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FWWD

Spring 2005

FAST FORWARD WITH **ABB POWER TECHNOLOGIES**



More power for one of Europe's busiest rail lines

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Major semi-conductor
plant upgrade

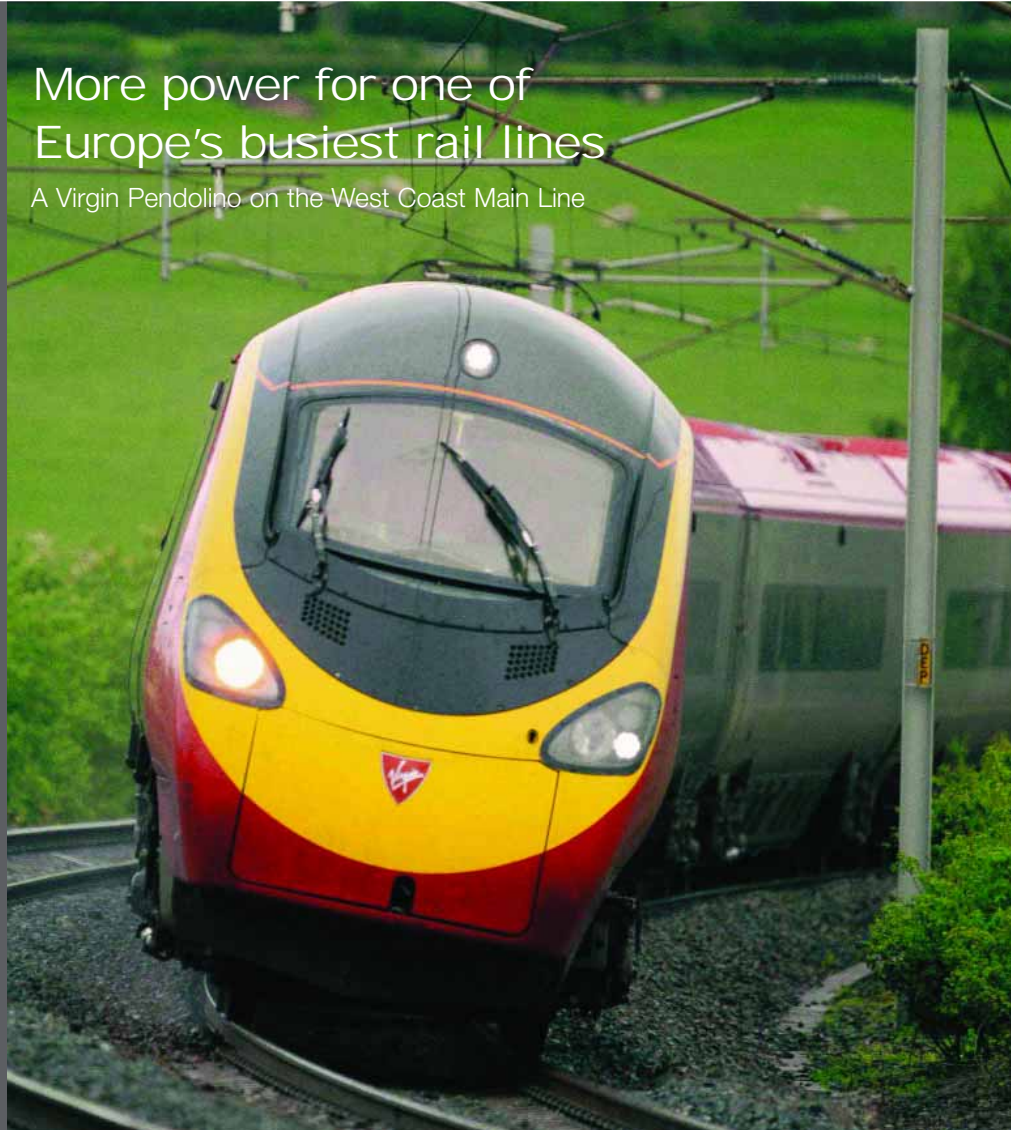
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On the power horizon

Trevor Gregory

ABB UK Managing Director

- > In the last ten years electricity consumption in Europe has grown by some 15 percent, with cross border exchange of power accounting for around five percent of the total consumption. At the same time transmission capacity has increased by only three to five percent.
- > Electric power cannot be stored and the grid must ensure that production and consumption are balanced at all times. A task that is increasingly difficult in a liberalised market.
- > With large investments in renewable energy planned from production resources increasingly located remotely from the load centres and no let up in the demand for electricity, bigger and smarter grids are essential.
- > What is needed to make this happen and what are the technological implications?
- > Grid investment needs to be stimulated by incentives and/or through reliability standards that can be enforced with penalties.
- > Coordination of the operation of grids in individual countries must be improved and, of course, the tools made available to make this possible.
- > Grids themselves must become more robust to disturbances in the electric system. This can best be done by improving the controllability of the grid, limiting the extension of synchronised grids and setting up 'firewalls' with DC links that allow exchange of power but prevent faults from spreading.
- > Environmental restrictions will require that new overhead lines be minimised or even eliminated - undergrounding will be increasingly preferred or even demanded.
- > The performance and reliability of transmission grids can be enhanced quickly with proven technologies to increase capacity, with significantly lower environmental impact compared with conventional methods of upgrading the grid.
- > Such technologies include: HVDC transmission, HVDC Light, FACTS devices, gas insulated substations, life extension to increase the reliability and useful life of existing equipment, and wide area monitoring and control.
- > These technologies provide insight into grid performance, increase grid capacity and provide tools to mitigate or prevent widespread power outages.





Medium-voltage switchgear insulated with SF₆ (sulphur hexafluoride*) gas is less harmful to the environment than the associated cables, overhead lines and transformers, according to a joint study by leading power companies.



Study finds SF₆-insulated switchgear better for the environment

A life cycle assessment (LCA) study to acquire environmental data about medium voltage power distribution in Germany was recently commissioned as a joint project by ABB, Areva T&D (formerly ALSTOM), Siemens, EnBW, EON Hanse, RWE and Solvay Fluor.

The LCA study establishes an environmental profile comparing air-insulated and SF₆-insulated switchgear. It shows that the total contribution of power distribution grids to global warming is very low. That switchgear technology in the medium-voltage range makes only a very minor contribution to the greenhouse effect. And, that ohmic losses (heat produced by electrical resistance) caused mostly by the use of cables, overhead lines and transformers are the principle ways a power grid contributes to the greenhouse effect.

This contribution can be even further reduced by the use of SF₆-insulated switchgear systems, the study says. In addition, the ohmic losses of SF₆-insulated switchgear are lower in the operational phase.

PROCEDURE AND SCOPE

The LCA was conducted in accordance with ISO 14040-43 standards and verified by TÜV NORD CERT.

Data was gathered for a representative mix of medium voltage switchgear: transformer substations, ring main units and customer substations. It included key electrical figures (in particular

ohmic losses), material data from disassembly analyses as well as electrical load and lifetime.

At grid level, two representative model grids were examined – an urban and a rural region. At the switchgear level, a representative mix of medium voltage switchgear was determined based upon a current delivery statistic from the Zentralverband Elektrotechnik- und Elektronik-industrie (ZVEI). It includes switchgear both for use in utility grids and for industry and infrastructure grids.

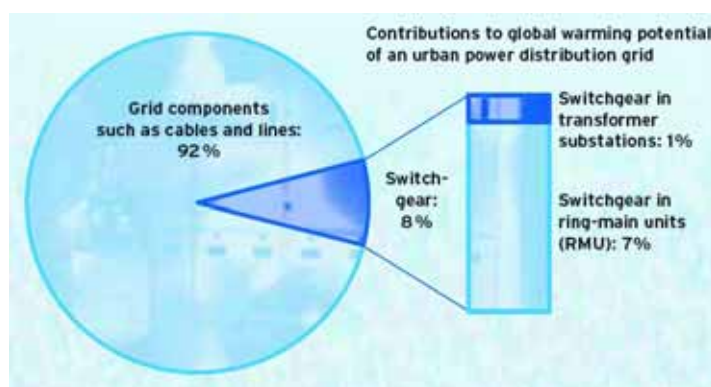
OHMIC LOSS FINDINGS

The LCA analysed representative power distribution networks in urban and rural areas, and found 92 percent of the contribution to the greenhouse effect made by power distribution comes from ohmic losses in cables, overhead lines and transformers, and only eight percent from switchgear.

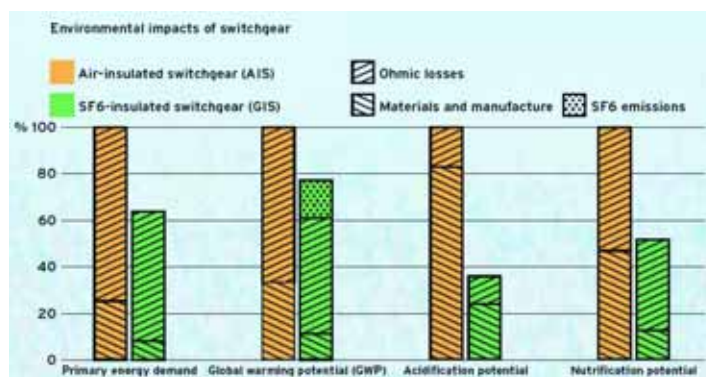
Switchgear of any type was found to cause only a relatively small proportion of these losses, and furthermore, the use of SF₆ as an insulating and arc-quenching medium in switchgear is proven to be ecologically competitive compared to other forms of insulation.

SF₆ A BETTER CHOICE ENVIRONMENTALLY

Current carrying conductors must be insulated from each other and their surroundings, and for this purpose SF₆ is about three times more effective than air insulation. Using SF₆ also reduces the amount



Contributions to global warming of an urban power distribution grid



Environmental impacts of switchgear

of space needed for equipment, and enhances protection of switchgear from ambient and climatic influences.

Moreover, the results of the LCA criteria for switchgear – energy demand, global warming potential, acid rain and nitrification potential – are significantly more favourable for SF₆-insulated systems than for air-insulated ones.

SF₆ as an insulating medium was, for example, around 20 percent better than air in terms of

greenhouse gas potential, because the more compact design of the SF₆-insulated switchgear and even the energy required for the materials and production of the systems is considerably reduced.

*Sulphur hexafluoride is a non-toxic, inert, insulating and cooling gas of high dielectric strength and thermal stability. It is particularly suitable for use in both high-voltage and medium-voltage equipment. A man-made gas, SF₆ is always used in closed or sealed electrical systems. At the end of the equipment's useful life, the gas can be recovered, recycled and reused.

More power for one of Europe's busiest rail lines

>> A £16 million order for power equipment and services has been awarded to ABB by National Grid Transco (NGT) as part of a programme to upgrade the power supply of Network Rail's West Coast Main Line (WCML).

The West Coast Main Line is one of Europe's busiest railways. Its 1,000 kilometres of track link many communities, stretching from the heart of London to Scotland, serving a population of more than 16 million people. Every day it carries more than 2,000 passenger and freight trains.

The new 25-0-25kV rail supply stations will allow Network Rail to upgrade trackside power supplies to the 50kV system required for high-speed rail services commonly used on mainland Europe.

ABB will provide two new 400/25kV connection points at each of two locations together with two remotely located 25kV substations. The contracts include two ABB supergrid transformers, switchgear and cabling at each site, together with advanced substation protection and automation systems. There is also an option for the provision of design/engineering and procurement of long



lead time equipment for a third, as yet unspecified, site.

ABB has a frame agreement with NGT to help modernise WCML and deliver cost efficiencies and savings to NGT and Network Rail.

"This contract and the agreement with NGT confirms our position as supplier of choice for rail power systems and as a reliable, long-term partner for railway operators," says Peter Smits, head of ABB Power Technologies.

ABB connects with Imperial College



Dr Markus Bayegan, Chief Technology Officer of ABB (left), and Sir Richard Sykes, Rector of Imperial College, sign the partnership documents

>> ABB has signed a long term strategic research partnership agreement with Imperial College London focusing on new power solutions such as FACTS (flexible AC transmission systems).

The official signing ceremony took place during a recent ABB day at Imperial College which brought together over 50 staff from both the university and ABB to examine joint approaches for developing optimal power infrastructure, reliable power grids, and optimal manufacturing and customer processes.

Speaking during the event Dr Markus Bayegan, ABB's chief technology officer, said, "Cutting-edge technology gives our core businesses in power and automation a distinct advantage over our competition. A central task of ABB's R&D team is to transform university research into industry-ready technology platforms. This concept, honed in recent years, comes to life in more than 50 university partnerships in the US, Europe and Asia. Long-term, strategic relationships with Massachusetts Institute of Technology, Carnegie Mellon University, Stanford University, Cambridge University and now Imperial College underline the importance of this approach."

Fast transformer delivery brings Sizewell A back to full production

» Sizewell A, British Nuclear Group's 420MW Magnox nuclear power station on the Suffolk coast, has returned to full production after ABB pulled forward a £1.7 million-plus fast-track, turnkey contract to deliver and install a replacement GSU (generator step-up unit) transformer nine days ahead of schedule.

Together, Sizewell A's two reactors produce more than 10 million kWh of electricity – enough power to serve the energy needs of a third of East Anglia. However in March 2004 one of the two GSUs, which step up the power station's 17.5kV terminal voltage to the 132kV required for the National Grid, came to the end of its 38-year life causing Reactor One to be taken off-line.

Although Sizewell A is scheduled to stop generating for good at the end of 2006 there was a clear business case for British Nuclear Group returning Reactor One to power as the cost of lost production far outstripped the cost of a new transformer.

British Nuclear Group gave ABB the task of fast-track manufacturing and installing a brand-new transformer, including low voltage busducting, high voltage cable works and site preparation. David Sullivan, UK general manager for ABB Power Transformers, says, "Within just ten days of the initial enquiry, we were able to specify the new transformer, pass British Nuclear Group's factory quality audit, achieve factory approval, produce a quotation and agree the contract. Crucially, we were also able to guarantee



David Sullivan of ABB (left) with Graham Silsbury of British Nuclear Group (right) and the new transformer.

delivery within seven months, so that Reactor One would be back on-line for the start of December."

The new 17.5/145kV 340MVA generator transformer is based on ABB's Trafostar common design and engineering platform for power transformers.

As well as manufacturing the transformer quickly, delivery presented an extra challenge. The 168 tonne load had to be moved through Poland to the Baltic Coast, out through the Kiel Canal and then sailed across the channel from Cuxhaven, Germany to Lowestoft.

Excellent co-operation between ABB and British Nuclear Group meant that delivery was not just on schedule but nine days ahead.

Mesh corner upgrade project

» ABB has won a turnkey contract worth over £5 million to upgrade a 275kV mesh corner substation in Leeds. The project includes the installation of a new MSCDN (mechanically switched capacitor damping network) and modification of the existing feeder circuit to strengthen the National Grid Transco (NGT) network.

The new MSCDN will provide reactive power compensation for the substation to ensure that the power system is both balanced and efficient.

Reactive power assists the flow of electricity along a conductor (in this case a transmission line) enabling the voltage to be maintained at the required level.

In principle, MSCDN is one of the simplest forms of compensation since it is switched by circuit breakers rather than power electronics, and as such it provides a cost effective means of strengthening the transmission network.

On site work started in January 2005 and the project is scheduled for completion in October 2005.

INTERNATIONAL NEWS

NORTH AMERICA

More power capacity for Mexico
ABB has been awarded \$70 million worth of work on three projects to strengthen Mexico's power supply. The company will replace an existing air insulated substation with a compact 400kV gas insulated substation. It will also supply three 400kV and 230kV air insulated substations as well as power transformers, power reactors and protection systems. In the third contract the company is to supply a 400kV static var compensator (SVC) to a substation to help stabilise the network. The contracts were awarded by the Mexican state power utility.

SOUTH AFRICA

Western Cape will benefit from FACTS

Eskom Holdings, South Africa's national power utility, has selected flexible alternating current transmission systems (FACTS) technology from ABB to improve network stability and transfer capacity in the Western Cape region of South Africa. The \$16 million contract includes four FACTS installations in the area and the work will be completed by the summer of 2006.

FRANCE

FACTS brings stability to north west France

A \$15 million contract for FACTS technology has been awarded to ABB by RTE, the French transmission system operator. The order also includes two SVCs, part of FACTS technology. The project is designed to improve the efficiency of the transmission system and increase the capacity of existing networks in Brittany, north west France. The work is scheduled for completion in 2005.

CHINA

Largest-ever GIS switchgear installation

ABB has won a \$60 million contract to supply and install gas insulated switchgear (GIS) and twelve sets of power transformers for the right bank power plant of the Three Gorges dam project in China. This latest contract for 500kV GIS switchgear combined with an early installation of the same size will make this the largest GIS installation in the world. Over the last five years ABB has won orders for transformers, switchgear and control systems worth \$1.3 billion for the Three Gorges dam project.

Transformer technology is not standing still. As well as improving the equipment itself ABB is leading the way in maintenance and support, including on-the-spot the repair for transformers operating in distant locations where return to base would be difficult and exceptionally expensive



Transforming the world of transformers

On the spot transformer repair in the far corner of Brazil

When ABB was called in to repair a failed transformer in the world's largest hydro electric power plant close to Brazil's the border with Paraguay, the conventional policy of transporting it to the nearest factory was out of the question. The transformer concerned weighed over 180 tons, the roads were poor, risk of further damage high and the nearest factory was 800 miles away.

Instead of taking the transformer to the factory ABB engineers put into effect their policy of taking the factory to the transformer.

A fully equipped workshop with clean room was constructed on the site of the power station concerned at Itaipu. The transformer was taken inside, dismantled, repaired, reassembled and tested on the spot.

A power transformer failure can, and usually does, have serious consequences for all parties.

Power consumers can lose out as their supply is cut or reduced. This is bad enough for domestic consumers but for industry it can be extremely damaging, threatening their businesses' survival.

At Itaipu the transformer was damaged when an electric failure occurred. The repair called for a complete replacement of the winding blocks.

It is vital that companies like ABB can respond quickly and flexibly to such serious

How it was done

The specially constructed on-site transformer repair facility at Itaipu required a strong solid foundation supporting a special 20 metre high metal fabrication with a floor area of 500m². It was built to withstand winds of up to 150km/h and had to remain watertight under heavy rainfall. Inside it had to provide an ultra clean environment where the transformer's active part, weighing some 180 tons, could be assembled. The clean room area was strictly temperature and pressure controlled. A mobile facility with vacuum, drying and oil treatment was brought on site. Mobile cranes and lifting devices were also erected inside the repair shop.

STEP BY STEP

After draining the oil from the transformer's active part, the upper core frame was opened and the upper core yoke disassembled. Next all internal leads and the HV winding mechanism were disconnected followed by the windings, main insulation and core winding insulation. The windings were then craned out from the core limbs.

The repair included replacing the complete pressboard core insulation with fibreglass. And in order to retighten the core it had to be laid horizontally, a really heavy lifting job.

All factory parts, including the windings and main insulation, arrived fully tested. These were then assembled on-site.



A complex drying process is adopted after assembly. This is made up of a series of vacuum and hot oil circulation cycles.

The final steps are on-site testing and commissioning.

At every step careful checks are carried out to ensure that the repair process is as stringent as it would be had the transformer been taken to an ABB plant. Every phase is conducted strictly to ISO 9001 and ISO 14001 procedures.



situations, especially in the developing world where local conditions can be very difficult.

This is why several large utilities in South America asked ABB for new solutions that would enable large transformer units to be repaired on site. The main factor was the difficulties of transportation but other issues had to be addressed also. These included:

- Reducing the repair lead time
- Avoiding transportation problems and associated costs
- Ensuring that the same high standards of work were achieved on-site as were expected when equipment was returned to the factory

A key component of ABB's on-site repair process is being able to provide a high voltage test capability. This is a vital service and important both for transformer commissioning and for diagnostic assessment before or after a failure.

Since 1992 the performance and reliability of more than 520 transformers has been improved following on-site work.

So far ABB has carried out more than 96 major on-site transformer repairs including equipment produced by other manufacturers.

The repairs to the Itaipu hydroelectric power station is the latest in a line of on-site repair successes it is also the largest ever attempted.

New technology for transformer upgrades

ON-LINE OIL REGENERATION

This process has demonstrated technical and economic advantages when applied to old transformers with aged acidic oil. It is more environmentally friendly than oil replacement and shows a much better efficiency over a long time period.



LOW FREQUENCY DRYING

A low frequency heating system can dry transformer active parts much faster without compromising quality. The remaining moisture content of the solid insulation is typically below one percent. The drying time can be less than half of that for a traditional hot oil and vacuum process. This reduction in lead time when drying a wet transformer or repairing a failed unit on site could be vital.



NOMEX

For end-users who need to boost the power of their existing units, there is the possibility of rewinding the coils with Nomex® high temperature insulation material. This results in significant improvements in lifetime and reliability. As well as the cost advantages for the unit, side benefits include: lower environmental impact than scrapping, no construction needed to prepare the site (the footprint remains identical) and a lower weight compared to a conventional unit.





Ian Funnell, UK sales and marketing manager for ABB Power Technologies, explains why the soaring costs of raw materials are now reflected in the ex-factory price of many MV and HV products

Commodity prices at historic peak

Surging development in China, reawakening demand in North America, low inventories and production difficulties in some areas have combined to create a sudden, dramatic rise in the global cost of key commodities used in the manufacture of many products, especially transformers, switchgear and cable.

For example, in the period July 2003 to September 2004 the following rises have occurred:

- Copper – up 74%
- Carbon Steel – up 70%
- Transformer Oil – up 40%
- Electrical Steel – up 25%
- Aluminium – up 22%

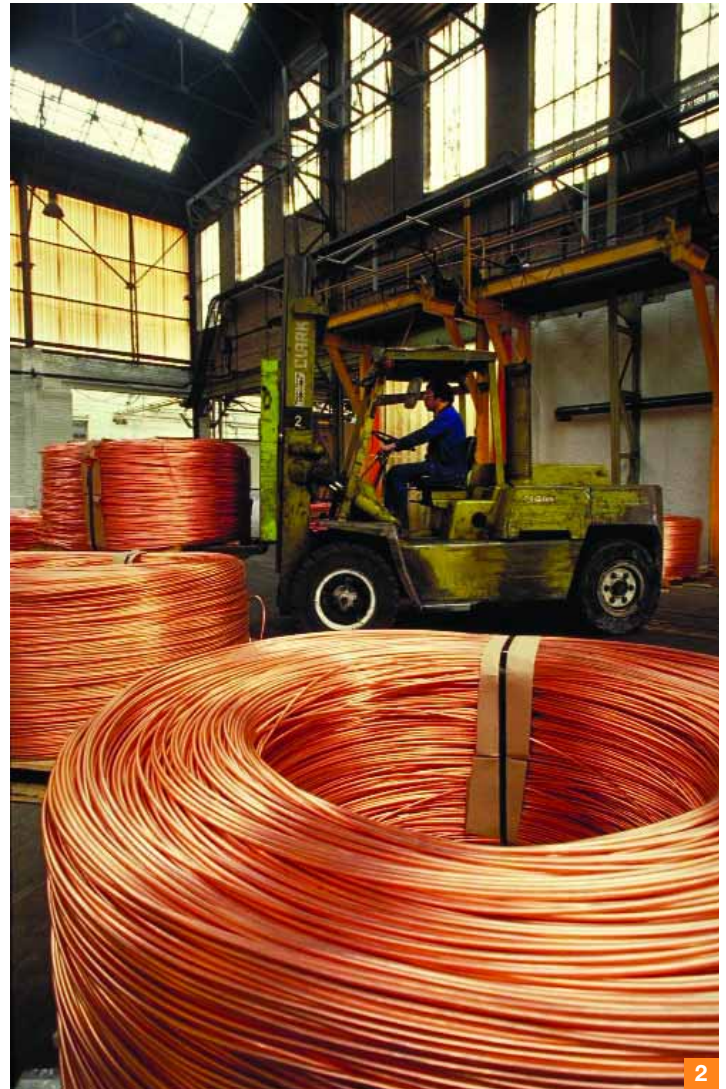
These increases mean that prices of our strategic commodities have reached their highest levels in decades and analysts expect them to remain high for the foreseeable future.

ABB is committed to delivering high quality products to its customers at cost-effective prices,

so we expect to absorb normal fluctuations in raw materials costs without passing them on. However, these cost increases are so immense that no manufacturer can withstand them on a sustainable basis without reflecting them in higher ex-factory prices. So, reluctantly, we have been forced over the past few months to announce general price increases across many of our product ranges.

We are making every effort to offset the effect of further raw material price increases, for example through continually improving productivity and manufacturing efficiency. We are also intensifying our hedging programmes, increasing our sourcing options and consolidating our global supply contracts. New designs and new technology will also have some impact, especially where they can reduce the amount of material required.

ABB, like its competitors, will continuously review product pricing to ensure it remains competitive as commodity costs change.



1 Transformer coil winding in an ABB factory.

2 Copper wire production.



Regular power interruptions and other problems at Bookham's optical semi-conductor facility was the driving force behind a major upgrade to the low and high voltage infrastructure undertaken by ABB Power Technologies.

Major power upgrade for semi-conductor plant

Regular power interruptions, brown-outs and harmonic distortions were affecting the production of semi-conductor wafers and the crystal growth process vital to the efficient operation of the Bookham plant at Caswell, near Northampton.

The major electrical systems infrastructure upgrade project, worth over £2 million, was project managed by Ove Arup working with Hoare Lea Consulting Engineers and ABB as principal contractor.

Bookham is a global provider in the design, manufacture and marketing of optical and RF components, modules and subsystems. The company's products are used in a variety of applications and industries including telecoms, datacoms, aerospace and defence.

The company's optical semi-conductor facility at

Caswell covers both research and development and production.

POWER PROBLEMS

Hoare Lea Consulting Engineers assisted Bookham in analysing the existing infrastructure and develop an outline design to improve power quality and supply. It was vital to avoid any disruption to the key production operations.

Among the challenges to be addressed were the fact that the site has Grade 1 listed buildings in a rural location and that the site is tightly licensed by the Environment Agency because of the prevalence of toxic chemicals and gases.

Bookham had also set firm demands for the power quality required, in particular there were strict limitations on the damaging harmonics that could circulate on its network.

INNOVATIVE AND SUSTAINABLE

ABB Power Technologies'

contract covered the design, build and installation of the new electrical infrastructure requiring it to act as principal contractor on the project. It co-ordinated all the work from its Rugby office.

The work included the design and build of a number of substations, 11kV incomer, generators, low voltage circuits and the high voltage network.

The high voltage system was designed to provide diverse routes with semi automatic open point switching to improve the resilience of the network.

Substations are modular in design and provide space to allow for future growth. Transformers are standard output, cast resin construction, have low impedance characteristics and include options for forced cooling.

Modular low voltage switchgear was selected to provide the best performance, safe maintenance and easy future upgrading.

Packaged generator sets with low fuel consumption, and fitted with low sub-transient reactance alternators to improve power quality, were also provided.

The result has been a complete new high and low voltage network designed, installed and commissioned on a challenging site without any significant disruption to existing operations. This includes the seamless integration of 2.5MW of normal and stand-by power in existing hazardous areas together with extensive modification of the existing distribution system within the plant.

A strong culture of innovation and sustainability has pervaded the project with a strong focus on an extended lifecycle, energy efficiency and minimal environmental impact.

The project was completed in two phases and was chosen as the Building Services Awards 2004 Project of the Year.



1



2



4



3

- 1 Aerial view of the Caswell plant.
- 2 The fab production area.
- 3 Good working spaces are essential for improved maintenance and sustainability.
- 4 A complete new active switching high voltage network was designed, installed and commissioned to fit within the confines of the site.

Competition, cross border trading activities and the increasing complexity of power networks is compounding power system stability issues. As grids get even more heavily loaded by sudden bulk power transfers, systems become very vulnerable and even minor equipment failures can result in cascade tripping and, eventually, blackouts. Real time wide area monitoring of electricity flows is essential in providing early warning of potential network stresses.

Major Tom to ground control

Wide area grid monitoring system uses GPS for timing accuracy

ABB's new wide area monitoring system (WAMS) technology uses GPS satellite signals to cost effectively ensure that the phasor measurement units, which monitor the condition of the power grid are synchronised with an accuracy of one millisecond. This enables system dynamics, such as frequency, voltage and power oscillations, to be observed in real time, regardless of the large geographical distances between measurement points and provides valuable early warning of potential network stresses.

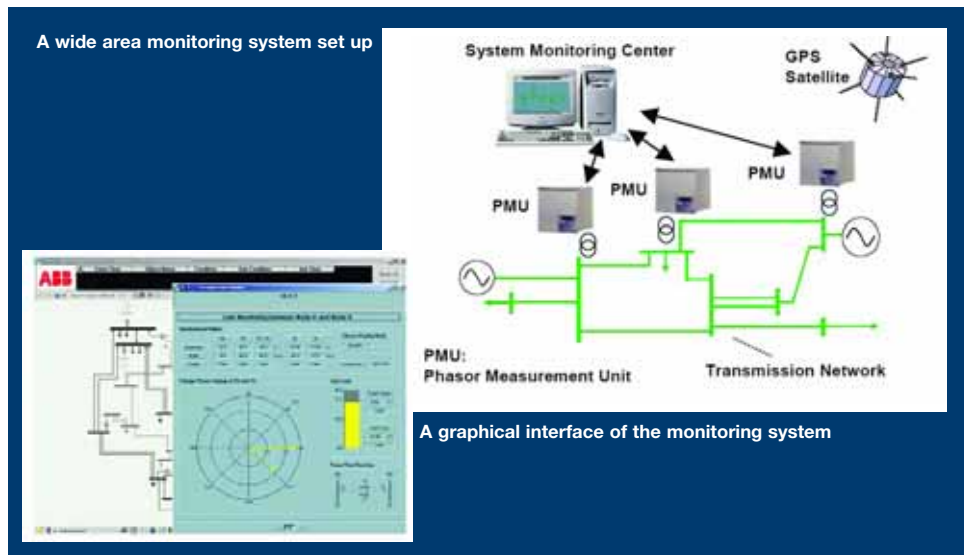
PRECISE, SYNCHRONISED MEASUREMENTS

Large power outages are usually the result of multiple system failures that happen within minutes, and sometimes in seconds.

The monitoring and control systems of individual utilities gather information from sensors within their own grid, and then evaluate this information to determine whether their system is operating to deliver the power to meet demand conditions. When things go wrong, the system either reacts automatically to take contingency actions, or displays information that allows system operators to take action.

Using the component PSGuard, ABB's wide area monitoring system gathers and analyses system data in milliseconds, compared with every two to five seconds in conventional network control systems.

This means emerging network problems, like shifts in frequency, can be documented and even predicted because precise and synchronised measurements can be taken consistently across the grid. Operators can also detect emerging problems in a neighbouring grid before they build up, allowing them to take preventative action.



WIDE AREA MEASUREMENT SYSTEMS

A typical wide area measurement system or WAMS, is built up on a reliable communication system connecting power stations, network control centres and substations. The GPS satellite system is used for timing accuracy and a number of phasor measurement units are deployed across the power network.

The phasor measurement unit or PMU streams the required real time data through the communication link to the WAMS. In some cases, PMUs could even include local instability protection schemes. To achieve value from the accurate and reliable data streams coming from these PMU devices, ABB has now introduced the PSGuard wide area measurement system.

The PSGuard system is a scaleable solution which can be implemented in stages, paving the way towards automatic wide area measurements by transmission companies. Application functionality packages can be chosen and

implemented based on utility needs with the system being built on standard PC hardware and operating systems and having the required security standards built in.

First in Europe

Recognised in 2003 by the Massachusetts Institute of Technology (MIT) in the US as one of the "top ten emerging technologies that can change the world", ABB's WAMS technology became the first commercially operative wide area grid monitoring system in Europe during summer 2004.

Installed by Swiss energy company ETRANS in the critical Swiss north-south transmission corridor, ABB technology is helping keep the power flowing from Switzerland to Italy by faster detection of critical operating conditions.

An ABB active filter is providing a dramatic improvement in network harmonic distortion at the new Padstow foreshore pumping station

PQF cleans up

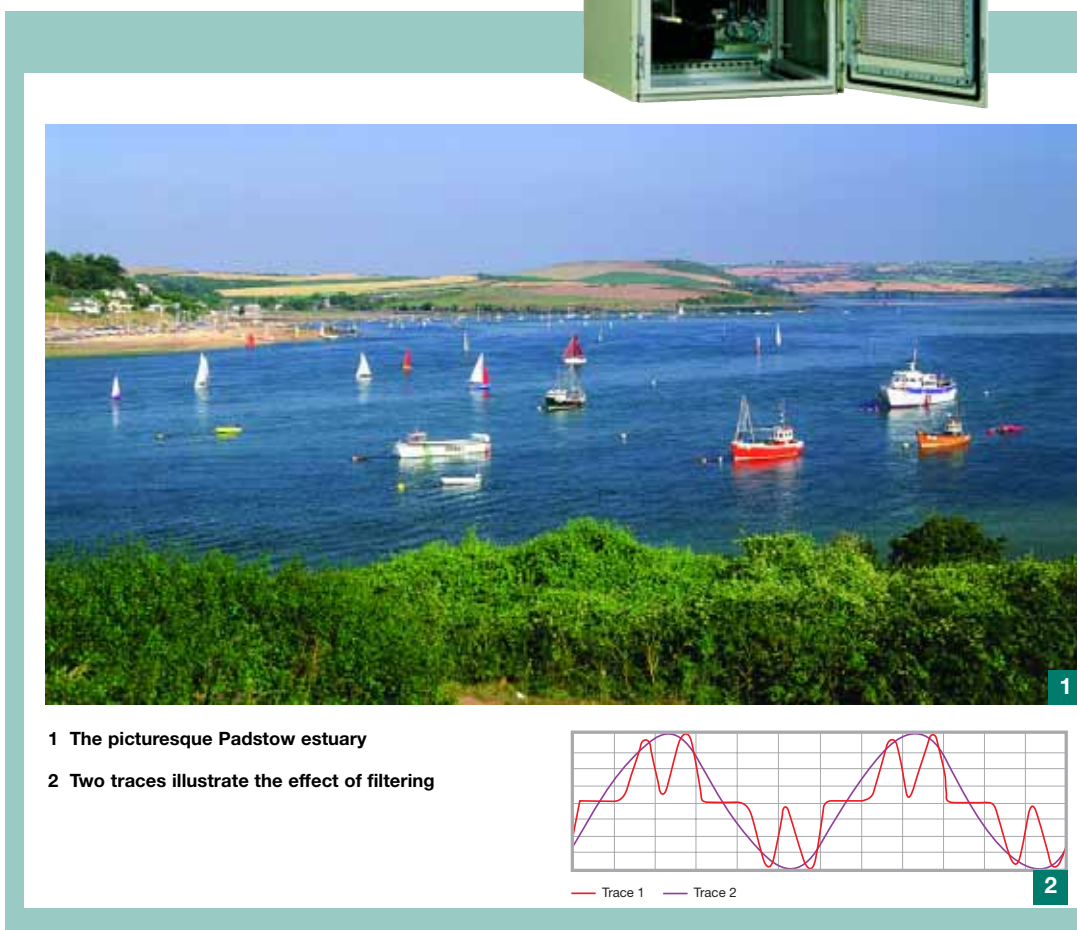


An ABB power quality filter

South West Water is currently investing around £1 billion in 'Clean Sweep' - the largest coastal clean up operation of its kind in Europe. One of the places that has already seen the benefit is the traditional Cornish fishing village of Padstow. The project, which includes a new foreshore pumping station, is helping to safeguard the beautiful coastline which contrasts a rugged landscape with sandy beaches and an abundance of wildlife.

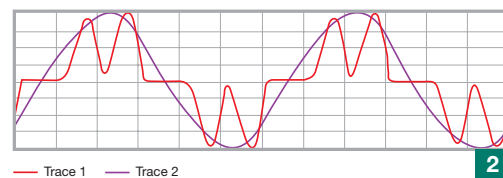
Western Power Distribution, the local DNO (distribution network operator) was concerned that the drives installed in the pumping station could give rise to unacceptable harmonic distortion on the local network. So in mid-2004 ABB was called in to carry out an investigation and implement a solution.

Many of the common loads in industrial and commercial applications are non-linear, such as variable speed drives, rectifiers, UPS-systems, computers, etc. These loads draw a current from the source that does not follow the voltage wave shape and hence introduce potentially harmful distortion into the power network. This can lead to overheating of cables, motors and transformers, damage to sensitive equipment, tripping of circuit breakers and blowing of fuses as well as



1 The picturesque Padstow estuary

2 Two traces illustrate the effect of filtering



premature ageing of the installation. ABB PQF (power quality filter) active filters have been developed to provide a reliable and cost-effective solution to this problem by continuously monitoring the current in real time to determine what harmonics are present. They then inject 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. The traces from Padstow provide a dramatic illustration. First, we see the unfiltered 400V

AC three-phase supply with serious distortion of the current waveform - instead of two crossover points per cycle, there are six.. The second set of traces show the effect of energising the ABB solution (a 70A active filter type PQFL) - there is a considerable improvement to the waveform and a 60 percent reduction in the current distortion.

ABB has developed the world's first 'one size fits all' platform for medium voltage primary distribution switchgear rated 12-24kV

UniGear ZS1 switchgear makes its UK debut

ABB's unique UniGear ZS1 range of metal-clad, arc-proof, switchboards – designed to meet the detailed specifications of individual local markets as well as the global customer's demand for standardisation – is now available for UK applications.

The global market for primary air-insulated switchgear (AIS) in medium voltage ratings is extremely diverse and highly fragmented as each country traditionally has its own unique specifications. To meet the specific requirements of switchgear customers in their individual markets, ABB previously offered 18 product platforms for medium-voltage AIS rated from 12kV to 24kV.

ABB has now replaced this large range of products with a single platform that meets the individual specifications of each market, while at the same time giving global operators a standardised product offering consistent quality. Called UniGear ZS1, the new switchgear is based on ABB's market-leading ZS1 family, which was first launched in 1986.

ABB assembled a team of specialists from around the world to develop the UniGear ZS1 platform and ensure all relevant, market-specific features were incorporated into the design.

The result of that collaboration is a unique, modular design that allows for more than 150

local switchgear requirements, all of which can be added to the basic UniGear platform. For example, within the UK market ABB has adapted UniGear to provide suitable rear cable box configurations, interlocking, shutter labelling and earthing arrangements.

The modular platform means ABB can now cover a product range that formerly needed 47 production lines with just nine production lines, each of which serves a major market or region. And the number of switchgear parts has been cut by almost 95 percent to ensure consistent quality and shorter lead times.

In addition to rationalising production and reducing the number of parts needed, ABB has succeeded in reducing the width of the panel from 650mm to 550mm for feeder applications up to 1250A. This makes UniGear ZS1 the most compact withdrawable AIS 12kV switchgear available on the market today.

The range of apparatus for the UniGear ZS1 switchboards includes vacuum and gas circuit-breakers and vacuum contactors with fuses. All this apparatus is interchangeable inside the same switchgear unit. This makes it possible to use a single switchboard-user interface, with the same service and maintenance procedures and operations. A fixed version switch-disconnector unit completes the range of apparatus. The switchboard can be fitted



with conventional (transformers and relays) or innovative (sensors and multi-purpose unit) measurement and protection components.

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CONTACTS

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

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