

Laborelec Chemistry Expert System Avoiding unnecessary costs and downtime due to chemistry related issues

Plant operators are the first line of defence in the event of chemistry excursions. Often, however, they are not trained in depth in water/steam cycle chemistry. When chemistry experts are not present on site, there is consequently a growing risk of chemistry-related issues not being detected and corrected in time. To remedy this situation, our experts have developed the Laborelec Chemistry Expert System (LCES). Using LCES, plant operators can diagnose and control water/steam cycle chemistry issues more easily.

Automatic expert advice

The LCES tool analyzes all chemical aspects of the water/steam cycle and automatically generates an alarm in the event of a chemistry related problem. It then provides expert advice, in the form of computer generated messages, indicating what corrective actions need to be taken. The tool enables plant operators to effectively address chemistry-related issues in any type of conventional power plant. In this way, it helps reduce the risk of equipment damage and efficiency loss, as well as the resulting operational and maintenance costs. For these reasons, Laborelec's LCES tool was one of the laureates of the 2011 GDF SUEZ InnovationTrophy.

The LCES tool was developed by the Laborelec team specialized in Water/Steam Cycle Chemistry (Danielle Leemans, Mélissa Duyckaerts, Marc De Wispelaere, and Marnix Vermeersch), with support from our Mathematics, Data Processing, and IT Service (Xavier Jaspar, Sébastien De Prins, and Emmanuel Ransquin).

Gas Turbine Blade Life Management Saving millions of euros, winning the Value Creation Label

While manufacturers typically provide a detailed plan for the repair and/or replacement of critical parts of a gas turbine, this plan is not always in the best interest of the power plant. For example, experience has proven that manufacturers tend to be conservative in recommending replacement of blades and vanes. To ensure optimal use of these expensive key components, Laborelec has developed the gas turbine Blade Life Management (BLM) methodology.

Expanding lifetime, saving costs

BLM employs a unique combination of real-life testing and advanced measuring and modeling techniques to determine the service life of gas turbine blades. As replacing the blades accounts for more than half of a plant's maintenance costs, BLM can significantly cut down on such costs, minimize loss of revenue, and reduce the plant's ecological footprint. BLM has already helped plants save millions of euros. As a result of its successful implementation in several plants, BLM has won the Value Creation Label at the 2011 GDF SUEZ InnovationTrophy. The year before, BLM won the InnovationTrophy in the Research category.



Laborelec's value-creating innovations recognized again

Creating customer value is, and always has been, the key driver of Laborelec's contract research. The innovations of our research teams, for instance, aim to maximize our customers' operational performance. Some recent examples are the Laborelec Chemistry Expert System (LCES), the Blade Life Management (BLM) approach, and the development of multipurpose transformers. Another example is our Demand Power Management System (DPMS), which is the world's first stable system for balancing local energy generation and consumption. GDF SUEZ has once again recognized the value-creating potential of our research during the 2011 InnovationTrophy. Find out more about these innovations in this special issue of Laborelec News.

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BLM is the result of a team effort—from left to right: Christian Bultereys, Bea Ghys, Steven Goedseels, Sigrid Gijbels, Jean-Pierre Keustermans, Steven Keyzer, and Steve Nardone. We would also like to thank: Kurt Boschmans, Evy De Bruycker, Jos Maris, Xavier Degive, and Sébastien Gregoire.



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NEWS: special on value-creating innovation

Creating multipurpose transformers saves time and money

Transformers are uniquely designed; no two are exactly alike. When they break down, their replacements need to be custom-made, which can take up to two years. To avoid such costly interventions, GDF SUEZ created a workgroup to cluster transformers based on similar characteristics. This workgroup was charged with developing a versatile spare unit for each cluster that could be used to replace each transformer in that specific cluster quickly and efficiently.

One versatile spare unit able to replace various types of transformers

The workgroup first mapped out the specific characteristics of the entire European GDF SUEZ fleet of generator step-up transformers. More than 150 units were clustered into three groups. For each of these clusters, a multipurpose spare model—capable of replacing each individual transformer in the cluster—was created. Today one transformer has been delivered, two others will be ready by the end of October 2011. These versatile spare transformers will be stored in the Netherlands from where they can easily be transported to any compatible European GDF SUEZ power plant to be operational within maximum three months. This makes it the world's first service to deliver a new transformer in only three months' time, as opposed to the normal 18 to 24 months period. Consequently, Laborelec—and its partners CNR and MCC—were awarded the Grand Prix in the Field Techniques category at the 2011 GDF SUEZ Innovation Trophy.

The study and development of multipurpose transformers is the result of close collaboration between Laborelec (Marc Heylen, Steve Eeckhoudt, Julie Van Peteghem), MCC (Michel Laire, Eric Nens, Ludo Kinable, Nico Verroken), CNR (Daniel Mouge and his team), Electrabel purchasing (Pierre Lucas), and Sharepart (Thierry Lambrecht, Xavier Debailleul).



During the award ceremony in Paris, the team was represented by Michel Laire, Marc Heylen, and Daniel Mouge.



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Demand Power Management System Innovative system for balancing electricity demand and production

Fluctuating electricity demand may cause temporary capacity problems and thus interfere with efficient, stable provision of electricity. Demand side management is a promising solution to this worldwide challenge. Laborelec has developed the Demand Power Management System (DPMS), which continuously balances electricity demand and production.

The most efficient use of available energy

Laborelec's DPMS is the first—and currently only—system that guarantees stable energy supply and user flexibility. It balances both the instantaneous (real-time) and the averaged supply/demand in an electrical system. Each power request for flexible loads, which do not need continuous power supply, is routed to a central controlling device that decides whether the requesting user receives the power immediately, after a delay, or not at all. The system has proven to be

completely stable and free of interruptions, even under the most challenging environmental conditions in the smart grid of a manned scientific research station in Antarctica. DPMS opens up a wide range of opportunities to create new services for residential, industrial, and tertiary customers. As such, this innovation was one of the laureates at the 2011 GDF SUEZ Innovation Trophy.

DPMS was developed by Sven Kerremans, Technology Manager Electrical Power Systems at Laborelec. Special thanks go to André Even for reviewing the DPMS algorithms, as well as to the Laborelec team that assisted during the implementation of DPMS at the Princess Elisabeth Research station (Rafaël Jahn, Dries Lemmens, Denis Herbert, Marc Locht, Sylvain Doucement, Stijn Uytterhoeven, Conrad Bottu, Sebastian Falkenberg).



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