



**Nikola Tesla,  
1856–1943**

New York based inventor and researcher and discoverer of the rotating magnetic field, the basis of most alternating-current machinery. He is also known as the inventor of the transformer.

**Michael Faraday,  
1791–1867**

British physicist and chemist, who discovered both electromagnetic induction and the laws of electrolysis. His many achievements include the invention of the electric DC motor.

**Harry Nyquist,  
1889–1976**

Swedish-American physicist, electrical and communications engineer. His work on the criteria for negative feedback loops is captured in the omnipresent Nyquist stability theorem.

**James Maxwell,  
1831–1879**

Scottish mathematician and physicist who developed a set of equations expressing the basic laws of electricity and magnetism as well as the Maxwell distribution in the kinetic theory of gases.

**Charles Babbage,  
1791–1871**

Known to some as the “Father of computing” because of his contributions to the principles of computing through his Analytical machine.



## Pioneering spirits

The beginning of a new year is the time when many of us take stock of the year that has passed. This is also the time when industrial R&D Groups take a long hard look at the direction from which they have come, the way they are going and more importantly, their achievements along the way.

The output of any R&D group cannot simply be measured in terms of dollars and cents generated this year or last. It is the responsibility of ABB's R&D group to generate value through strategic patents in important areas of our businesses as well as ensuring that scientists and engineers contribute to highly prestigious technical conferences and publications around the world. In addition, we are wholly committed to the effort of expanding the frontiers of technology. For us to achieve this, we require in our researchers some of the defining attributes of the scientists featured on the front cover of this issue of ABB Review, such as a pioneering spirit and the curiosity to understand and delight in innovation.

The fact remains, however, that the most important output from industrial R&D is the size of businesses generated from the fruit of our labor.

Indeed the harvest was very good in 2004 and in this issue of ABB Review we are proud to present some of the highlights from our achievements last year.

Perhaps the most significant result in the area of *Automation Technologies* was the introduction of our pioneering Industrial<sup>IT</sup> Extended Automation System 800xA. As the world's first automation system to integrate process control with other computer systems, it enables our many customers to seamlessly integrate their existing automation solutions with a whole range of new functionalities. Asset management, for example, will help them reduce their overall maintenance costs. Equally as important is the wide range of application software for plant performance optimization in all industries. Optimization is achieved by reducing the overall power consumption in, lets say, the cement industry or controlling the thickness of a metal sheet in a cold rolling mill or pressure control in oil and gas wells.

With our MultiMove technology, customers can control several robots from a single control module as compared with previous setups when individual control units were required for each robot. The end result from a customer point of view is not only the ability to develop highly flexible manufacturing cells but increased profitability.

Within *Power Technologies*, we have focused extensively on the development of reliable, highly efficient and environmen-

tally friendly grids of the future. We will continue our R&D efforts in wide area monitoring and grid control to prevent cascading faults which can result in blackouts. We will also continue to further strengthen our leadership position in HVDC technology as well as the development of flexible AC transmission systems (FACTS) to stabilize the grid and reduce its losses.

Our research has enabled us to develop some innovative solutions so that traditional devices in the electric grids of the world can be upgraded. For example, the new common circuit breaker platform applied to an increasing number of switchgear families improves their safety and performance. On top of this, our integrated switchgear solutions significantly reduce valuable space requirements. New ways of measuring very high dc currents with light and flexible fibre-optics or innovative compact AC capacitors are all major advances in power technologies.

Our researchers are very often recognised for their contributions to science and technology. For the third year in succession, an ABB researcher was named one of the world's top 100 young innovators by MIT for her work in using augmented reality to teach robots how to handle more complex tasks.

While innovations are very important for our businesses and the satisfaction of our customers, keeping them and others informed of new and emerging technologies and products is also important. ABB Review has asked its readers how they perceive the information we send out every quarter. The feedback has been very encouraging and in particular it has confirmed a lot of interest in the group's innovation.

In response to many of our readers' requirements, we have modernized the layout of the Review and there can be no better way of launching it than by using some of our best innovations of 2004 to illustrate ABB's pioneering spirit.

We hope you will enjoy the tour d'horizon through the creative labs of ABB.

Markus Bayegan  
Chief Technology Officer  
ABB Ltd