3 provides high levels of performance, accuracy, leak detection and reliability while saving every drop of energy and cost, naturally.

Using the sun and wind, this next generation instrument takes the earth's most natural resources to provide unique power management options for an energy conscious world – at the same time protecting your water and revenue streams.

Further info: www.abb.co.nz/instrumentation



Advantages

- Confidence – in the reliability and accuracy of the instrumentation
- Durability – new improved plastic coated metal housing and connectors
- Eco – renewable energy
- Efficient – almost self-sufficient through long lasting batteries, renewable energy
- Remote capabilities – saving time, money, water, energy

Low voltage products

PSE softstarters

An efficient softstarter that is easy to use



Advantages

- A built-in bypass for energy savings
- No unwanted complexity
- Torque control
- Language neutral backlit display
- Easy-to-use four button keypad
- Very compact
- Easy to mount

The PSE softstarter is the world's first compact softstarter with torque control and display. Developed in close co-operation with our customers to ensure it meets all their needs, it provides excellent value for money.

Ideal for applications where space is limited but where advanced functionality is still required, the PSE softstarter has been designed for most common applications such as pumps, fans, compressors, conveyor belts etc.

Designed to ensure exceptional reliability, the PSE softstarter is equipped with features to ensure that the whole operation is kept reliable. For example, torque control eliminates water hammering and thereby greatly reduces the mechanical stress on pump systems and provides a more reliable operation with less downtime.

Thanks to the built-in bypass, the PSE softstarter is a very compact unit which is easy to mount. There is no need to install an external bypass contactor which means the installation time is greatly reduced.

Further info: lvproducts@nz.abb.com

Drives

ACS355 machinery drive – SIL3 certified

Setting new benchmarks in speed, simplicity and safety

Released in late 2010, the ACS355 general machinery drive is already establishing new industry benchmarks in speed, ease of installation, operational safety with SIL3 certification as standard and value for money.

Highly compact and cost effective and with the highest power density in its class at 2.8 kW/dm³, the ACS355 drive is equipped with high levels of intelligence, functionality and safety to meet the needs of high-volume machine building and manufacturing.

The drive is available in one of the broadest power ranges in the machinery drives class – from 0.37 to 22 kW – covering all the typical needs of machine builders with a single family of machinery drive.

Further info: www.abb.co.nz/drives



Advantages

- Safe Torque-Off function (SIL3) as standard – reduces the need for external safety components
- Exceptionally compact and uniform design
- Broad power range from 0.37 to 22 kW
- Highest power density in its class at 2.8 kW/dm³
- Quick commissioning with application macros and panel assistants
- Inbuilt sequence programming capability



System 800xA Extended Automation The Power of Integration

Integrated Process and Power Automation. ABB reduces capital expenditure and lifecycle costs by bringing process control, process electrification, substation automation and power management together on a common System 800xA platform, eliminating the need for multiple systems for your plant. Also, in one powerful, integrated, plantwide system, operations and maintenance are unified, reducing downtime and increasing productivity. For more information visit www.abb.com/controlsystems