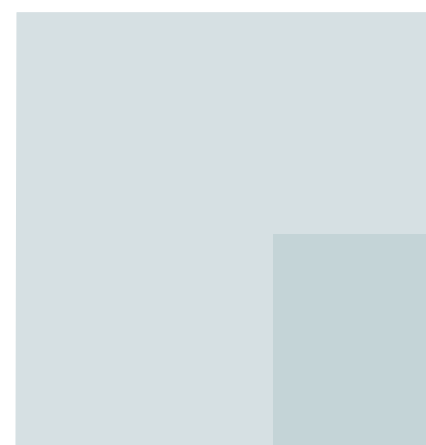


Technology Solutions

Corporate technical magazine of the ABB Group
in South Africa and the sub-Saharan Africa region



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Technology Solutions

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Showcase of new power and industrial automation technology



Over the past 100 years, electricity has become the world's most flexible and reliable form of power. Global demand is increasing and, in many countries, the supply of electricity is directly linked to the gross domestic product. South Africa is no exception to this trend: in recent years we have come to

realise just how important electricity is to industry, commerce and our homes as blackouts have affected many of us in one way or another. A most spectacular and positive impact of electricity has been the national electrification programme since 1994 by the South African government, the electricity distribution industry and Eskom. The programme has dramatically increased electrification for the poor, especially in rural communities. Electricity has made a huge difference in uplifting people and promoting economic development.

ABB's power technologies support infrastructure for safe and reliable distribution of electrical power over ever larger networks. The article on Waveguide in this issue of ABB Technology Solutions highlights new developments in transmission technology for communication in MV switchgear.

Capital productivity is crucial to the commercial success of industry. The global process industry loses \$20 billion, or five percent of annual production, due to unscheduled downtime and poor quality. Almost 80 percent of these losses are preventable using modern technology. In this issue we showcase the Mondi Packaging Frantscach mill in Austria that has been modernised with ABB's most up-to-date automation and control technology. Quality through continuous modernisation is a key factor in their success.

Earlier this year ABB in South Africa introduced a new range of quality wiring accessories and automated systems for homes

and offices for the first time in South Africa. Wiring accessories is the term for home and office electrical fixtures such as light switches, switch covers, plug ports and sockets. Home and office automation systems control cooling, heating, ventilation, security systems and even household appliances such as microwave ovens and music centres. ABB is proud to now be able to supply quality products to consumers in this country. An article on "Ambient intelligence" in this issue explains these new technologies. ABB's building automation systems also help reduce and suspend non-essential services when the risk of network overload is imminent. Energy efficiency is an important benefit and provides significant savings.

A sustainable energy future for the world has become increasingly important and urgent because of global warming. The World Business Council for Sustainable Development issued its report in October 2006 under the name of "Powering a Sustainable Future". ABB co-chaired this work through the active participation of CEO Fred Kindle. The International Energy Efficiency Agency, IEA, in its most recent report estimates that unexploited energy efficiency potential offers the single largest opportunity for emissions reductions. Technologies to improve the efficiency of energy conversion exist and ABB is a major supplier of these technologies. ABB has products and solutions available today that can make a difference in how industry and utilities use and produce electricity. In future issues of this publication we will present some of these products and solutions.

Enjoy this issue which has been redesigned to make your reading easier and more pleasurable.

Carlos Poñe
CEO and Country Manager
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Experience counts Mondi Packaging Frantschach can rely on ABB

The 125-year-old Mondi Packaging Frantschach mill sits in the Lavant Valley amid the breathtaking beauty of the southern Austrian Alps. Three paper machines produce approximately 250 000 tons of sack and kraft paper per year. Frantschach's pulp and paper are used to produce high-quality end products. Producing pulp for the Melitta coffee group as well as luxury paper bags based on its kraft paper, the mill's overall export rate is more than 80 percent of production. Quality is fundamental and the company's strategy is to modernise continuously to ensure it has the most up-to-date technology. And helping Frantschach in this task is one of its many long-term partners, ABB.

The Mondi Packaging Frantschach mill has three paper machines, the PM 6, 7 and 8, that produce approximately 250,000 tons of sack and kraft paper per year. The wire width of the PM 6 is 490 mm and the sack paper produced covers 60-125 grams per m². With a speed of 920 metres per minute, the PM 6 is one of the fastest sack paper machines in the world. The PM 8 also produces sack paper and has a wire width of 510 mm and a speed of 830 metres per minute, while PM 7 produces kraft paper of 30-150 grams per m² with a speed of 350 metres per minute. The Frantschach mill also produces approximately 50 000 tons of unbleached market pulp per year, and uses spruce and pinewood as the raw materials.

State-of-the-art technology

Franz Maischberger, Head of the Project Department responsible for Electrical, Process Control and Process IT, has been working at the mill for 29 years; his passion for stable state-of-the-art technology is one of the reasons for Frantschach's position as a technological forerunner. Maischberger says that "the mill's strengths lie in: quality; Research and Development; employee skill; two highly efficient sack paper machines; and just-in-time delivery". Its outstanding approach to sack paper production sets the standard for many other Mondi sack paper mills.

Frantschach's sack and kraft paper goes under the brand name of "ADVANTAGE". Sack paper needs to be of the highest quality as some customers fill them with 25 or 50 kilos of cement, producing some 4 000 sacks per hour. Frantschach enables customers to achieve this by paying special attention to factors such as printability, strength, energy absorption and porosity.



Three ABB quality control systems perform online quality control on PM 6, 7, 8 and the flash dryer.

The world-renowned coffee filter brand, Melitta, acquires Frantschach's unbleached pulp. Other special pulp grades produced by the mill are used in the production of isolation material for transformers. Meanwhile the luxury paper bags used in many shops are based on Frantschach's kraft paper.

Long-term partnerships

Quality is a key factor: Firstly, the company's strategy is to continuously modernise to ensure it has the most up-to-date technology. This is helped by the fact that it has reliable long-term partnerships with major P&P industry machine, and equipment and system suppliers. The Frantschach mill is reconstructing its wood yard and raw material mixing at a cost of approximately 20 million euros.

Secondly, the company identifies best practices in its production processes and is constantly accumulating experience through its "Knowledge for Production" continuous learning system. Each shift worker logs information on any incidents or problems, as well as the related actions and solutions. This means that all experiences related to the process are available online around the clock.

The third factor concerns health and safety. Maischberger says that "safety, health, environmental friendliness and a zero rate

of accidents are our working environment goals". This is a question of attitudes rather than techniques," he continues. As a result of this ambitious programme, safety performance has developed significantly over the last few years.

Industrial^{IT} CPM solution

Equipment and PCs bearing the ABB logo can be found all over the mill. The second generation of Manufacturing Execution Systems (MES) solutions - the equivalent of Collaborative Production Management (CPM) - have been deployed in production planning and optimisation, production tracking and quality management. Three quality control systems delivered by ABB perform online quality control on PM 6, 7, 8 and the flash dryer, while ABB's Automation System, which already covers the paper machines, the pulp mill and the power plant, has just been upgraded and extended to now cover the wood yard.

Approximately 10 years ago, ABB delivered an MES system to the Frantschach paper mill. Some years later it was decided to install a new system because the original MES system was nearing the end of its lifecycle and because Frantschach mill's corporate structure changed when it became a member of the global Mondi Packaging Group. The mill decided to acquire new production planning, production tracking and quality management systems from ABB in 2002 to cover the production scheduling of the flash dryer, paper machines, winders and rewinders as well as warehousing and logistics. According Maischberger, "Our experience of ABB's earlier systems guided our decision to purchase another CPM solution from them. The applications were designed as multi-mill solutions, possibly covering similar mills belonging to Mondi Packaging in the future."

100 percent assurance online

A template solution, a proto system based on ABB's Industrial^{IT} CPM solution, was created as a first step. IT specialists from the Frantschach mill and ABB's Helsinki base worked together to install the new system. Even though it was based on a standard CPM solution, many customised features were incorporated to ensure that it fitted perfectly into the mill's processes. A challenging additional aspect was the linking of the ABB-CPM solution to a centralized SAP system built simultaneously. The system now supports 70 concurrent users.

A fundamental new feature of the template/proto solution is the Capability to Promise (CTP) feature, which gives a 100 percent assurance online to customers that Mondi Packaging Frantschach is able to deliver the right quality at the right time. Another unique feature, the integrated planning functionality, enables paper producers to forecast the amount of pulp needed for paper and market pulp production and to balance this with the planned production of bulk pulp.



The second generation of MES solutions have been deployed in production planning and optimisation, production tracking and quality management.

A similar system, based on this Frantschach template, was successfully installed at the Mondi Packaging Dynäs mill in May 2006.

Fully integrated solution the key

A fully-integrated mill means that every aspect of the mill can be controlled. The original pulp mill control system was delivered between 1996 and 2000 and was upgraded in 2006 to include the latest advanced features of the current system. This system comprises 12 ADVANT AC450 controllers and 16,000 input/output points gathering information on processes, with about 20 operator workstations. The paper mill system is based on ADVANT AC450 technology which operates all three paper machines on one Distributed Control Network. Therefore sitting in a conference room, for example, an operator can connect online to the pulp and paper mill processes and simultaneously display the continuous cooking process, paper machine operation and QCS in real time.

Access rights are set up so that each user gets the required information for timely and informed decision-making. In the same way, online history data is made available immediately. This fully integrated solution is helping to improve the productivity of the entire mill.

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Data pipeline

Transmission technology for communication in MV switchgear

From the point of view of electromagnetic compatibility, switchgear presents a highly challenging environment. The correct functioning of the equipment, however, depends on reliable communication between its components. Copper wiring is prone to electromagnetic interference whereas optical fibres are fragile and expensive to install. Both also present a risk of cabling errors. As an alternative, ABB is proposing broadband radio-based communication using hollow metal conductors - Waveguide. Radio signals are transmitted through these conductors where they are immune to external interference and do not themselves interfere with other devices. Furthermore, such conductors can be used by multiple communication channels simultaneously and are robust and easy to install.

In view of the introduction of the IEC 61850 series of standards, ABB believes that the time is ripe for a paradigm shift in communication in medium voltage switchgear installations. This change will not stop at the transmission medium. The solution proposed is a closed-system, low-power broadband communication using Waveguides.

Innovative data transmission method

The world of standards has changed and expanded in recent years. The last major innovation appeared on the market with IEC 61850, and more are awaited with IEC 62271-1. The IEC 61850 series of standards, "Communication Networks and Systems in Substations", is being increasingly adopted in the global power engineering market. Initial pilot projects - still limited in their scope - are already in progress to implement these standards. Furthermore, an extensive exchange of experience on current solutions and present limitations of these standards is taking place. The future will require further rethinking in this context.

In a joint development effort involving several divisions of ABB, an innovative (although proven in other industries) data transmission method has been established. This will allow data within switchgear installations to be transmitted with high reliability and simplicity. The approach relies on the use of high frequency electromagnetic waves of low power in a closed system. The principle is simple and versatile. What is needed is a correctly dimensioned Waveguide, a probe that can both receive and transmit, and a coaxial connection to the protection and control device used. Radio technology is an indispensable part of modern life. Wireless communication technology is in use everywhere, for radio itself,

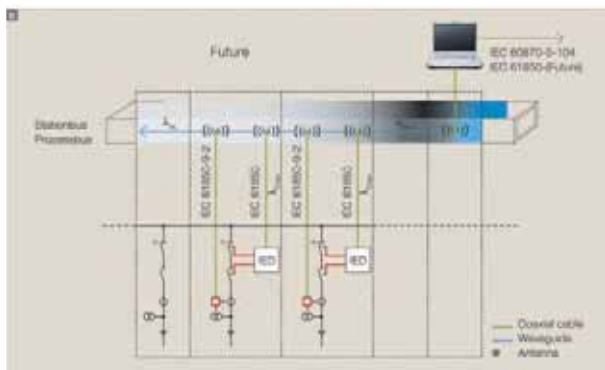
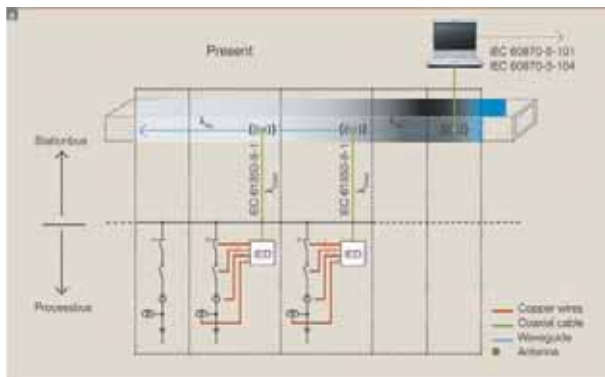
television, telephones and network connections. The present state-of-the-art in transmission systems for all these applications is the digital, wireless network. The first radio signal was transmitted as early as 1886 by Heinrich Hertz using a spark gap. The development of antennas replaced the spark gap in the course of time, but radio operators are still nicknamed "sparks" today.



Waveguide is set to become an integral part of medium-voltage switchgear.

Matching dimensions

If radio signals are to be propagated in a Waveguide with low attenuation, a few simple conditions must be fulfilled. The dimensions of the conductor and the frequency of the radio signal, for example, have to be matched. This means that signals are transmitted with low attenuation only when a certain limit frequency is exceeded.



Waveguide solutions - a present, and b future.

Wavelength and frequency are inversely proportional, and so the wavelength λ_{Limit} has to be smaller than the limit wavelength λ_{Limit} .

The following formula is used for the dimensioning of the system: $\lambda \leq \lambda_{Limit} = 2 \cdot x$ where x is the width of the rectangular Waveguide.

Optical fibres preferred medium

In today's switchgear, the internal communications links (substation bus) are normally established from panel to panel - irrespective of whether serial or binary signals are to be transmitted. With parallel wiring, this is appropriately implemented using loop lines that are plugged into the terminal strip of each panel. Depending on the size of the installation, the complexity of the interlock system and the operator's need for control functions and information, it can involve cable harnesses with over 60 individual cores. Adding or changing signals in the loop lines immediately implies complex rewiring. The work required and the corresponding tests entail high costs for the operator. Only the use of serial communications techniques allows the number of loop line cores to be reduced. With this transmission method, the signals and measured value data are as a rule transmitted serially to a central point. Furthermore, the control commands can be transmitted to the relevant medium voltage panels.

In response to various ambient influences in switchgear applications, optical fibres (optical waveguides) have become established as the preferred transmission medium. In contrast to copper alloys, optical fiber cables are insensitive to electromagnetic interference, but they are also more costly due to their mechanical properties, the greater amount of work involved in installation (eg fitting of plugs, protected routing in conduits) and the need for specialised tools and skilled personnel.

Simple and versatile

The demands for reliability and durability of systems are continuously increasing. Therefore, it became an objective of ABB to find a more suitable transmission medium for panel to panel communication that would fulfill the criteria outlined above and, at the same time, would be simple to use. In addition, this medium had to satisfy the new requirements of the IEC 61850 series of standards. The achievable bandwidth had to be in the range of an optical waveguide (fiber optical cable), but installation had to be significantly easier. The advantage of electrical isolation between the data transmitters and receivers, which is guaranteed by the material of optical waveguides (but not copper conductors), was also to be retained in the new system.

The principle of the Waveguide is simple and versatile in its application. Similarly to the optical waveguide, reflection from one, or rather two, parallel boundary surfaces is required for quasi loss-free transmission of the signal. To achieve this, the two walls (boundary surfaces) must be at a defined distance from each other, which is calculated from the wavelength used (see equation 1). Input and output of the signals are accomplished by spherical antennas. Shielded coaxial cable is used to bridge the short distances between the protection and control devices and the Waveguide, [see Waveguide in comparison with other media] shows a comparison between the various transmission media.

The electrical energy which is injected into a Waveguide by means of an antenna (probe) builds up an electromagnetic wave with E and H (electrical and magnetic) fields inside the conductor. As soon as the limit frequency for the particular system is exceeded, an electromagnetic wave spreads out in the Waveguide and propagates at almost the speed of light. On input, first an E field is created, which results in an H field. Waveguide antenna are in principle reversible, ie, can be used both to transmit and receive HF energy. If the Waveguide is correctly dimensioned, the electromagnetic waves are propagated almost without losses (attenuation approx. 2 dB/km). With the form selected, a low power 5 GHz signal is used. The technology employed corresponds to that of modern wireless local area network (LAN) systems. With a Waveguide, the radio signals are optimally protected from external interference and vice versa - the environment is protected from the radio signals.

Plug and play

The Waveguide segments are arranged in such a way in the low voltage compartments of the switchgear that they are automatically connected together when the panels are installed. Using Waveguide technology, the work involved in establishing panel to panel connections during site installation of a switchgear system is reduced to a minimum, in comparison with conventional loop line systems (typically up to 60 cores). When the panels are joined together, the sections of Waveguide are lined up with each other. The small gaps between the Waveguide sections in each panel unit are hermetically sealed with sleeves so that no contamination from outside can enter the conductor. At the wavelength used, the gap has no adverse effects on the attenuation of the transmission system. In direct comparison with a conventional shielded Ethernet cable, the Waveguide is mechanically more robust, shielded from high frequency interference and, in contrast to cables, electrically isolated panel by panel (similarly to an optical waveguide connection). With this "plug and play" system, the entire communications system can easily be tested during inspection at the works.

Two Waveguide systems a few meters apart, eg a switchgear system installed on opposite sides of the substation, can be connected by means of a passive system consisting of antennas and coaxial cables. From the point of view of network topology, a redundant network would have to be structured in such a way that failure of either a switch or the connection could be tolerated (n-1 principle). In direct analogy to copper or optical waveguide communications systems, this problem is reduced to duplicating the Waveguide access point, as it may be assumed in this case that a communications link via the Waveguide can be regarded as highly robust and therefore safe from failures. In this respect, a highly dependable network can be achieved at comparatively low cost.

Multi-channel technology

The new IEC 61850 series of standards not only describes a simple communications interface on the basis of a substation bus. It also describes a process bus, which permits the connection of intelligent primary devices. These can, for example, be voltage and current sensors or transformers, or switching devices, which have a communications interface according to IEC 61850. When current and voltage measurements (sampled measurement values) according to IEC 61850-9-2:2004-04 [9, 10] are to be transmitted in real time from the sensor/instrument transformer to the Intelligent Electronic Device (IED), or distributed horizontally among the IEDs in a substation (eg, for busbar protection), a robust communications link is of decisive importance. Furthermore, it must be ensured that the physical connection provides sufficient bandwidth for fast transmission, so that no delay that would have an adverse effect on the protection system can occur.



Waveguide in comparison with other media.

With a Waveguide connection, a large bandwidth is achieved using multi-channel technology. In this way, up to 24 independent channels, each with 56 Mbit/s, can be connected to the Waveguide. This design permits not only transmission of vertical and horizontal information to IEC 61850, but additionally allows further services to be implemented via the system. Electricity metres installed in the switchgear can, for example, be read via the Waveguide, or web-based services implemented. Coupling of other active components can be achieved with a corresponding media converter.

Especially for sampled measurement values, the Waveguide provides a connection that satisfies the safety demands of a protection system and the technical requirements of IEC 61850-9-2:2004-04 [9, 10].

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Wired environments keep humans firmly in the loop

New technologies are being wired into homes and offices to provide ambient intelligence, with the human clearly in the centre.

Ambient intelligence refers to an emerging technology that will transform our homes and offices into "intelligent" environments. Technology will be invisibly embedded in our everyday surroundings, there whenever we need it and resulting in the seamless integration of lighting, sounds, vision, domestic appliances, and personal healthcare products to enhance our living experience. Lights will be switched on and off, and blinds will be moved up in response to a range of stimuli, including human activity. Such automation will provide enhanced comfort and productivity, and will reduce energy consumption. It will also provide better communication and security.

Smart & Lean

In keeping with the modern trend for user-friendly intelligent technology, ABB's company, Busch-Jaeger Elektro GmbH, has launched easily programmable touch sensitive display units combined with a range of motion sensitive switches and alarm units under the brand of "Smart&Lean". These products can be incorporated into networks to control everything from music and lighting to blinds and security alarms.

The units monitor human activity using infrared motion detectors, and each has a number of operating modes to satisfy the specific needs of its allocated area. These adjustable modes range from fully automated to fully manual. Heating and cooling functions can be integrated into the system alongside lighting controls, with individual thermostat settings being specified via the central display unit. Key to the success of these devices is their ease of use, combined with elegant design and longevity.



ABB's i-bus EIB allows integration of environmental control for residential and commercial buildings.
1 Display unit 2 Movement sensitive switch



Technology is being used more and more to provide for comfort, entertainment and security needs, and to enhance productivity.

Lighting settings need to be controlled for a number of reasons. Aside from creating the right ambience at a dinner party, building managers may want to reduce electricity consumption by installing timed off-switches in corridors and other communal areas. Or they may want to reduce the risk of accidents by providing motion-sensitive on-switches in dark stairwells. Whatever the reasons, programming the appropriate settings must be quick and easy, and more than one setting must be available. A reading room and a living room have very different lighting requirements. But what if the reader wants to read in the living room? The change from one condition to the next should be achieved by the touch of a single button.

The integration of a music system under similar control would further enhance the desired ambience in a room. The incorporation of a service record, listing of maintenance schedules and equipment renewal dates, would enhance the efficiency and safety of many buildings.

Safety and security

Globally, demand for better home security systems is increasing and the integration of additional functions alongside ambience settings in an intelligent environment can provide considerable benefits to the home owner. Functions such as "door unlocked"

and "window left open" warnings and alarms for security motion detectors along with the more standard alarms and audio features are now becoming available. A more advanced feature allows lighting and blind settings to be recorded in a home over a week of normal occupancy. This sequence can then be replayed during periods when the home is unoccupied. The "simulated presence" provided by this function gives the absent occupier a feeling of comfort, knowing that the house appears to be in use. The application of video surveillance equipment takes security monitoring to a higher level, even allowing remote surveillance of properties.

Energy efficiency equipment

As demand for electricity continues to grow, periods of peak load are becoming more difficult to handle. To avoid black outs caused by excessive demand on limited supplies, electricity generators offer cheaper tariffs to encourage off-peak use. By incorporating this information into the integrated control systems of homes and offices, significant savings can be made. On a larger scale, control systems of the future will allow functions to be prioritised so that non-essential services can be reduced or suspended when the risk of network overload is imminent. To implement these features, each individual appliance must be accessible remotely and low-priority appliances must be distinguishable from more essential equipment such as alarm systems, computers and freezers. This will allow electricity providers to define schedules for each level of equipment, and to shed loads accordingly. The same information bus used for the integration mentioned above would provide the backbone necessary for such energy efficient use of equipment.

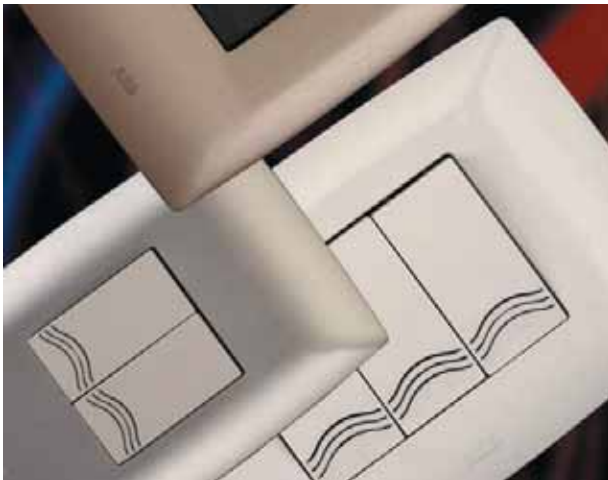


ABB South Africa's new ABB WAVE electrical wiring accessories.

Little escapes its attention

The Busch-Jaeger system is centred on a fully graphical, LCD panel. The touch-sensitive panel is used to display and operate up to 210 switching and control functions via overviews and drill-down screens. The screens define individual rooms or areas and

can be configured to meet the needs of individual end users. The information bus, on which the system is based, is the ABB i-bus EIB. For programming and commissioning purposes, a multimedia/SD (secure digital) card is the preferred medium, but modifications can also be handled via the EIB bus and a simple computer-EIB interface (RS 232 or USB).

The infrared motion detector in each Busch-Jaeger comfort switch has a range of 170°C, so little escapes its attention. The switches use two-wire technology combined with an external input to provide convenient integration into any cross-connection. The system is inherently safe and can be installed with minimal disruption to existing services.

Intelligent building a reality

The intelligent building is gradually becoming a reality, but its success depends on the development of systems that are easy to use. ABB Busch-Jaeger has taken on this challenge and launched a range of "Smart&Lean" devices that can be networked to control lighting, blinds, screens, room heating and cooling, alarms and intercoms. Embedded sensors measure temperature, light levels, wind speed and human activity, giving rise to audible/visible alarms or mechanical responses. The network is based on the ABB's i-bus EIB that allows the integration of environmental control, entertainment and security systems, and more. It is configured via a user-friendly, ergonomically designed touch panel through a series of easy to read screens.

The system operates under the guiding principle that technology should serve the user - not the other way around. This guarantees that ambient intelligence will enter homes and offices unobtrusively, relieving the human occupants of tedious responsibilities, while keeping them firmly in charge of the loop.

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364DS

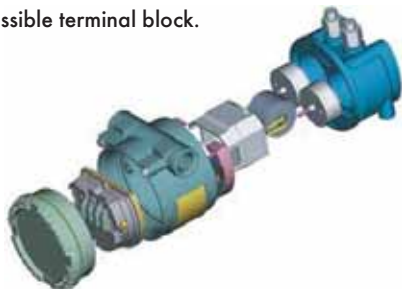
The "common sense" approach to pressure instrumentation design

Today's sensor devices are certainly high-tech, but the rate of innovation in sensor technology over recent years has been disappointingly slow. This is because most users would rather stick with tried and tested technologies than expose their processes to the potential vagaries of new instrumentation. Reliability therefore has highest priority in the eyes of an instrumentation user, then comes accuracy and cost. ABB's response to this need is the 364DS pressure transmitter which is reliable, robust, compact and simple.

The new devices were reduced to a minimal number of parts and material variants. Housings and flanges were simplified and reduced in size and materials specifications were raised (eg stainless steel was chosen as the standard instrument housing and Hastelloy C was used for the seal diaphragm). Most importantly, all potential sources of leakage were eliminated by removing gaskets and introducing an innovative "all welded" body, a technology that has since been patented by ABB.

All-stainless steel housing

Encasing a pressure transmitter in an all-stainless steel housing is an attractive, but expensive, option and aluminium housings are often used to cut costs. Now, thanks to ABB's new design, the cost of an all-stainless steel housing has been reduced. The new housing has been designed and assembled to operate at more than four times the required explosion stress. Tests have shown that it can tolerate an internal pressure of approximately 100 bar (100 kg/cm²) with no significant deformation of the mechanical structure. The housing also protects the sensor from vibration and physical shock. Although smaller than its predecessors, the 364DS series are easily accessible due to the "all welded" body which incorporates the housing for the electronics as well as a large, fully accessible terminal block.



The "all welded" body of the 364DS pressure transmitter incorporates the housing for the electronics as well as a large, fully accessible terminal block. (Exploded view.)

Easy set-up

One major source of problems with any new electronic device is complicated set-up. The HMI (human machine interface) of the 364DS is centred on four buttons that allow the user to navigate easily through a self-explanatory menu, similar to those used in current cell phones. The HMI also offers a choice of operating languages.

Reliable, robust, compact and simple

The instrument housing has an ingress protection rating of IP67 (NEMA 4X), but the instrument itself can actually work with covers removed in environments of 100 percent humidity.

The 364DS is a typical "off the shelf" product and, despite its stainless steel construction, weighs much less than its aluminium-housed competitors. The units are also equipped with replaceable, upgradeable electronics, an auto-repairing database, remote indicator options, a flow totaliser, programmable alarm saturation limits, advanced internal diagnostics, and a square root cut off.

Base accuracy of the new instruments has been improved to 0.06 percent of the upper range limit (URL). More importantly, the influence of temperature has been limited to a maximum of 0.15 percent in the -40°C to +85°C range. Stability has been improved to keep errors below 0.15 percent of URL over the transmitter's 10-year working life.

A common sense approach to design and development, combined with ABB's experience in the field, have produced a series of transmitters that will provide customers with the maximum return on their capital with the highest degree of safety.

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Pampered by paint robots



Bumpers for 150 cars a day are produced at Venture's Rosslyn plant.

Mention "robots" in South Africa and people will think you are talking about traffic lights on the city streets. But the ABB robots at the Venture plant in Rosslyn don't only look different, their mission is far classier: easing the flow of shiny, new BMW's off the assembly line.

Mechanised colleagues

Nine imported paint robots made their debut on bumpers and side-skirts manufactured by Venture for BMW's assembly line in Midrand, several kilometres away. "The decision to go to robotics was to make the process more consistent," says Venture plant engineer Dean Vernon. "It is absolutely precise every time – it is all about accuracy." Workers at the Venture plant took their new mechanised colleagues in their stride – after receiving assurances that none of them would be fired due to the automation.

Instead Venture trained the displaced workers at another plant using similar robots, so they would be ready for them once they were installed. As ABB staff set up the robots and trained Venture workers in their use, frenzied construction began for a new plant that would become their home. Eight months later, the nine robots were already producing painted bumpers for 150 cars a day.

The new plant has the super clean look of a hospital and the ambience of a spaceship. Posted on two long whiteboards in the spotless hallway were scores of complex statistical charts of temperature trends and paint colours.

"It is like a surgery in there – we have temperature controls, stainless steel floors, and everything is extremely clean," says Vernon. A walk down the 100-metre corridor of the new plant

offers views of the teams of trafficcone orange robots involved in a curiously graceful choreography of bends and bows as they methodically spray slow-moving racks of bumpers and sideskirts. "Sometimes they look like they have personalities because of the way they move," says ABB engineer Pieter Prinsloo.

Reduce surface tension

The first section is titled the "Flaming Room" where two ostrich-sized robots bend long necks at the plastic bumpers to spew an even blue flame to reduce surface tension and enable the paint to stick better to the surface.

Next is the "Prime Booth" where two bulkier robots spray red, grey or white priming paint to prepare the bumpers for the final colour. Walls in each enclosed room are coated with grease to catch any stray mote of dust or dirt that might tarnish the paint-job. The robots tend to take from 25 to 30 seconds to paint each auto part, depending on its dimensions. Like an excruciatingly slow amusement park ride, the racks of bumpers then ease down into the "Basecoat Booth" where three robots wielding multi-pronged applicators focus on applying more colourful paints to the bumpers, such as "Japan Red" and "Monaco Blue."

Outside this room is another white board containing several weekly "defect analysis" charts, which pinpoint any problematic trends in a particular colour. Ironically, the colour that can cause the most problems is the austere Alpine White, a favourite among car buyers. "It is a very difficult colour because you are working from a black substrate and if there is a problem the white comes out looking almost blue," says Neville Van Wyck, a Venture robot operator. Three basecoats are applied to each piece as they inch their way down from one robot to the next.

The final stop is the "Clearcoat Booth" which is a favourite because the two robots there apply that last final coat of clear shine that gives a new car that glimmery gleam. At this point the work of robots is done. Flesh and blood employees take over for the one final check of the finished product in the "Wet inspection room," and then the bumpers are ready for their next ride: the BMW assembly plant.

16 shades to choose from

About 50 cars are included in each colour sequence, with an array of about 16 different shades to choose from. Yet the most popular colours tend to be the most conservative, with shades of silver, black and white leading the rest. Although the favourite paint colours don't change too much, the content of the paint itself has become more environmentally friendly in past years. The arrival of paint robots to the Venture plant also introduced the change from solvent-based paint to the less harmful water-based paint. ABB has also supplied a "paint

kitchen" to Venture where all the different arrays of paint are mixed and stored according to their specific temperature needs. In the past in a different factory, Venture set up robots and paint mixing section with two different companies, but found it too time consuming to juggle them both.

"ABB is the best at the automation side and they are good on the paint side as well," says Vernon. "We learned in the past how complicated it is to have different people on each side." Monthly troubleshooting meetings are held with ABB staff and there is also a person on call 24 hours should any urgent problem arise. With one less complication out of the way, the Venture staff plans to continue to fine-tune their new robots so that they will be supplying parts to 200 cars a day. "Right now we are trying to squeeze every last drop of juice out of them," says Vernon with a smile.

The nine ABB robots at work painting bumpers for Venture in Rosslyn, Pretoria boast many benefits:

Reliability

While the robot uptime is about the same as regular workers, their performance is smoother and more thorough.

Savings

The focused and methodical spraying technique used by the robots saves on paint, with less messy spillage.

Better technology

The paint flowing through the ABB robots becomes positively charged and therefore sticks more efficiently to the targeted bumpers.

Greater quality control

Any irregularities in the bumpers painted by ABB robots can quickly be corrected as opposed to the unpredictability of human error.





Venture's vitals

Venture's bumpers can be found all around the world on cars exported from South African assembly lines.

US-based Venture entered the South African market in 1997 and in 1999 moved to consolidate and merge manufacturers of plastic components for the motor industry.

Venture South Africa supplies bumpers and plastic fittings to all VW, BMW, Daimler Chrysler and Toyota exports from South Africa.

Through a vigorous capital investment programme, some 100-million US dollars were invested over a four-year period in South African plants in Durban, East London and Rosslyn, Pretoria.

Venture South Africa employs 250 workers.

ABB's robotics solutions

ABB is a leading supplier of industrial robots - also providing robot software, peripheral equipment, modular manufacturing cells and service for tasks such as welding, handling, assembly painting and finishing, picking, packing, palletising and machine tending.

Key markets include automotive, plastics, metal fabrication, foundry, electronics, pharmaceutical and food and beverage industries. A strong solutions focus helps manufacturers improve productivity, product quality and worker safety.

ABB has installed more than 150 000 robots worldwide.

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Projects & News

'Little, big air circuit-breaker' launched in South Africa

ABB has launched the 'X1', a new addition to its Emax series of air circuit breakers in South Africa. Dubbed 'the little, big air circuit breaker', the X1 is suitable for rated currents up to 1,600 A. The selective version has a rated short-time withstand current of 42 kA, whereas the current-limiting types have a rated ultimate short-circuit breaking capacity of 150 kA at 415 VAC.

The X1 air circuit-breaker can be mounted on a steel plate vertically or horizontally, whether in the drawout type or not. A new locking system to draw out the movable parts prevents unintentional and potentially hazardous switching operations.

Connections of the power circuit-breaker to the external power supply are implemented with a new quick wiring system. This means that there are no more cables within the device, no screws for internal connections and no larger overall dimensions of the air circuit-breaker.



Power projects awarded international health and safety certification

ABB South Africa's Power Technologies Systems (PTS) division has been awarded an OHSAS 18001 health and safety management system certification - the first such international certificate for projects in the company.

Carl Watson, manager responsible for the PTS division, accepted the listing certification on behalf of the company.

A great accomplishment

"We are honoured to receive this listing certificate," said Watson.

"It's a great accomplishment mainly because of the complexity of recording and controlling many aspects for projects running on multiple sites. Hard work and determination of the team involved in preparing for certification made this possible."

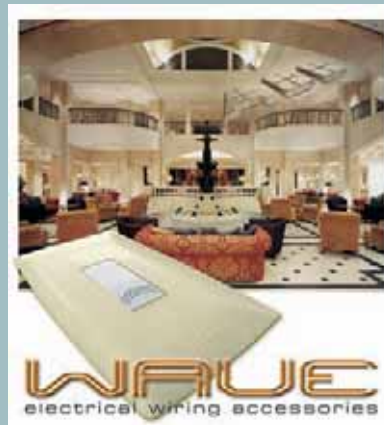
The OHSAS 18001 listing covers health and safety management systems, training, procedures and processes at PTS offices in Sunninghill and all sites where it runs projects such as at Tutuka Power Station, Kriel Power Station and other customer operations.

New range of electrical wiring accessories introduced

ABB South Africa has introduced ABB WAVE, a new range of quality electrical wiring accessories and automated systems for homes and offices.

"We are well known for heavy electrical engineering in this country but in many parts of the world ABB is a household name because of our electrical wiring accessories. Now ABB will offer these products and systems to residential and commercial building owners in South Africa," says Per Wanland, senior vice president for Automation Products at ABB South Africa.

Products are made from robust materials that are colour-fast, UV and weather-resistant, break-proof and PVC and halogen-free.





WAVE
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