



## Page 6

HVDC transmission – the first 50 years!



## Page 14

HVDC superhighways for China

### 6 50 Years of HVDC transmission: Parts I and II

Gunnar Asplund, Lennart Carlsson, Ove Tollerz

1954 saw the world's first commercial high-voltage direct current transmission link go into service between the Swedish mainland and the island of Gotland. 50 years on, with many innovations to its credit, ABB is still the undisputed leader in HVDC technology.

### 14 HVDC superhighways for China

Leif Englund, Mats Lagerkvist, Rebati Dass

ABB and the State Power Grid of China are cooperating in the construction of HVDC transmission highways that will carry electricity from the Three Gorges power plant to China's main load centers. The recently inaugurated 500-kV, 890-km link to Changzhou can operate at world record levels of up to 3300 MW.

### 21 Advanced FACTS control

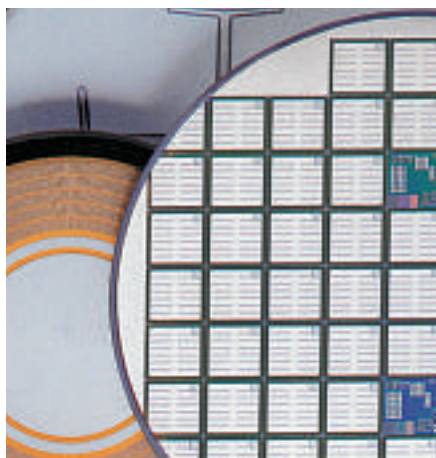
Göran Andersson, et al

In a joint project with two leading universities, ABB is working to solve problems involved in coordinating wide area control for the purpose of power flow control and damping of oscillations in electricity networks.

### 27 Power semiconductors – at the center of a silent revolution

Stefan Linder

Power semiconductors have almost completely replaced electromechanical solutions in drive applications, in transportation and in energy transmission and distribution. But what is it about these devices that make them so superior for high-power applications?



**Page 27**  
Power semiconductors



**Page 32**  
Wide area monitoring – the big picture



**Page 37**  
Managing energy performance

## **32 Inform<sup>IT</sup> Wide Area Monitoring**

Joachim Bertsch, Cédric Carnal, Andreas Surányi

Advances in phasor measurement and communication have made it technically feasible to take a wide area approach to monitoring power system stability on-line. PSG modules from ABB optimize asset utilization and can prevent entire power networks from collapsing.

## **37 Real-time energy performance management of industrial plants using Industrial<sup>IT</sup>**

Trond Haugen, et al

Energy management relies on collecting data, identifying opportunities, setting targets, implementing changes and monitoring results. Having efficient access to the right information is key – which is where ABB's Industrial<sup>IT</sup> comes in.

## **43 Engineer<sup>IT</sup> Documentation Assistant makes complex documentation simple**

Zbigniew Korendo, et al

Complex industrial products tend to be accompanied by a mountain of documents, and an electricity substation is no exception. To make life simpler for industry, ABB has developed the Engineer<sup>IT</sup> Documentation Assistant.

## **R&D digest**

**47** Inform<sup>IT</sup> Aspect Object Viewer – the Industrial<sup>IT</sup> equivalent of Adobe Acrobat

**48** The 'human touch' – advanced robot programming

**50** A new web-based simulation tool for polymer plant operators

## **52 News**

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