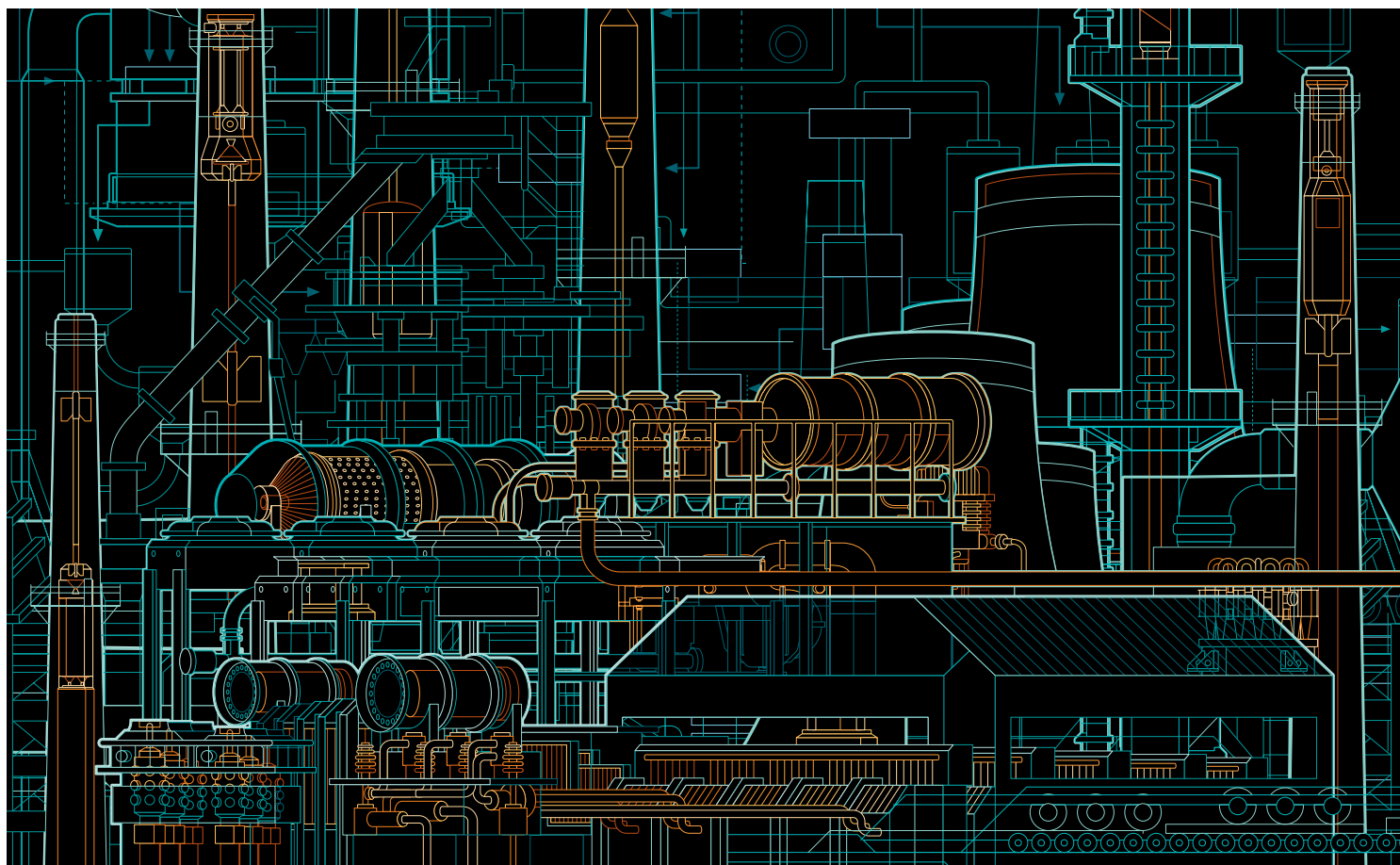


UNITROL now



Exciting your industry

Innovative power house solution 04

Grand Coulee Dam - US Bureau of Reclamation

UNITROL® 1010 ready for traction 10

Latest AVR used within locomotives

IEEE PES Prize Paper Award 12

ABB's excitation systems team wins major award



04

Improving energy capacity by 15 percent at Grand Coulee Dam, Washington, USA

ABB and US Bureau of Reclamation
representatives in front of the majestic dam



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UNITROL® 1010 inside locomotives

ABB AVR for synchronous generator now used
within the electrical system of locomotives

UNITROL now 66|12



Aija Mankkinen

Head of Excitation Systems

Dear Reader,

Welcome to the latest issue of *UNITROL now*.

Exciting your industry - that's our goal and driving force. In this issue we show the diversity of industries where our products/systems can be implemented. We start in the water power industry, where we present our innovative power house solution at the majestic Grand Coulee Dam in the US on page 4. You can then read about the retrofit at Rugeley Power Station (coal-fired power plant) on page 6 and the implementation of IEC 61850 in the power generation industry in general. On page 10 we describe how our latest AVR can benefit electrical systems on locomotives. Finally, we take a look at two exhibitions that we have attended recently: one for the oil & gas industry and the other focused on sugar.

Furthermore, I am really proud to announce

that we were awarded the IEEE PES Prize Paper Award 2012 for an outstanding paper written by three of our ABB Excitation Systems team members - more information on page 12.

I hope you enjoy reading this issue of *UNITROL now*.

Thank you for your interest, support and collaboration throughout 2012.

Wishing you and your family a happy holiday season and a new year filled with peace and prosperity.

Kind regards



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Prize Paper Award 2012
IEEE Power & Energy
Society award won by
ABB Excitation Systems



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Product launch for the new UNITROL® 1000 family members
Exciting and informative customer/partner day in Turgi, Switzerland

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Upgrade of existing AVR with UNITROL 6080

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Forthcoming opportunities to meet excitation systems experts and experience live demonstrations



ABB delivers an innovative power house solution to Grand Coulee

Text Daniela Cristinziani

ABB is helping the US Bureau of Reclamation improve its generating capacity by 15 percent thanks to laser-like customer focus and close collaboration across intercultural ABB teams.



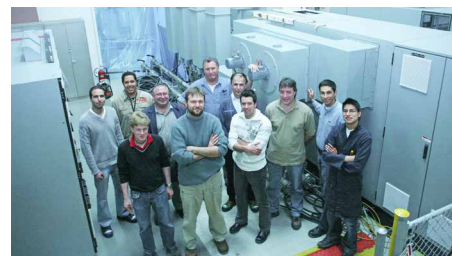
ABB has successfully developed and implemented a winning solution for the United States Bureau of Reclamation's (USBR) Grand Coulee Dam, located on the Columbia River in Washington State. The USBR is the second largest producer of hydroelectric power in the United States with operations and facilities in the 17 western States. The gravity dam was constructed between 1933 and 1942 to produce hydroelectric power and provide irrigation to fuel the growing industries of the north western United States, during World War II.

USBR is well on its way to achieving its mandates in meeting increasing water and generated power demands while protecting the environment and the public's investment in these structures. Upgrading Grand Coulee's third power house is helping to fulfill its mission by increasing the future generating capability.

ABB's scope of supply includes a turn-key solution to replace the aging exci-

tation systems in the third power house with 6,000 Adc water-cooled static exciters (UNITROL® 6800) with water-cooled transformers for the six hydroelectric generators which together have a total capacity of 2.7 GW. ABB is also providing equipment removal services, installation, commissioning and training to the USBR.

At the half way point in the project, ABB has successfully completed and commissioned the first three units and expects the remaining three systems will be completed as efficiently and successfully, allowing the USBR to continue accomplishing its mandates.



The successful ABB team coming from Canada and Switzerland.

Upgrade for Rugeley Power

UNITROL® 6080 has replaced the existing AVR units

Text Mark Garside

Rugeley Power Limited's coal-fired power station in Staffordshire, UK is part of a joint venture between International Power (a wholly owned subsidiary of GDF SUEZ) and Mitsui & Co. It has been in operation for over 40 years and is currently capable of generating around 1,000 MW for the National Grid. Flue gas desulphurization (FGD) equipment was completed in 2009 and Rugeley is now investing in the upgrading of the power station's original 1960s vintage automatic voltage regulators (AVRs) as part of its commitment to ensuring safe and reliable operation.

ABB's technical expertise and extensive experience in retrofitting excitation systems, adding to the proven reliability of its AVRs, helped secure these upgrade orders. Two new UNITROL 6080 AVRs

with dual auto channels and dual power converters are replacing the existing AVR units, while retaining the rotating exciters. The first order was awarded in 2010 and that unit has now been in operation for around two years. The second order was awarded in February and successfully commissioned in September 2012.

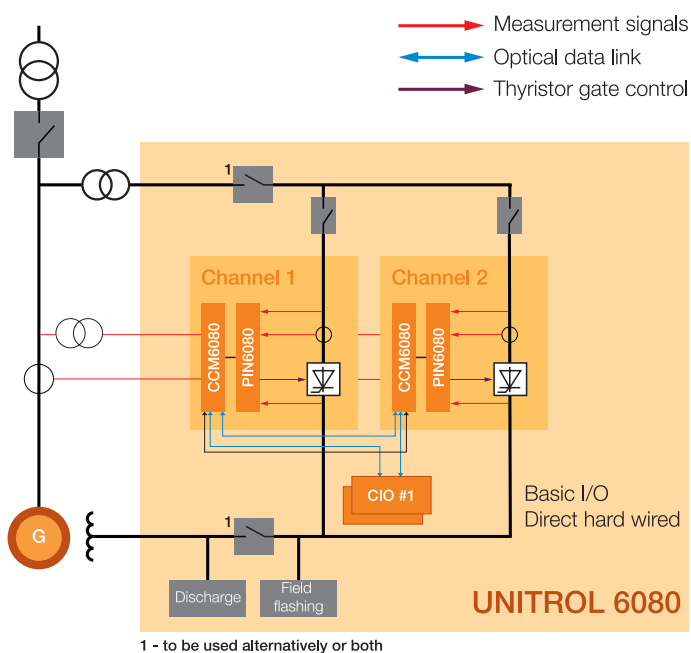
The UNITROL 6080 AVR is one of the latest development in ABB's highly successful line of UNITROL Excitation Systems. The UNITROL 6080 is based on the AC 800PEC high performance processor family, which is an extension of ABB's 800xA control platform, developed to meet the fast control requirements of power electronics. It meets current grid code requirements while the dual-channel configuration of the UNITROL 6080 significantly improves the reliability of the plant. The excitation control terminal

and the Ethernet connection with OPC protocol are further options that allow simplified operation, monitoring and maintenance of the new excitation systems.

ABB's project team and Rugeley power's station staff worked closely together to commission the new equipment, including interfacing with the existing station systems.



UNITROL 6080 AVR for Rugeley Power Station



General hardware concept of UNITROL 6080 (without backup channel)



IEC 61850 for UNITROL[®] and SYNCHROTECT[®] used in power generation

Text Wolfgang Knapp, Werner Zimmerli

IEC 61850 is the new communication standard for substation automation worldwide. More than 1,000 plants, based on this standard have been commissioned since it was introduced in 2005. Recently, the application range is extended to power generation and so the second edition of IEC 61850 has become a standard for power utility automation.

IEC 61850 is considered the successor of the original IEC 60870-5 family in power systems. At first sight the two standards, created by the same IEC Technical Committee "TC57", might appear similar. But there are fundamental differences, and many experts believe that after the success with substations, IEC 61850 will also gain acceptance in power plant industries. What makes them so confident?

Compared to IEC 60870-5, which is based on a signal-oriented data model, IEC 61850 data model is strictly object-oriented. This makes also a major

difference to all other well-known communication protocols such as Profibus and Modbus. Standardized object names provide a high level of system interoperability across different generations of intelligent electronic devices (IEDs) and even across vendors – an old dream of system integrators! Components become independent of the communication system. This enables a comprehensive life cycle management of the plant.

The data model supports both, client-server-services for a safe plant management and publisher-subscriber-services for time-critical data transfer between IED's eg, events (GOOSE) and sampled values (SV). Coding and transfer are done with a stack from main stream components (MMS, TCP/IP, Ethernet with typically 100 Mbit/s). This results in a higher level of integration, common communication networks and common tools, thereby helping the user to save cost.

ABB is one of the leading companies for IEC 61850 applications in substation automation. With IEC 61850 interface now available for the auto synchronizer SYNCHROTECT 5 and the excitation system UNITROL 6000, ABB once again leads, this time for power generation applications.

The first power plants using IEC 61850, such as Karlsberg brewery in Germany and Jirau hydro power plant in Brazil, are already commissioned or under construction and will soon go online.



Az Zour Emergency Power Plant 08 in Kuwait is equipped with five gas turbines and MEGATROL CS.

MEGATROL Cross Start (CS)

Text Tobias Keller

Redundancy for static starters

Starting gas turbines with static starters, using the main generator as the startup motor to accelerate the gas turbine to firing speed, is a well proven technique. Among the advantages it provides fast startup times and adjustable speed dependent torque to reduce the stress applied to the turbine and the generator.

With the MEGATROL product family, ABB offers a product containing a static starting device and excitation – a package that allows you to start and excite your gas turbine and its generator. The MEGATROL product family is divided into three segments, MEGATROL light (3 MW starter, 2000 A excitation), MEGATROL medium (5 MW starter, 3000 A excitation) and MEGATROL power (15 MW starter, 6000 A excitation).

There is also a fourth member of the MEGATROL family – MEGATROL CS. MEGATROL CS is a cross-start functionality available for all different MEGATROL sizes. Depending on the structure of a static starting device, the DC-link, the rectifier and the inverter converter, it is not possible from a power electronics point of view to just create a redundant structure to allow a safe N-1 operation. Considering all possible faults, it would be required to add an additional static starting device in parallel. Economically, this can prove expensive. The number of static starting devices is even further reduced as the static starting device is only active for a few minutes for starting purposes. Nowadays, two gas turbines are often started with just one starter. But if this starter fails or is under maintenance, it wouldn't be possible to start two gas turbines. This is, of course, an unacceptable condition. The well-known and proven solution here is to interconnect all static starters with a common bus and to add isolators in such a way that a cross-connection from one starter to all or at least a subgroup of gas turbines is possible. As this interconnection takes place on a medium voltage level, safety is paramount. Another important challenge is the integration of the cross-start into the unit control or plant control systems. As the unit control is typically

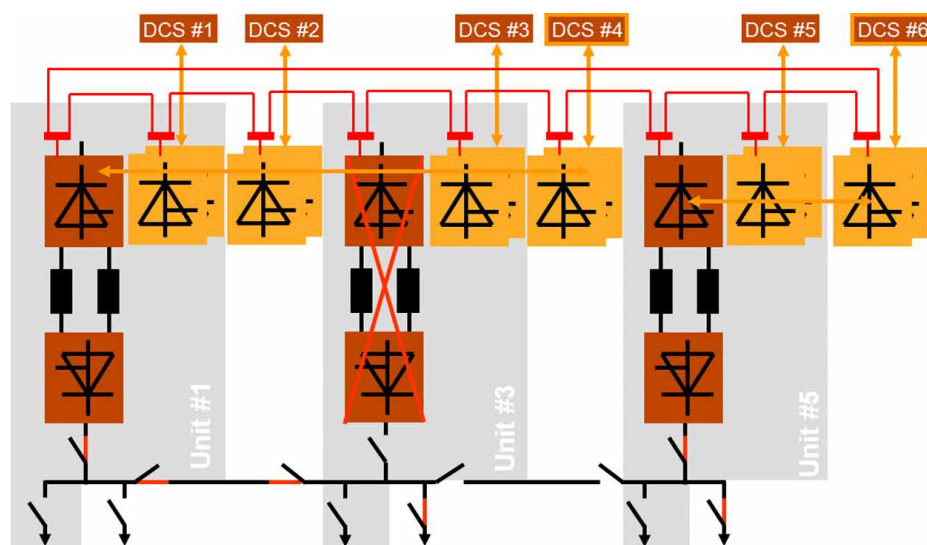
limited to controlling one single unit using cross-start as an interconnection between different units, needs horizontal communication towards the other unit's controls. At a plant control level, the speed and interaction possibilities are quite often limited.

MEGATROL CS is an advanced software which can be easily integrated into the MEGATROL system and takes over the control of these cross-connection isolators and the communication to the control system.

Depending on the plant setup, MEGATROL is configured in such a way that it automatically detects the network topology and recognizes available starters. The unit control system is just sending a start command to the excitation connected to the generator of the gas turbine that needs to be started. If this

unit has its own starter available, this starter is selected and all signals are directly forwarded from the excitation to the static starting device. If there is no starter available, an available starter will be selected, the commands and status signals will be redirected from the excitation to the selected starter and the gas turbine will be started after closing all required cross-connection isolators through MEGATROL CS. The control system must neither take any action nor forward any signal, all of the communication is done via generator-related excitation. As MEGATROL CS is running on the excitation itself, it is not required to add an additional controller. As it is possible to have a redundant excitation setup, MEGATROL CS is redundant itself and can also take care of safety.

Typical MEGATROL CS setup



MEGATROL CS setup with six gas turbines and three starters, all interconnected.

UNITROL® 1010 ready for traction



ABB has successfully implemented the new UNITROL 1010 traction plate outside the traditional power projects. The redundant AVR system configuration ensures the highest availability for any railway operation.

Text Laszlo Matucza, Rudolf Moeckli

ABB in Switzerland has just launched the UNITROL 1010 and UNITROL 1020 automatic voltage regulators (AVRs) with suitable measurement bandwidth for variable-speed applications.

Alongside traditional on-site power projects, the UNITROL 1010 AVR is well designed for other applications in marine, wind, crane, mining and rail industries.

Rail employs increasing numbers of advanced diesel-electric locomotives for routes without electrification. The power generation of a diesel-electric locomotive is based on a diesel engine driven variable-speed brushless synchronous generator.

The nature of the use and variable-speed operation requires several important features from the applied AVR:

- dynamically V/Hz limiter with suitable bandwidth for the operation
- flexible source power strategy to provide sufficient excitation power over the full speed range of operation
- wide range of operating temperature
- shock and vibration resistant execution
- high availability

The UNITROL 1010 AVR has all of the above characteristics. External parts for UNITROL 1010 AVR module are selected only from railway approved components according to EN50155 and are assembled with special care on a system plate to withstand continuous vibration. Redundant AVR system configuration will en-

sure the highest availability mandatory for any railway operation.

ABB's traction and machines products groups are working together to provide a single partner for electrical systems on locomotives. This has resulted in several UNITROL 1010 AVR projects including:

- Vossloh - EURO-Light
- Vossloh - UK-Light
- CSR - Australian Pacific Railways

UNITROL 1010 is a milestone among ABB's AVRs making its public debut into railway projects.



ABB traction converter, CC1500 DE Vossloh



ABB traction generator and motor

UNITROL 1000 systems

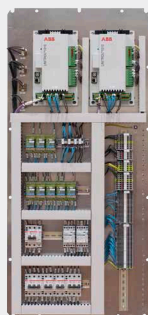


ABB UNITROL 1010 traction plate

ABB provides over 100 years of experience in building project-specific engineered systems for any applications.

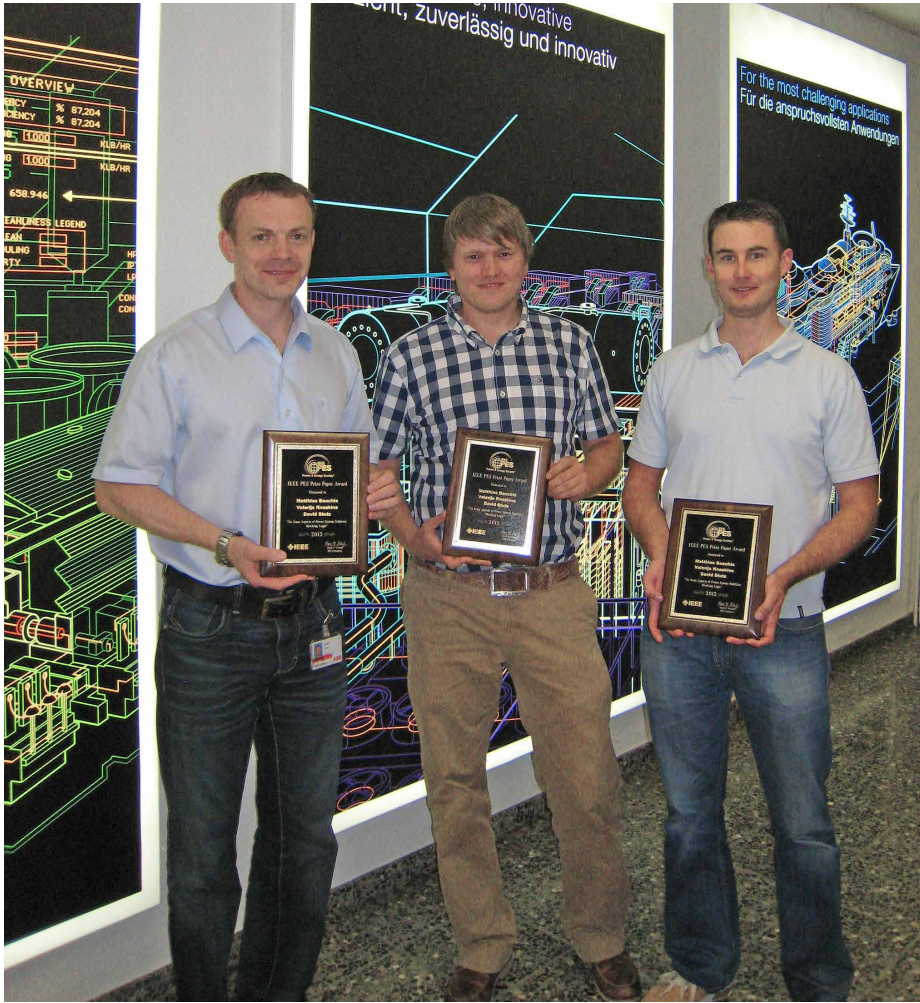
Various systems, depending on the customer's needs, are offered:

- Single channel systems
- Dual channel systems
- Mounting on a plate or in a cubicle

Systems include protection breaker and exciter field breaker. They are fully tested in the ABB factory and AVR setting can be ordered preset.

Ask our **experts** for more information.

IEEE PES Prize Paper Award 2012 goes to ABB Excitation Systems



Congratulations to our colleagues for this great achievement.

A paper entitled “On some aspects of Power System Stabilizer Blocking Logic”, written by Matthias Baechle, Valerijs Knazkins and David Stutz from ABB Excitation Systems, has received the prestigious IEEE Power & Energy Society Prize Paper Award 2012.

The IEEE Power & Energy Society (PES) sponsors 26 society-level awards. All award recipients are selected through a competitive, vetted nomination process. From some 3,000 papers per year only two gain final recognition.

PES selected three of ABB's excitation systems development team as the 2012 recipients of the prestigious IEEE PES Prize Paper Award. The paper reported the discovery that an optimally tuned PSS can destabilize the generator. The solution, highlighted within the paper, describes how potential large-scale disturbances can be prevented, thereby helping to avoid blackouts.

An abstract of the paper is accessible [online](#). To read the complete paper you need to have a subscription.

IEEE Power & Energy Society (PES)

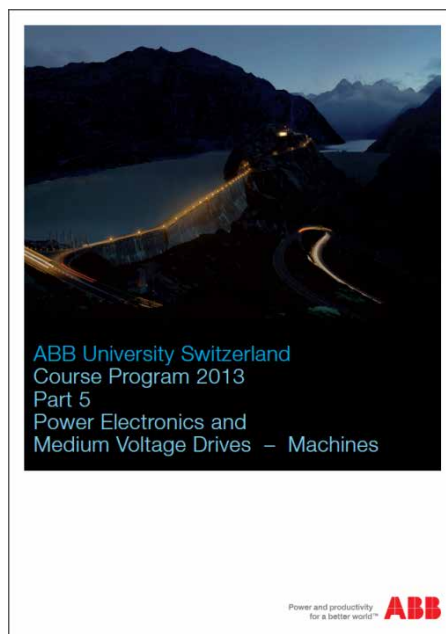
Interested to know more about IEEE PES? Take a few minutes and watch the video link below.



[IEEE PES video on YouTube](#)

2013 Course Program out now

A diversity of courses are available to help increase awareness, skills and know-how about ABB's excitation systems, services and technologies.



2013 course program

The new course brochure can be downloaded [online](#) or a hardcopy can be ordered via e-mail from the responsible learning center.

Benefits of training

The training courses support ABB's customers to increase their return on investment, reduce down time and improve the skills and motivation of their personnel.

Extended course offering

The course range for the UNITROL® 1000 product family has been extended. A new standard training course, named J131 UNITROL 1010/1020 Service and Commissioning is now part of the course program.

Course goal:

UNITROL 1010 and UNITROL 1020 provide a comprehensive range of automatic voltage regulators (AVRs) and are intended for small generators and industrial synchronous machines. The course goal is to teach students to operate, maintain and commission as well as troubleshoot both AVRs.

Learning objectives:

Upon completion of the course students will be able to operate the system either using the front panel or the PC tool, perform standard maintenance and troubleshooting work and put the UNITROL 1010 or UNITROL 1020 in operation.

Course information and registration

Information about standard training courses such as course descriptions, prices, schedules and registration forms can be found through our course locator on the following web portal:

www.abb.ch/abbuniversity

For customized training courses, please contact:

ABB Switzerland Ltd
Learning Center Power Electronics and MV Drives
Austrasse
CH-5300 Turgi
E-mail: Training-for-Power-Electronics-and-MV-Drives@ch.abb.com

UNITROL® 1000 up close and personal

Product launch of UNITROL 1010/1020 at ABB in Switzerland

Around 40 customers and partners visited ABB's Power Electronics facility (Turgi, Switzerland) in October. The UNITROL 1000 product launch event provided an opportunity for hands-on experience of the latest generation of automatic voltage regulators (AVRs) and to exchange opinions with ABB's technical specialists.

Event at a glance

The opening morning was dedicated to UNITROL 1010, UNITROL 1020 product-specific presentations, followed, in the afternoon, by live demonstrations of the new AVR and its commissioning and maintenance tool, the CMT1000. "We are particularly proud of our CMT1000 tool. It has a very intuitive interface. You can master the program in one or two hours", commented Rudolf Moeckli, Product Manager of UNITROL 1000 family.

The day ended with factory tours covering the whole ABB Power Electronics and MV Drives production facility in Turgi.

According to feedback, visitors were impressed by the technical know-how of the hosting excitation systems team and showed a lot of engagement while examining the demo units.



- 1 First part of the event: Presentations (EN and DE)**
Power Electronics Center, UNITROL portfolio, UNITROL 1000 overview and grid codes, service portfolio
- 2 Second part of the event: Live-demonstrations**
UNITROL 1000 - CMT, engineered solutions, PSS and training simulator
- 3 Final part of the event: Factory tours**
MV drives, traction converters, high power rectifiers, power converters and excitation systems

Rio Oil & Gas - Expo and Conference

A leading industry event in Latin America

The 30th Rio Oil & Gas exhibition took place from 17 to 20 September 2012 in Rio de Janeiro, Brazil. ABB displayed its latest products and systems for the oil & gas industry.

The conference is a prominent place for networking, discussing major technological issues and promoting innovative ideas. Similarly, the exhibition was an outstanding opportunity for ABB to showcase its innovations to more than 50,000 national and international visi-

tors. On the ABB booth products and services such as UNITROL, Azipod, MNS panel, drives and motors, control technologies, measurement products, a turbo and an Azipod model were displayed.

ABB showed its new factory, which will produce drives and motors, contributing to the nationalization index required by customers.

The ABB booth even appeared on the news 'Bom dia Brasil', at Globo television,

the most important TV channel in Brazil.

More information, videos and images of the event can be found on the [official website](#).

Expo and conference 2012 in numbers:

Visitors: 53,086

Exhibition area: 39,500 m²

Participating countries: 27

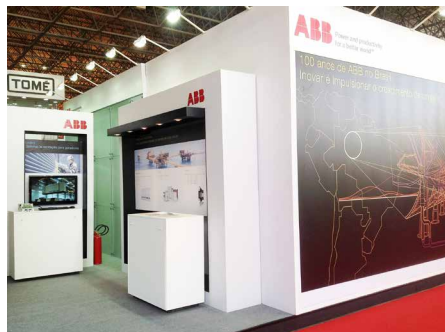
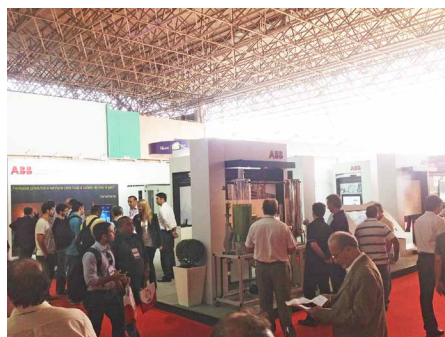
Press: 300

Delegates: 4,400

Exhibitors: 1,300

International pavilion: 14

Technical papers: 586



Fenasucro&Agrocana 2012

Largest sugar-energy industry world summit

Fenasucro&Agrocana is a leading trade show in over 40 countries. The show focuses on the sugar industry and its demand for energy. ABB recently participated at the event in Brazil.

Thousands of technically qualified visitors from the sugar industry attended the exhibition and conference in Sertãozinho - São Paulo this year. The city and its surroundings, are known for their strong economic links to the sugar cane production. There are 438 sugar and ethanol power plants in Brazil.

ABB showcased its latest portfolio of products and services including excitation systems. The outcome for ABB was very positive, with new and valuable contacts established.

Further information and news around the event as well as the sugar cane industry can be found on the [official website](#).

Upcoming Events

ABB Automation and Power World

Exhibition and Conference
Umwelt Arena Spreitenbach
Switzerland
April 22 - 26, 2013

UITP Geneva 2013

60th World Congress and Mobility & City Transport Exhibition
Geneva, Switzerland
May 26 - 30, 2013



UNITROL® 6000. Proven excitation solutions with over 100 years of experience.



ABB is the world leading volume supplier of UNITROL® automatic voltage regulators (AVR) and static excitation systems (SES) - known to provide a high return on investment for many years. UNITROL® 6080 (AVR/SES) and UNITROL® 6800 (SES) are designed for any type and size of power plant and bring a new benchmark in flexibility, reliability and connectivity. They are built to meet plant-related operational requirements, as well as relevant industrial standards. Moreover, the flexible engineering concept ensures smooth refurbishment solutions that perfectly suit given plant conditions. To find out more, visit www.abb.com/unitrol