

**ABB's innovation rewarded –  
World's most advanced pressure  
sensor**

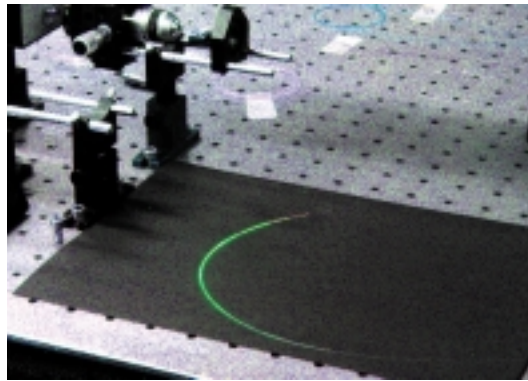
*Opto & Laser Europe*, the magazine for photonics professionals, picked their top papers from the Conference on Lasers and Electro Optics (CLEO), which was jointly held with the Quantum Electronics and Laser Science Conference (QELS) in Baltimore, USA, in May.

Among the eight papers chosen, from the total of 1169, was an ABB paper on LASOPS – a fiber laser sensor for fluid pressure (E. Rochat, K. Bohnert and H. Braendle).

CLEO/QELS is one of the largest conferences in this area of science and technology. It was attended by about 7000 professionals from around 50 countries and included a trade show featuring more than 300 commercial exhibitors.

As the sensor is basically just a piece of optical fiber, and it measures the pressure by monitoring how light in the fiber behaves, it is ideal for places where the going gets really tough, like deep inside oil reservoirs.

For example, in most pressure sensors the pressure acts on a go-between (the transducer) which, in turn, acts on the sensing element. This is

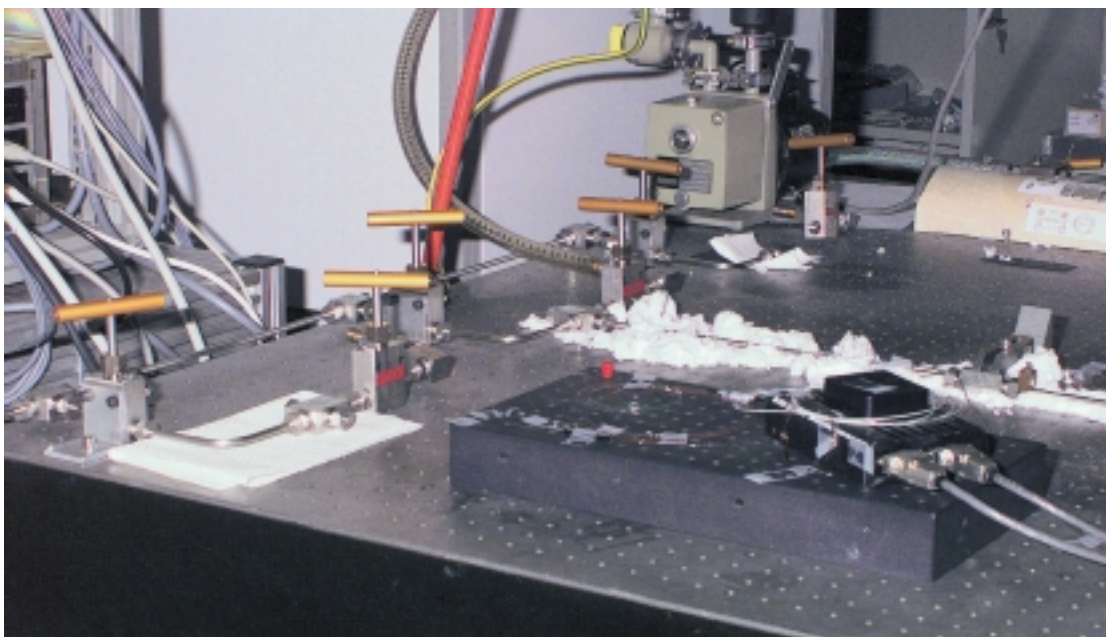


the weak link. In LASOPS, however, the pressure acts directly on the sensing element (the fiber itself).

And there is no need to worry about supplying power to the sensor. As the sensor is completely passive, there is nothing to power! It suffices to fire in some laser light (from up to 30 km away!)

A further advantage is the multidrop capability; many measuring points can be configured along the same fiber. And data cabling is also unnecessary – pressure is translated into a frequency modulated light signal and is carried back via the fiber.

The ultra-high hydrostatic pressure measurement resolution (about 5 ppm) of LASOPS



# R&D

is the world's best for any purely passive, remotely operated and high temperature capable sensor. Demonstrated results show that the high expectations of the oil companies can be met.

### ABB's CO<sub>2</sub> initiative appreciated by the UN

At the latest international congress of the World Energy Council (WEC) in Houston 1998, ABB challenged the global energy industry to contribute to the fight against Global Warming. The WEC accepted the challenge and initiated the 'WEC Pilot Program on Greenhouse Gas Emissions Reductions' with strong support from ABB. A goal was set to reduce greenhouse gas emissions by 1 billion tonnes annually by the year 2005.

The WEC's Pilot Program runs a public global GHG emissions reduction projects database that is open for everyone on the website of the World Energy Council ([www.worldenergy.org](http://www.worldenergy.org)). It shows the broad extent that industry and others are making to reduce greenhouse gas emissions around the world, and has rapidly become the most popular part of the WEC's website.

The database has a number of useful applications:

- It provides an opportunity for industries, financial institutions, and others seeking emissions offsets, to identify promising projects that may merit financial support.
- It provides companies and organizations the opportunity to demonstrate publicly what they are doing to reduce GHG emissions in their own countries and worldwide.
- It allows emissions reduction projects to be recorded and tracked as they proceed.
- The information in the database can also be used for identifying potential projects for emissions trading, Joint Implementation (JI), Clean Development Mechanism (CDM) and any other bilateral or international agreements.

Currently, over 700 projects in more than 90 countries are included in the database. When fully implemented, these projects alone will reduce global GHG emissions by more than 1.3 billion tonnes of carbon dioxide equivalent per year. It is widely believed that there are many more projects under way that have not been recorded in the database, and a new goal has been set to 2 billion tonnes of annual emissions reduction.

During the summer, the United Nations Environment Program (UNEP) pointed at the WEC's Pilot Program as a promising example of real progress towards reducing emissions, with an address to the climate negotiators in Bonn. "We must do more, we have to do more. But the march to a less polluting world has begun", said Klaus Topfer, Executive Director of UNEP.

This initiative is helping to move the debate from talk to action and to raise public awareness. ABB is actively participating in the WEC's efforts to drive the project forward.

### An ultra-clean way to make ultra clean gasoline

Worldwide, more than 80 million barrels of oil are refined daily and much of it ends up as transportation fuel. Improving air quality standards put the onus on refiners to produce clean, low-polluting gasoline. Alkylate is just such a fuel – in fact it is almost the ideal gasoline because it has high octane and contains virtually no regulated components, such as sulfur, benzene, etc. However, today's refiners are not building many alkylate plants because current technology is based on hydrofluoric or sulfuric acid. Refiners have long sought a way out of the technological dilemma in which clean fuel manufacture itself uses hazardous chemicals and generates hazardous waste.

In June 2001, ABB and its partners, Akzo Nobel and Fortum Oil and Gas, announced the development of a breakthrough technology to

make alkylate using a benign, solid catalyst. This first-of-a-kind process, known as 'AlkyClean', employs a proprietary catalyst, an advanced reactor design and an innovative processing strategy. The new 'green' technology is now entering its implementation phase. ABB and its partners are building a demonstration unit in Fortum's facilities in Porvoo, Finland. The plant is scheduled for completion by January 1, 2002, with operations planned shortly thereafter.

### Developing the fuel of the future

Three of Scandinavia's largest enterprises, Statkraft, Sydkraft and ABB, have signed a letter of intent to build a pilot plant for the production and distribution of hydrogen with a view to developing hydrogen as a future commercial energy carrier. The agreement implies that a pilot plant run on wind power will be built in 2002.

The intention of the three companies is to develop new technology and gain experience from a hydrogen plant fueled by wind power. In addition, the parties will investigate the synergy effects to be had and possible by-products for industry and in private homes.

Hydrogen will become a competitive alternative to fossil fuels and batteries as an energy carrier. "The fact that three big players join together in developing environmentally friendly alternatives to fossil fuels will be of great importance to society in general, in addition to producing local and global environmental gains", says Jon Brandsar, Statkraft's Director of Technology.

Fuel cells will be a future significant market for hydrogen. Although they were first produced in the middle of the 19<sup>th</sup> century, the first practical applications of these electrical power sources had to wait until the 1960s, when they were used on the Gemini and Apollo space capsules. However, recent technology advances are making feasible

the widespread replacement of fossil fuel based power sources by fuel cells. Their operation is very simple: two fuels (eg, hydrogen and oxygen) are combined to produce electrical energy by means of a chemical reaction – cleanly and efficiently. There are no moving parts and only water and a little waste heat as by-products. Higher voltages can be produced by arranging cells together in a stack.

Future use of fuel cells is an important element in the effort to achieve more environmentally friendly energy supplies, and renewable energy sources have long been an important part of ABB's research and development. "We hope that our experience in technology development as a system supplier, together with the competence our partners have in applying energy, will ensure good results in the future", says Olaf Melhus, Executive Vice President of ABB.

Statkraft is Norway's largest energy supplier. It owns and operates a large number of hydropower plants (Statkraft owns 33.4 TWh, or 30 per cent of Norway's electric power production capacity). Sydkraft, a subsidiary of the German energy company E.ON Energie, is one of Sweden's largest energy companies that, in addition to producing and transmitting electric power, also supplies electricity to end-users.

Run on hydropower or wind power, a hydrogen plant has no emissions at all. The goal of the project is to acquire know-how and experience that can make hydrogen a commercially interesting energy carrier, in addition to the inherent environmental benefits.

Jon Brandsar emphasises the long-term view of the project, "climatic problems mean that new solutions are becoming imperative and we will see a gradual replacement of energy carriers. In time we will face a demand that energy production is to be pollution-free. Hydrogen produced at a wind or hydropower driven plant satisfies this demand, and through this cooperation the three partners want to be a driving force in the development of this type of technology".

### Polymer instead of porcelain

ABB's new surge arresters will survive an earthquake!

Lightning, switching and other transients events cause potentially damaging energy surges in power systems. To combat these surges and thus minimize equipment damage, surge arresters are routinely installed to protect valuable grid components.

Traditionally, these arresters have housings made of porcelain – not the best material for a device which has to withstand both earthquakes and vandals – to name but two of the hazards they face. Consequently, manufacturers have searched long and hard for a replacement – and now they have it.

PEXLIM is an ABB surge arrester which features a polymer housing. Its weight is half that of a conventional arrester, it is more rugged (transport-

damage proof) and safer (no splinters if there is an accident)

The performance of the technology has been continuously enhanced and it has even been recently used in a record-breaking 800 kV application. The major achievements paving the way for the competitive product are single shot direct molding with hydrophobic material, manufacturing control loop design and robust process control.

This innovative arrester family covers all applications ranging from sub-transmission voltages to ultra high voltage (800 kV). It uses the same world-class ABB ZnO discs as porcelain-housed ABB EXLIM arresters. The novel outer polymeric insulation – silicone rubber – is molded onto the active elements. This offers a number of advantages such as freedom from partial discharge, freedom from additional sealing needs, highly improved pollution performance and a vitally important earthquake-proof design.

Los Angeles Department of Water and Power (LADWP) 550-kV surge arrester – seismic proof.







Installing PEXLIM on AEP 800-kV equipment

PEXLIM arresters already satisfy a major portion of the demand for the standard applications in sub-transmission. Furthermore, PEXLIM provides a number of opportunities for new applications and installation methods, thus enhancing the reliability of the protected system or reducing the total

investment cost. One good example is the recent supply of seismic-proof PEXLIM arresters for the 550-kV systems of Southern California.

The conversion from porcelain to polymer insulation for arresters is rapid and, in response to growing market demand, ABB is presently doubling production capacity for PEXLIM by bringing in a second production line and shortening lead times by fine-tuning the process parameters, aided by statistical methods and leaner logistics. Some countries now ask only for polymers. It is expected that more than 50% of production for applications up to and including 245 kV will be PEXLIM this year already. This dramatic increase is fueled by increased market share and conversion from the ABB EXLIM porcelain arrester family.

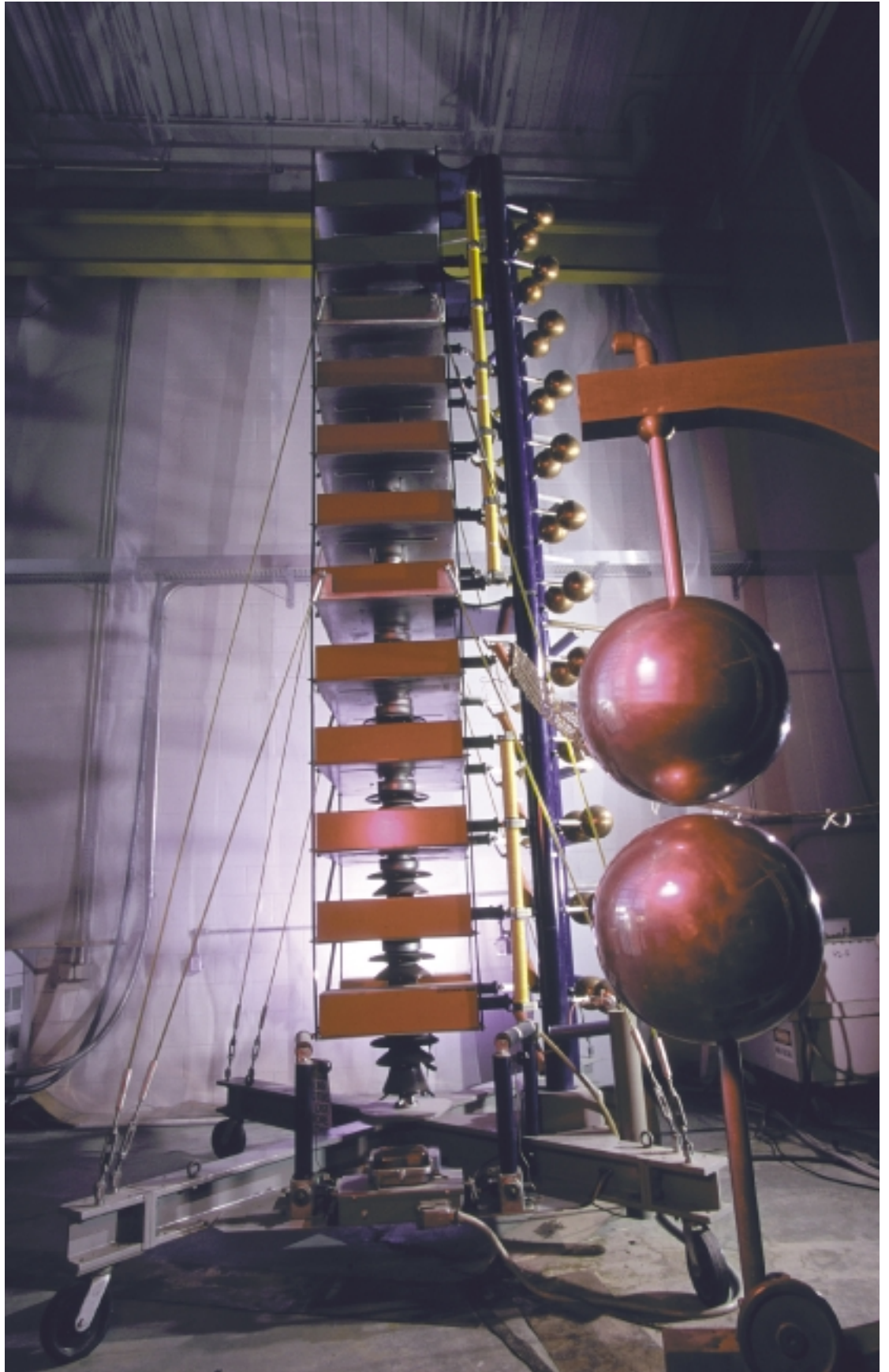
ABB Review will soon carry a more detailed report of this new technology.

---

Behind every successful ABB product lie many hours of patient and thorough research and development effort. Here we see a researcher calibrating a capacitor divider used for partial discharge testing.



# R&D



To be successful in research and development you need to have the proper tools. Sometimes that can be a PC or an oscilloscope. Sometimes it has to be bigger, like this 1.2-MV impulse generator.