

NEWS: focus on Diagnostic Centre and condition monitoring

Remote monitoring generates further performance improvements at Castelnou

Laborelec remotely monitors the performance of the Castelnou Power Plant (Spain). This enables our experts to identify the degradation of key components and to make performance diagnoses. We also provide recommendations for further improvements in close consultation with the power plant staff.

Regular reporting on key evolutions

Laborelec uses its in-house developed Performance Monitoring (PM) tool to monitor turbine, compressor, and air-cooled condenser efficiency, as well as other parameters such as heat rate. 'We use these readings to generate reports that highlight performance evolutions over both the last month and the past twelve months,' explains Willy Vanderelst.

Advice in identifying root causes

'Performance is compared with historical information as well as design and test data, then discussed with the Castelnou Power Plant staff during conference calls,' adds Marcel Guina. 'Based on our experience and reference values, we provide the power plant with indications on possible improvements, as well as recommendations on how to achieve them.'

In addition, the PM tool provides a graphical representation of the power plant. Using secure Internet access, the status of key plant components can be remotely visualized in real time. (see also page 4)

Continuous performance improvement

'The PM tool has already helped us identify a number of performance improvement areas,' notes Vanderelst. 'These were discussed with the power plant staff.'

Marcel Guina, Willy Vanderelst



Condition monitoring tools and follow-up services

As an asset manager, power plant operator, or process technician, you want to monitor the condition of your equipment so that you can plan interventions efficiently. Laborelec helps you achieve this. We develop and provide condition monitoring tools for renewable energy units, entire power plants, or key components. In addition, our Diagnostic Centre can remotely analyze plant data on a regular basis. In this way, we are able to identify trends and advise you on appropriate measures. This edition of Laborelec News illustrates a few of our recent realizations in this domain.

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The Castelnou Power Plant relies on Laborelec's remote monitoring to identify opportunities for further improving performance.



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Final acceptance tests at blast-furnace gas power plant

Electrabel is running a new power plant on the Arcelor Mittal site in Ghent, Belgium. Laborelec was closely involved during the final commissioning phase. Our experts also developed a tool to monitor the performance of the unit.

The new plant runs on blast-furnace gas that is a side product of the Arcelor Mittal production process. Before the unit entered service, Electrabel called upon Laborelec's commissioning expertise and knowledge of regulations to supervise the final tests.

Assessing test procedures

'We verified the procedures to be used for the performance test of the plant in order to determine whether they were in line with European regulations for this type of unit. We then discussed and finalized these with the plant's manufacturers,' explains Stijn Wauters.

Laborelec assisted Electrabel in supervising the final acceptance tests. Besides witnessing the performance tests at both maximum load and baseload, our experts verified that all measurement points were properly located and not influenced by any external parameters. 'We also assessed whether all emissions were measured according to legal requirements.'

Monitoring the performance of renewable energy units

Is the performance of installed photovoltaic panels and wind turbines as it should be? Laborelec is employing operational data from GDF SUEZ renewable energy units in Belgium to answer this question. The goal is to rapidly highlight any drop in performance and identify the root cause.

Assessing PV performance at string level

'In the case of photovoltaic units, we have created a model that calculates how much electricity a PV unit can theoretically generate. The model utilizes parameters related to the unit itself and environmental parameters such as sunlight intensity,' explains Dries Lemmens. 'The outcome is then compared with a unit's actual production.'

This model enables to monitor the performance of an entire plant or of a small group of panels (string level). This makes it easy to identify which inverters require maintenance, repair, or replacement.

Checking turbine performance against manufacturer data

'For wind turbines, manufacturers supply information on the theoretical power curves of a unit. We monitor turbine production based on wind speed and make comparisons with the manufacturer data,' adds Lemmens. 'We can thus calculate whether a turbine's actual performance over time will be in line with the values predicted by the manufacturer.'

Monitoring plant performance

In addition, Laborelec developed a tool to monitor the performance of the entire plant, as well as of individual components. We used the same tool to verify the results of performance tests carried out by the plant and component manufacturers. 'Our performance monitoring tool confirmed their findings,' concludes Wauters.

Stijn Wauters



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Laborelec's knowledge of European legislation was a crucial factor during the final acceptance tests of the new furnace gas power plant in Ghent, Belgium.

The wind turbine monitoring tool enables the determination of production losses due to stoppages. For instance, certain wind turbines need to reduce their capacity at night to lower noise levels. Depending on the angle of light, they may also need to be stopped at certain times of the day to avoid stroboscopic effects on neighbouring homes. A stoppage can also be necessary following ice build-up.

Vasiliki Balafouti, Dries Lemmens, Marc Loch



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Laborelec is able to measure the intensity of sunlight using a pyranometer. This is an important parameter in accurately calculating PV performance.

Monitoring combustion dynamics using SmartSignal

Laborelec has fine-tuned the SmartSignal tool to monitor combustion dynamics with greater accuracy. This enables our experts to detect signs of potential failure even faster.

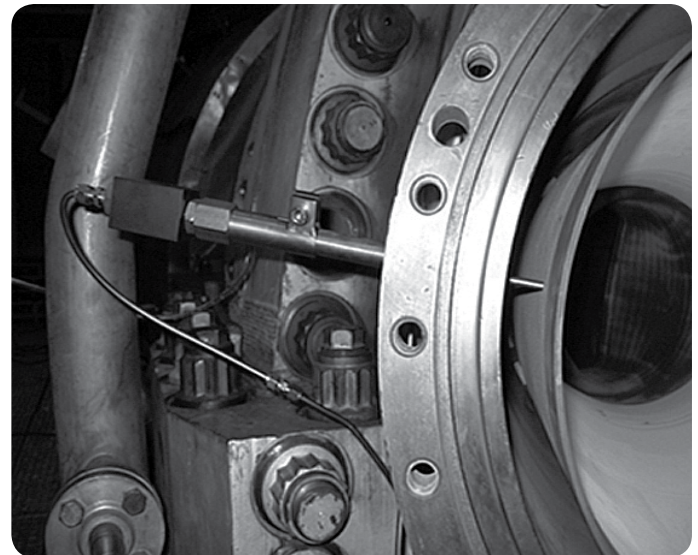
Complexity demands appropriate software

Combustion dynamics modelling involves a vast number of parameters. These primarily relate to temperature, pressure, gas quality, and valve positions. In addition, problems with combustion dynamics can appear quite suddenly. 'These elements combine to make accurate monitoring a very complex matter,' explains Antonio Alarcon Candia. 'The SmartSignal software is a great help in such complex environments. It continuously compares operational data against reference values and highlights deviations.'

Two-dimensional data comparison

SmartSignal serves as a starting point for early fault detection and further investigation. 'We have recently added new developments to the tool to enable its use for combustion dynamics monitoring,' adds Hannes Laget. 'In addition to comparing the operational data of a burner with its reference data, we can now also compare the specific behaviour of the burner in question with that of other burners. This two-dimensional data comparison significantly improves the accuracy of combustion dynamics modelling and monitoring.' The new developments are currently being tested in five units.

Antonio Alarcon Candia, Hannes Laget



Laborelec has fine-tuned the SmartSignal tool to also enable accurate combustion dynamics monitoring in gas turbines.

Monitoring the condition of nuclear power plants A European first for GDF SUEZ

Doel 4 and Tihange 3 are the first European nuclear power plants of the GDF SUEZ Group to be equipped with SmartSignal. This will enable the early detection of potential problems. Laborelec was in charge of the installation project and will remotely monitor the condition of both units.

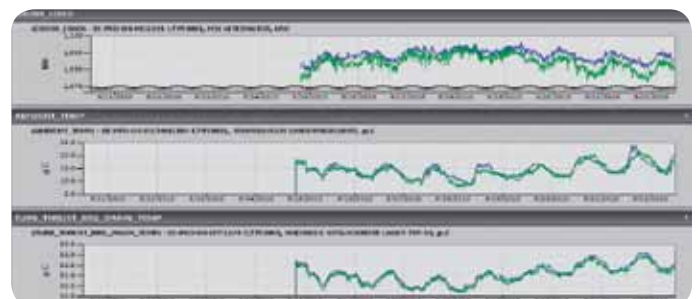
Prior to this project, Laborelec had already monitored the condition of the primary circuit pumps at Doel 4 and Tihange 3. This monitoring enabled to further improve pump reliability. Consequently, plant management decided to extend the permanent monitoring to the entire unit at both sites. SmartSignal now operates in both the nuclear and non-nuclear areas.

'The purpose of the project is to detect any indication of a future problem,' explains Jan Tierens. 'This way we can advise the plants on appropriate preventive actions. It can also help streamline maintenance planning and avoid unforeseen production stoppages.'

Jan Tierens



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Laborelec helped install remote early fault detection tools at Doel 4 and Tihange 3.

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Laborelec, a proud member of GDF SUEZ

In recent years, Laborelec has successfully positioned itself as the leading technical research and competence centre for electricity within the GDF SUEZ Group. Now we are taking the next step to reinforce this position.

From 1 November 2010 on, we will highlight our GDF SUEZ membership with a new logo. In doing so, we follow the example of sister companies Electrabel, Cofely, and Tractebel Engineering, among others.

Early detection of gas pressure swings Laborelec identifies measurement issue

Laborelec remotely monitors the condition of the Zandvliet Power Plant. This monitoring has already proven its capabilities. It for example enabled our experts to identify and report gas pressure and flow measurements problems in an early stage.

Gas pressure variations can have serious consequences. 'As soon as we noticed the variations in the gas pressure, we checked the plant's output,' explains Jan Tierens. 'Our analysis revealed, however, that the variations at the Zandvliet Power Plant did not affect production in any way. The problem was therefore most likely an issue with the measurement tool.'

Consulting the gas concentration in transformer oils on-line

Power plants can rely on Laborelec for the permanent monitoring of dissolved gases (DG) in transformer oil baths. Our Diagnostic Centre remotely monitors the DG concentration, interprets the data, and automatically publishes the condition information on a secure web application.

The secure web application enables operators to consult the condition of their transformers anytime, from anywhere. The tool provides all the information necessary to assist in the efficient planning of maintenance work.

'The application provides an overview of all transformers being monitored. The dashboard's colour codes immediately highlight which transformers require special attention,' explains Wouter Termote. Users can also consult the monitoring results for each transformer separately. This includes all standard hydrogen measurements and, where applicable, the more specific measurements of ethane, methane, and ethylene, among others. 'The tool shows the results in comparison to the threshold values that have been defined by our in-house oil experts. This makes it easier to correctly interpret the data and plan appropriate actions,' concludes Termote.

Wouter Termote

'The new logo emphasizes that we are a proud member of the GDF SUEZ Group,' states Bart Boesmans, Managing Director of Laborelec. 'Apart from the new logo, nothing else changes. We remain the same highly motivated and competent cooperative society. We will continue to do what we do best. You, our trusted customer, can rely on us for research and services in electrical power technology. As your objective, certified, and recognized partner we offer you independent advice. And we will continue to serve both customers in and outside of the GDF SUEZ Group, with the same passion and drive.'



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This early detection enabled Laborelec to inform the power plant of the measurement issue well in advance. This enabled the plant to put the issue on the agenda for the upcoming maintenance shutdown. Tierens: 'Our monitoring helped the plant to avoid a potential additional shutdown in case it would have been a real pressure and flow problem. The subsequent penalties that distribution network operators claim for unforeseen production stoppages can be substantial.'

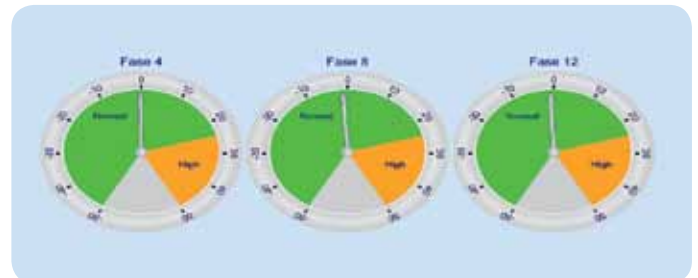
Jan Tierens



Laborelec's permanent early fault detection enabled the timely identification of gas pressure and flow variations.



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The web application clearly visualizes the condition of each transformer.