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FWWD

Spring 2006

FAST FORWARD WITH **ABB POWER SYSTEMS & PRODUCTS**



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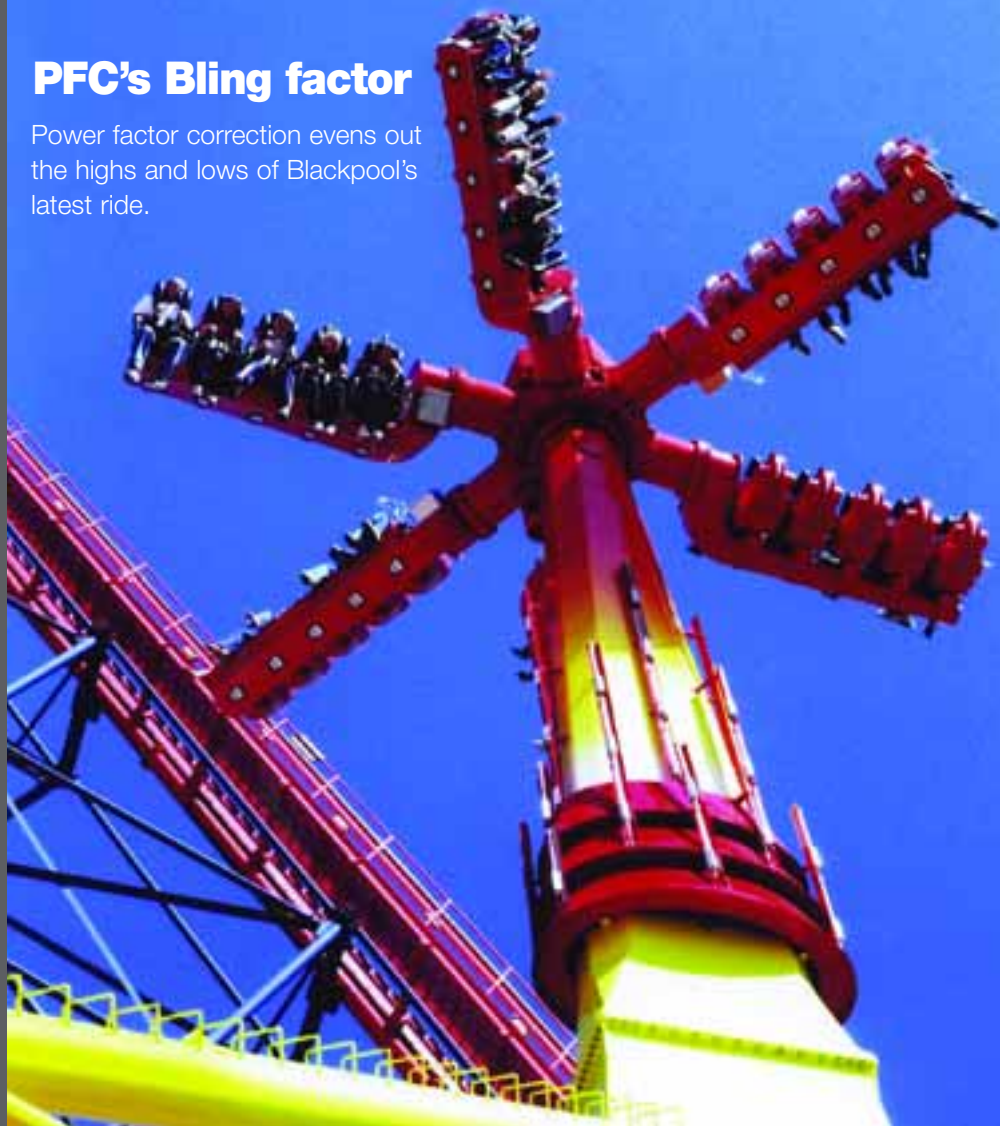
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Published by:
ABB Limited
Power Systems
Oulton Road,
Stone, Staffordshire
ST15 0RS

Editor:
Karen Strong
Telephone:
01785 825050

www.abb.com/uk

Searching for tomorrow's engineers



Trevor Gregory
ABB UK Managing Director

- > The DTI's latest Energy Review consultation document highlights some major questions that have to be answered to guide government decisions on energy policy. Over the coming decades, large investments will be needed to replace or refurbish substantial parts of the UK's transmission and distribution networks. These upgraded networks will be rather different from those they replace. Not only will they need to be smarter, more flexible and more efficient, they will also have to accommodate a much broader mix of generation, including wind power and other renewables, as well as distributed generation such as CHP. Demand-side technology will also have a greater impact, providing changes in the way we consume energy and delivering greater efficiency to meet low-carbon requirements.
- > Work on key enabling technologies for the new smart networks, such as ABB's HVDC Light systems, is well advanced. That, though, is only half the answer. No matter how good the technology, new skilled and experienced staff will be needed to complement the existing highly skilled engineers and managers to implement, deploy and maintain it. So the UK power industry will soon need the services of many skilled engineers, technicians and craftsmen both to replace those who are retiring, and also to reverse the decline in new entrants to the industry.
- > These problems have been masked in recent years, as the large-scale restructuring in the sector had created a surplus of trained engineers to fill any vacancies. Now though, this trend is beginning to decline, with many companies having reached their optimum balance and starting to increase staffing levels in anticipation of future growth.
- > ABB takes this incipient skill shortage very seriously indeed. That's why we have joined forces with the IEE Power Academy to help attract more youngsters into this new era of exciting opportunities. The Power Academy – which includes all the major TNOs, DNOs, manufacturers, consultants and universities – offers an attractive mix of financial incentives, technical training and business education for entrants to power engineering courses. It also promotes the opportunities for an exciting and rewarding career in the industry through seminars, lectures and work experience.
- > The Power Academy is an excellent example of coordinated action between industry, academia and the professional institutions, and I am confident that it will achieve its objective of creating a critical mass of electrical engineering graduates. But there is still a great deal of work to be done, especially within schools. The challenge for all of us is to capture the hearts and minds of young people well before they make their choices of GCSE and A-level subjects, so that they know that engineering is a great career choice.



Terry Smith, ABB's quality, health & safety and environmental manager, updates on two new initiatives designed to take site safety to the next level

Driving forward on Health & Safety

>> In recent years, ABB has adopted a very positive Health & Safety culture. We have placed it at the heart of our business: it is never an extra consideration or afterthought.

This approach is really paying off, with reports of site incidents and near-misses in 2005 showing clear improvement. ABB's overall safety performance, (Reportable Injuries Diseases and Dangerous Occurrences - RIDDOR) at a (RIDDOR/hours worked x 100,000) frequency rate of 0.58 is well below the industry standard of 1.9. However, we always aim for constant improvement.

That is why we are introducing two important new initiatives. The first embraces National Grid's 'Golden Rules' and rolls them out across all our customer sites, and the second is an increased emphasis on Personal Protective Equipment (PPE).

We launched the new initiatives at our annual site Health & Safety review in January – a three-day forum in which all our site managers from every UK site (15 in total) got together with representatives from our preferred contractors to discuss what is happening in the world of safety. As well as reviewing past performance and reflecting on lessons learned, attendees received refresher training and updates on new H&S regulations.

THE ROAD TO ZERO

National Grid has its own 'Road to Zero' programme, which aims to achieve zero injuries, zero work-related ill health, and zero



environmental incidents. As part of this programme it has developed eight 'Golden Rules'. These rules have been put in place to help everyone think about the safety implications of the work they do, and to give clear guidance on the safety behaviour expected of everyone to make the workplace safer. We fully endorse this approach, and we are adopting the Golden Rules throughout ABB and ensuring that they are implemented for all customers, at every operational site.

A NEW LOOK AT PPE

For ABB's new PPE initiative we have adopted an even more rigorous approach, derived from our experience of the good practice we have seen in our rail industry projects. The impetus arose from a statistical analysis of site Health & Safety issues made possible by the detailed reporting procedures we have implemented, which cover any incident, no matter how small, as

well as near-misses. The analysis showed that, while the existing PPE equipment was doing a good job in preventing serious injuries, there were still many preventable minor injuries, especially to eyes and hands. To combat this, we have now made the wearing of suitable eye protection and gloves mandatory at all times while working on site.

We also took another look at foot protection and decided that, in view of the number of ankle injuries, a greater level of support was required. So safety shoes are no longer sufficient. Everyone on site must wear lace-up safety boots.

Safety helmets are long established as the most visible example of PPE. But now we are insisting on the use of a chin strap to ensure they stay in place. This is of course already a requirement when working at height, however we believe that the chin-strap offers enhanced safety in many other situations.



The new PPE is not just for those working on site day-to-day, it is essential for project managers, contract managers and anybody who comes on site. Thanks to an early roll-out, all our sites were compliant well before the April 2006 deadline for implementation.

The National Grid Golden Rules cover:

- Permits and authorisation
- Safety systems and protection devices
- Working at height
- Ground disturbance
- Reporting faulty workmanship
- PPE
- Safe driving
- Alcohol and drugs.

Harmony comes to Connah's Quay

ABB has been selected by E.ON UK to design, manufacture, supply and commission the replacement steam turbine supervisory system for its 1,420MW Connah's Quay power station at Deeside, north Wales. The new system will be based on ABB's advanced Harmony platform for process control and automation.

Connah's Quay is a CCGT (combined cycle gas turbine) power station that uses natural gas piped ashore from Liverpool Bay. E.ON UK had become concerned that, after 10 years of operation, the steam turbine supervisory systems were out-dated as well as becoming increasingly difficult to maintain.

The key factor in ABB's success in winning the contract was its capability to provide a complete service from design to delivery. This includes manufacture and installation of all panels, wiring and equipment, and commissioning of the system from field devices through to the DCS (distributed control system).

The control systems for two of the four modules will be replaced in 2006, and the remaining two will be replaced in 2007.



View of Connah's Quay power station.

New current flows under the Thames

ABB has completed an £11 million project to install two 400kV cable circuits running through National Grid's new Dartford Cable Tunnel under the River Thames. The project combines a major reinforcement to the power system with the replacement of older, obsolete, cables to meet the increasing demand for electricity in London.

The two-year cable replacement programme at Dartford involved the removal of existing 275kV oil-filled cables that ran beneath the road deck of the west Dartford Road Tunnel (DRT), and the construction of a dedicated cable tunnel beneath the Thames, running 2.4km from Littlebrook in Kent to Thurrock in Essex.

ABB's role in the project has been to work with Sudkabel, the cable manufacturer, to supply, install, commission and test two 400kV cable circuits in the tunnel. These use high-technology cross-linked polyethylene (XLPE) insulation technology, that requires less maintenance than conventional oil- and gas-filled cables. Each circuit

requires three cables, one for each phase of the three-phase electricity supply, so six 150mm diameter cables have been installed. ABB has also supplied the cable sealing ends and surge arresters.



Powerful new connections for Grove Park

ABB has completed two power connection contracts on the rapidly expanding Grove Park Business Park at Enderby, Leicester. The work, which included the supply of high- and low-voltage substations, was completed in just three months.

ABB's ability to meet the deadline was a key factor in winning the contract. Grove Park was keen to get the project completed quickly, as there were two companies waiting to occupy units on the business park. ABB was able to respond quickly to the request to tender, obtain the substation equipment and install it in the required timescale.

The 1.25 million square foot park has been under development by Grove Park Commercial Centre Ltd, part of the Penman Group, since 1996.

ABB installed a low-voltage substation with air circuit breaker and ring main unit in new premises for Espo, and a high-voltage substation for Centrica. Both sites were connected to the network, with about 700 metres of 11kv cable laid to connect both substations.

Spot on for Domino's Pizza

ABB has completed a £150,000 contract to increase the power supply needed to cope with growing consumer demand at the headquarters of Domino's Pizza in Milton Keynes. The fast-track contract had to be undertaken without disruption to the company's round-the-clock working which supports its network of retail franchisees offering home-delivered pizza.

Domino's realised the need for more power when it increased its refrigeration capacity in response to expanding business and in anticipation of future growth. At this point the company discovered that it had outgrown its existing 600kVA power supply.

The work to expand the power supply was put out to tender and the contract was awarded to ABB on the grounds of competitive pricing and recommendation.

Within the contract, ABB increased the available supply to 800kVA. It supplied and installed a new 1,000kVA substation, low-voltage distribution panel, a 1,000kVA generator and an automatic change-over switch for the generator.

ABB also liaised with East Midlands Electricity on the final connection to the network and associated works. There was no disruption to the



existing supply and the switch over from the old to the new supply took place without incident.

The work was carried out in less than 10 weeks from the time the project was approved.

According to Brendan Walsh of Domino's, "We have been very satisfied with ABB's work. Any special requests were always dealt with and the team acted in a professional and timely manner all the way through the project. I would not hesitate to recommend the company."

Delivering wind power to the grid



Airtricity's new 72MW wind farm at Braes of Doune in Stirlingshire, due for completion in the Autumn is being constructed by Alfred McAlpine. The on-site substation being supplied by ABB will connect the 33kV output from the turbine transformers to an 11km underground link for transmission to the existing grid supply point (GSP) at Braco substation.

The wind farm will consist of 36 V80 turbines which are currently being constructed by Vestas in Campbeltown, Scotland.

Within the substation, ABB will supply Alfred McAlpine with 12 panels of ZX1.2 metal-clad GIS (gas insulated switchgear) rated at up to 36kV, together with two auxiliary substation transformers in outdoor galvanised steel enclosures. ABB will also provide installation, test and commissioning services.

Alan Baker, chief executive of Airtricity in Scotland, said: "We anticipate that construction of our Braes of Doune wind farm will be complete in autumn of this year. The entire output from the development has been purchased by Centrica and when operational it will generate enough energy to power around 46,000 homes."

No hiding place

'White' lighting installed in the City of Lincoln by ABB is helping to make the streets safer for road users and residents. A major benefit is that there are fewer unlit areas to encourage crime and anti-social behaviour. At the same time, energy-efficiency has been improved and light pollution reduced.

INTERNATIONAL NEWS

SCANDINAVIA

Hands across the Baltic

A contract to upgrade the control system of the 30-year old Skagerrak 1&2 high-voltage direct current (HVDC) link between Denmark and Norway has been won by ABB. The new ABB MACH 2 system was selected by Energinet.dk of Denmark and Statnett of Norway. The MACH 2 system is the world's most used control system for HVDC and FACTS, with over 400 systems in operation.

BRAZIL

FACTS gives 500kV transmission link a boost

ABB has won a contract worth more than US\$15 million to install Flexible Alternating Current Transmission Systems (FACTS) in Brazil to increase the capacity of the Colinas-Sobradinho 500kV transmission system in the north-east of the country. Awarded by ABENGOA, the Spanish contractor the contract covers three series compensation banks. The contract is scheduled for completion by the end of May 2006.

USA/MEXICO

Borderline potential

A new HVDC intertie between the USA and Mexico is to be designed and built by ABB. The installation will be a back-to-back system capable of delivering 150MW of power in either direction. The system will connect Sharyland Utilities in Texas with Mexico's CFE, enabling both transmission grids to share reserves and ultimately facilitate cross-border trading.

QATAR

Three turnkey substations

An order worth US\$22 million has been won by ABB from the Qatar state-run utility, Kahramaa. The order is to supply equipment and commission three turnkey substations along a new 132km transmission line being built from Ras Laffan to Dukhan. Power Transmission Limited of India is building the power line.

WORLDWIDE

Customer value award

Frost & Sullivan, the consulting company, has awarded its 2005 Customer Value Enhancement Award to ABB. The award is given for delivering outstanding value to customers worldwide. According to Frost & Sullivan, "Under its 'Industrial IT for Power Generation' solution portfolio, ABB has demonstrated the ability to translate its extensive processes knowledge and expertise into products, solutions, and service support that have helped its customers improve their overall performance." The Customer Value Enhancement Award is presented every year to the company that has best demonstrated the ability to expand its customer base while maintaining quality of service to existing customers.



Duncan Botting, head of technology and business development for ABB in the UK, outlines how the company's broad portfolio of technologies can help meet some of the key challenges posed by the UK Government's Energy Review consultation document.

Facing up to our energy challenge

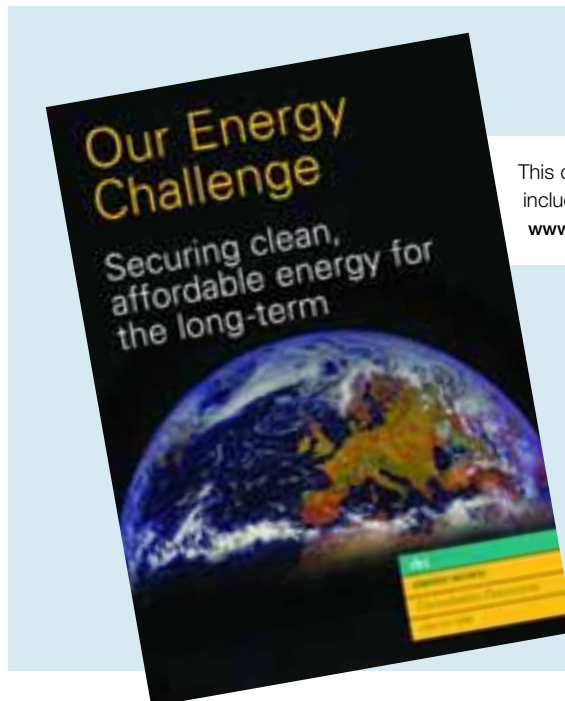
>> The Department of Trade and Industry (DTI) has published its latest Energy Review consultation document entitled 'Our Energy Challenge – securing clean, affordable energy for the long-term'. An important element of the review is to evaluate how far electricity and gas grids might contribute to, or act as a constraint on, the UK meeting its broader energy goals.

This review identified that delivery networks had not been given sufficient consideration in the previous Energy Review in 2003, and has highlighted a number of important elements for deeper consultation, including:

- investing in the necessary replacement of the ageing network infrastructure
- upgrading and extending capacity for new gas import facilities and accommodating a wave of new and varied generating capacity
- How transmission and distribution grids may enable new technology to be adopted to provide flexible, reliable and economically efficient optimization of network design and operation.

Drawing on our close connections with major utility customers, leading research institutions and government, ABB is well placed to respond to the review with a broad outline of how innovative technologies and processes could meet the challenges ahead. ABB has developed a substantial portfolio of key enabling technologies that are available now to help the gas and power industries to respond to these challenges. For example, the performance and reliability of transmission grids can be enhanced by proven technologies to increase capacity, with significantly lower environmental impact compared with conventional methods of upgrading the grid. Such technologies include:

- **HVDC transmission:** high-voltage direct current power systems allow electricity to flow across regions, delivering it from the point of generation to the point of need without adding to the burden of existing AC (alternating current) grids, or increasing congestion.
- **HVDC Light:** this unique ABB technology offers a number of technical features for broader applications than conventional HVDC, including enhanced voltage control and black start capability. It can help utilities restart their systems more quickly following a total black-out. It is cost-effective at lower power ratings than traditional HVDC systems, while the capability to use underground or underwater transmission cables adds further flexibility and environmental benefits.
- **FACTS devices:** Flexible AC Transmission devices, such as Static VAR Compensators and Series Capacitors, enable more power to flow through existing power lines while improving voltage stability. They make the system more resilient to 'system swings' and disturbances.
- **Gas-insulated substations (GIS):** gas-insulated substations can enhance the capacity and reliability of an urban network in around one fifth of the space required for a conventional air insulated (AIS) substation. They can be placed indoors or even underground.
- **Life extension:** modern materials and design analysis, together with preventive maintenance programmes, allow ABB to upgrade the capacity of existing equipment economically, improving its reliability and increasing its useful life.



This document together with other materials including a video can be found on-line at www.dti.gov.uk/energy/review



ABB is developing overview technologies for transmission and distribution networks.

POWER GENERATION

In addition to supplying inverter technology for around 60 per cent of the world's wind power units, ABB is leading the way in grid connection technology for renewable and distributed generation schemes to provide the essential stability and reliability to meet grid code conditions. For conventional power generation, ABB offers a broad portfolio of instrumentation, protection and advanced control and monitoring platforms such as the highly acclaimed 800xA Distributed Control System that is providing increased levels of integration of information to deliver improved efficiency.

SMARTGRIDS

Both transmission and distribution networks will need to adapt to the new challenges future generation and demand profiles. ABB has developed technologies that can provide detailed insights into grid performance, increase grid capacity and mitigate or prevent widespread power outages.

In order to gain greater visibility of transmission networks, WAMS (wide area monitoring and

control) provides an 'overview technology' and, coupled with SCADA systems, can oversee the complete grid operation. ABB is also building intelligence into local installations, such as major substations and remote transformers. These devices can monitor themselves, while global systems take care of the whole.

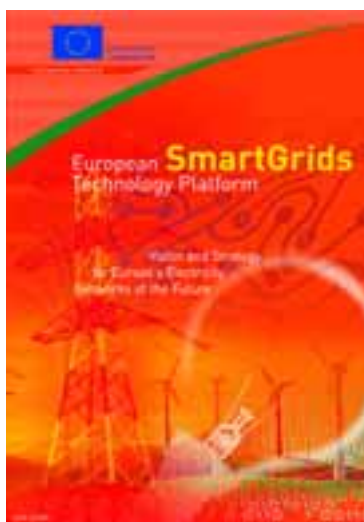


ABB is providing an important contribution to support various distribution network research, design and development projects under the regulator's Innovation Funding Initiative (IFI) and Registered Power Zone (RPZ) activities. ABB is keen to work with collaborative partners to find innovative resolutions to some of the major challenges ahead.

ABB is also contributing to the European technology platform SmartGrids - Electricity Networks of the Future, which presents a vision for the development of secure and sustainable electricity networks for Europe. The aim is to make the best possible use of both large centralised generators and smaller distributed power sources to provide consumers with a highly reliable cost-effective power supply. ABB is also involved in a similar initiative in the US – the Electric Power Research Institute's 'IntelliGrid' consortium.

More information on SmartGrids can be found at www.europa.eu.int

A National Grid outdoor substation serving Manchester will soon be replaced by a new indoor substation using ABB's state-of-the-art gas insulated switchgear (GIS).

Site work starts at Stalybridge

ABB's civil engineering team has started work on a £44 million turn-key contract for the complete replacement of Stalybridge 275kV substation – one of the main National Grid substations serving Manchester city centre. The old air-insulated switchgear (AIS) is to be replaced by a new indoor substation based on ABB's compact, state-of-the-art, gas insulated switchgear (GIS). The project is the first major ABB activity to be carried out as a Joint Activity Solution (JAS) between National Grid and ABB. Under this new collaborative way of working, a core National Grid/ABB team was established at the early project stages to carry out a detailed analysis of the available substation replacement options and to define the optimum solution.

The Stalybridge 11-bay outdoor 275kV substation was originally constructed between 1957 and 1961. It is now in need of substantial refurbishment as the existing circuit breakers are almost life-expired, while the concrete infrastructure is also reaching the end of its useful life. Since the circuits served by the substation are of vital importance to Manchester's city centre, they are difficult to take out of service. So the new substation has to be constructed off-line.

INDOOR GIS SOLUTION

The JAS team selected the compact indoor GIS solution, rather than AIS, because there is insufficient space on site to accommodate an off-line AIS substation. Furthermore, an in-situ replacement would require piling works to take place adjacent to live equipment and structures that are already known to be in poor condition. The off-line GIS solution

has the added benefits of reducing National Grid's resource requirement and facilitating a more flexible outage programme.

In addition to the complete replacement of the 275kV AIS substation, the project also includes rationalisation of overhead line entries to the substation and system reinforcements, and extension of the adjacent 400kV AIS substation.

NICAP

Stalybridge is the first new-build substation in which ABB is implementing bay solutions for the substation protection and automation systems based on National Grid's standardised NICAP

(National scheme for Integrated Control and Protection) philosophy. This approach, using pre-engineered, pre-tested and pre-approved equipment enables the same functionality to be condensed into a much smaller footprint, reduces the amount of on-site work and achieves

major reductions in the delivery time for this element.

The 275kV substation replacement is programmed to be commissioned and fully operational by November 2008 with all remaining ancillary work to be completed by February 2009.

Two London contracts

ABB has also won two contracts from National Grid in the London area. The two London contracts cover the extension of two recently-completed high-voltage gas insulated switchgear (GIS) substations serving the capital. The projects, which will run through to 2008, cover the supply of an additional 240MVA 400/132kV supergrid transformer and five GIS switch bays at one site and a new 400/66kV supergrid transformer at another; in both locations ABB is providing additional cabling and equipment.



The site team prepares to start work at Stalybridge.

ABB's HVDC Light technology is at the heart of the new Estlink project that will connect the grids of Estonia with those of the Nordic countries, through Finland.

More power to the Baltic

Estlink, the first interconnection between the Baltic states and the Nordic countries, is an important step towards greater energy efficiency in Europe. Linking these two key grids will improve grid reliability and help to avoid future black-outs, as well as contribute to industrial competitiveness and improve supply to consumers.

Work is advancing on the project and is being undertaken by ABB who won the contract to design, build and install the complete power link. ABB's HVDC Light (high voltage direct current) technology will ensure security of supply, minimal power loss and low environmental damage. The 100km line will be oil-free and has no magnetic field.

The contract was awarded in 2004 and is due for completion later this year, within the specified 20-month time-frame.

The power link is jointly owned by Finnish and Baltic power companies and supported by the European Commission.

ABB is constructing the cable link beneath the Gulf of Finland with converter stations at each end. Two-thirds of the link is under water.

An estimated 2TWh of electricity will be transmitted through the cable, which is rated at 350MW with a low ambient overload capacity of 365MW. The two HVDC converter stations will be capable of generating or consuming up to 125MVAR of reactive power independently of each other and independently of the active power transfer.

The Estlink project is the first connection involving one of the new member states of the newly expanded EU.

ABB won the contract in competitive tender. According to Marko Allikson, a member of the Eesti Energy (Estonian Energy) management board, the competition was tough and the selection process was thorough and time-consuming. He says, "Both qualified suppliers were technically very strong. The decisive factor in evaluation was a better price." Prior experience in analogous projects was an important requirement of the tenderers.

ABB has installed more than half of the HVDC systems in the world, transmitting 44,000MW of power in more than 50 projects.

Estlink is one of a number of existing and planned projects connecting mainland Europe and the Baltic countries with Scandinavia and the Nordic region.

On land, a 93mm diameter extruded polymer insulated cable with a 2,000mm² aluminium conductor is being installed.

The submarine cable is made from 96mm diameter extruded polymer-insulated material with steel armouring with 1,000mm² copper conductor.

According to Samir Brikho, head of ABB Power Systems business, "The selection of ABB underscores the significant role that our technology can play in creating vital links between power grids in an expanded Europe. HVDC will help integrate electrical systems in the Baltic region and stabilise grids on both sides of the interconnection."



Cable laying spider



Power quality is a critical factor for industry today. It affects the performance, reliability and economy of plant and equipment. With a growing demand for more powerful, connected and user-friendly electrical devices, power factor correction is an important area that can deliver a substantial improvement in power quality.

An essential factor in power performance

>> ABB has extended its PQF (Power Quality Filter) series of microprocessor-controlled active filters with the launch of the PQFS compact wall-mounting unit designed to solve harmonic and neutral current-related problems in commercial buildings and small industrial applications.

The PQFS has the versatility to work equally well with three-phase, three-wire or three-phase, four-wire systems. It is ideally suited to small and medium loads where the equipment is connected between line and neutral, or line and line, or a mix of these types.

The unique feature of load balancing between line and neutral enables the PQFS to reduce even the fundamental frequency current in the neutral, normally present due to unbalanced loading between phases, as well as filtering the harmonic currents from the line and neutral conductors.

STANDARD PQF FEATURES

The PQFS offers all the standard features of the PQF range in a compact unit; including individual targeting of harmonics combined with curve setting functionality and closed loop control. This allows achievement of standards such as G5/4 and IEEE 519, with optimal filter rating. Reactive power compensation enables the load power factor to be increased to the desired level, while balancing loads between phases helps in reducing the negative sequence current.

In common with the existing filters in the PQF range (PQFI, PQFM, PQFK) the PQFS is modular in design. On-site extensions can be made easily by adding slave units in parallel with the master unit. The PQFS is suitable for direct connection up to 415V and is available in three power ranges: 60, 45 and 30 ARMS per unit.

ABB PQF ACTIVE FILTER CONCEPT

The increasing use of non-linear loads in all types of industrial and commercial applications has resulted in the introduction of potentially



The PQF range

harmful harmonics into the power network that can lead to overheating of cables, motors and transformers, damage to sensitive equipment, tripping of circuit breakers and blowing of fuses as well as premature ageing of the installation. ABB PQF active filters provide a reliable and cost-effective solution to this problem by continuously

monitoring the current in real time to determine what harmonics are present and then injecting harmonic currents in the network with exactly the opposite phase to the components that are to be filtered. The two harmonics effectively cancel each other out so that the feeding transformer sees a clean sine wave.

Cost and energy savings for the big 'Bling'

Pleasure Beach, Blackpool's spectacular new ride takes its name from the world of pop culture, 'Bling'. The white-knuckle experience takes people for a 60mph spin in three different directions at up to 100ft above the ground. It demands considerable amounts of power and the owners of the park looked to ABB to help them deliver the electricity required without having to undertake a total upgrade to the power network supplying the Pleasure Beach.

The Bling ride places a big demand on the three-phase power network that serves one of the world's greatest entertainment parks. The ride was expected to draw around 1,400A per phase. With the installation of ABB's power factor correction equipment, the supply current needed was reduced to 1,200A per phase which, in turn, has meant that the power needed to operate the ride was cut by approximately 25 per cent.


The power factor correction installation consists of one bank of capacitors totalling 300kVAR.

With total energy savings running at up to £2,000 per month during the peak season, the ABB equipment is expected to pay for itself in less than three years.



Richard Ledgard explains how ABB has restructured its MV business to respond to the changing nature of the oil, gas and petrochemical industries, as rising oil prices contribute to an unprecedented demand for electrical equipment.

MV business pumps up for petrochem

 MV (medium voltage) control equipment at 33kV, 11kV and 6.6/3.3kV levels plays a key role in oil and gas processing plant, not just for heat, light and power, but also for electrical supplies for the process systems. Electrical equipment represents something like 10 per cent of the capital in an oil processing facility, and in the case of liquefied natural gas (LNG) facilities, this can be greater still. So, as the rising price of oil continues to fuel the growing demand for the fast-track construction of huge-scale petrochemical plant, it has also created a surge in demand for MV products.

This MV boom has created some major challenges for ABB. It is not just a case of ensuring that we can meet demand. We are also striving to help customers to maintain their project costs in the face of potential shortages in key raw materials such as steel and copper – created largely by huge industrial growth in China. At the same time, we have been adopting some new approaches to meeting the requirement of the Engineering, Procurement, Construction (EPC) contractors.

SIMPLICITY AND CLARITY

Previously, customers would issue separate enquiries for MV switchgear packages, the protection and control equipment and the

SCADA interface needed to link them into the ENMS (Electrical network Monitoring System). However, EPCs now place a great emphasis on simplicity and clarity. They want a partner to manage the MV package on their behalf. The major benefit of this approach is that it enables detailed orders to be placed with ABB before the final design is complete. We can then reserve the production capability and pre-order raw materials, to ensure that the equipment is available to meet delivery requirements. The partnership principle is being expanded as ABB enters into frame contracts with end-users during the Front End Engineering Design (FEED) development of the project.

ABB has also restructured its MV business by bringing together our expertise in switchgear and distribution automation (covering protection and control and SCADA systems) within a single function – to provide an effective single point of contact. At the same time, we have rationalised our product range based on the output of a number of specialised global factories. This enables us to supply a fully integrated MV switchgear solution, based on a common platform, irrespective of the project's

geographical location. As well as smoothing the procurement process the tangible benefit is a turnkey solution, delivered on schedule, with a significant commercial advantage to the customer.

UNIGEAR

An excellent example of simplicity in action is our new UniGear ZS1 switchgear – the world's first 'one size fits all' MV primary air-insulated (AIS) distribution switchgear rated at 12–24kV. From a single platform, UniGear ZS1 can meet the individual specifications of each market, while at the same time giving global operators a

standardised product that offers consistent quality.

ABB is also able to offer specialist solutions on a project basis. In a recent application for an LNG facility, we offered a variation of our standard double busbar arrangement to provide a space-efficient solution, where a number of LNG pumps required reduced-voltage starting when the main plant supply was lost. This solution has now been adopted in a number of similar applications, as in addition to the space savings there is a significant commercial advantage in using redundant reduced-voltage starters across any number of LNG pumps.



ABB RESIBLOC® dry type transformers offer a flexible, reliable and environmentally safe design for a wide range of applications beyond just distribution duty, and can withstand heavy loads and extreme temperatures.

RESIBLOC® cast resin transformers fit the bill

» ABB's RESIBLOC® design provides a safe, reliable MV (medium voltage) transformer, conforming to IEC 60076-11 and most worldwide standards, for a wide range of applications. RESIBLOC transformers are capable of meeting exacting performance requirements, while providing a non-flammable environmentally safe, maintenance-free product.

RESIBLOC transformers are made of pure epoxy resin reinforced with glass-fibre rovings, a material of enormous strength that can withstand extreme mechanical stresses and thermal shocks from severe climates, regular cyclic loading and short circuit forces. The transformers are designed and tested to function at ambient temperatures as low as -60°C, or beyond 50°C. RESIBLOC transformers are non-explosive, non-toxic, self-extinguishing and are 100 per cent moisture-proof and unaffected by freezing conditions or chemicals.

RESIBLOC transformers are produced without the use of moulds. Instead, their coils are manufactured on numerically controlled winding machines, so they can be customised to meet exact customer specifications and



RESIBLOC coil manufacture

requirements including losses, impedances or dimensions. Typically, this design flexibility can be used to produce a transformer to just the right size, able to pass through a restricted access hatch or doorway without the need to dismantle it, or to function in an area of restricted height. RESIBLOC transformers are used indoor, and outdoors, with enclosures available to suit most worldwide demands, and require no vaults or containment dikes, sprinklers or other costly fire suppression systems



RESIBLOC transformers are often used in variable frequency drives (VFD) and traction applications, where sudden cyclic loads and harmonics are applied and multiple windings solutions are required. RESIBLOC transformers with on-load tap changers are frequently used in countries with irregular voltage systems. A wide range of additional equipment is available – including earthing switches, load or no-load break switches and fuses etc – all the way to providing almost a small sub-station. Other variations include single-phase three-winding transformers, transformers with special terminal arrangements, cable supports or flange connections to match any busbar systems, built-in CTs, additional NER or similar units, and purpose-used extras such as Castell locks.

RESIBLOC technical data

Power rating (AN)	250kVA to 40,000kVA
Rated voltage	up to 45kV

CONTACTS

For further information about any of these subjects please visit www.abb.com/ffwd or contact us as follows:

Substations	-	01785 825050	Transformers	-	01925 741469
HV/MV Switchgear	-	01925 741469	Asset Management	-	01785 825050
Automation	-	01785 825050	Wind Power	-	01785 825050
Service	-	0845 6011946	General Enquires	-	01785 825050