

Smart Condition Monitoring at E.ON's Power Technology

Gary Hewitt of E.ON's Power Technology and Duncan Affleck of Beran Instruments describe how E.ON is using today's measurement and communications technologies to provide comprehensive condition monitoring expertise to power plants across the world.

- Continuous Monitoring by dedicated Plant Diagnostic Engineers
- Worldwide communications using today's technology
- Condition Monitoring on CCGT / Coal / CHP

Overview

Among the key services offered by E.ON's Power Technology is real-time condition monitoring for power plants, aimed at optimising maintenance costs and minimising unscheduled outages and their duration. Recently, the company demonstrated its commitment to this service by making a major investment in a dedicated condition monitoring suite at their Ratcliffe-on-Soar facility.

Originally intended to provide expertise for E.ON's own stations, continuous plant condition monitoring is now available on a confidential basis to third parties.

Using sophisticated diagnostic techniques on real-time data from the plant in question, experts at E.ON's Power Technology can advise operators on the best strategy for dealing with any developing problem, or simply keep a vigilant eye on potential problems on 'difficult' machines. For plant operators, this means that they have instant access to the best available advice for ensuring the continued health of their plant.

Over fifty plants in the UK and overseas - including installations in Hungary and the USA - are already making good use of the service. The plant covered embraces a wide range of technologies, including traditional coal-fired, combined cycle gas turbine (CCGT), and combined heat and power (CHP).

Power Technology Ltd - part of E.ON - is one of the world's leading energy sector consultancies. Based in Ratcliffe-on-Soar, near Nottingham in the UK, the company provides specialist technical services for all aspects of power plant development, operation and maintenance. It has an enviable reputation for the excellence of its engineering skills, combined with practical experience within a competitive environment.

On-line measurement

Nowadays, virtually all strategic plant items are equipped with on-line monitoring systems which

continuously collect data from dynamic sensors (such as accelerometers and velocity, pressure, and displacement transducers), along with key plant process parameters. This data is used by local plant operators in the day-to-day control of the plant, and is also analysed and stored as the basis of the condition monitoring strategy. Beran's PlantProtech™ Condition Monitoring Systems include comprehensive alarm suites, which can be configured with rule-based alarms to provide a very high level of protection for the plant.

The strategic condition monitoring service offered by E.ON's Power Technology uses data and alarms collected by the on-line monitoring systems at the plant. About 80% of the monitored plant utilises equipment supplied by Beran Instruments, and the facility can also communicate with systems provided by a variety of other manufacturers.

Central monitoring

The on-line data is transmitted to the monitoring facility using a variety of methods, including private wide area networks (intranet), ISDN VPN or modem dial-up. Depending upon the level of monitoring required, the data may be uploaded continuously, on a regular timed basis (often in the early hours, when communications traffic is light), or as required by the engineers.

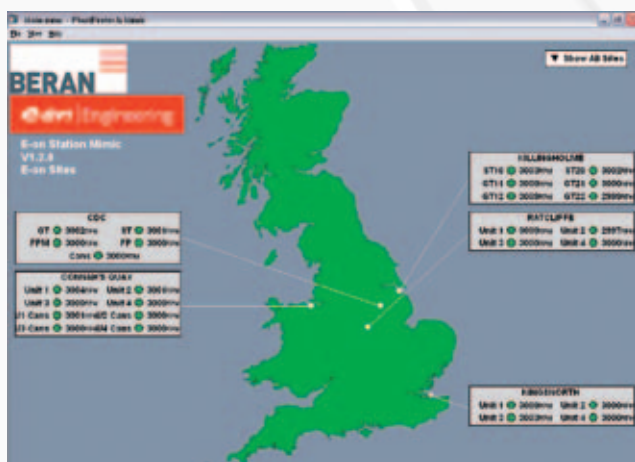


Inside E.ON's monitoring facility control room

Technical Report

Instant health screening

Data from all connected plant is available instantly on two large screens in the main monitoring suite, which uses additional software supplied in conjunction with Beran Instruments. This software includes a comprehensive alarm suite, which enables the diagnostic/plant engineers to tailor the condition monitoring strategy to the individual requirements of the plant item being monitored.



Overview monitoring screen showing the operating status of E.ON plant. Data for other monitored stations is also available via this screen.

The powerful combination of the local Beran PlantProtech Condition Monitoring System data and the new monitoring software provides an extensive real-time view of plant health/condition, and gives the plant health experts at E.ON's Power Technology access to all the data that they require for accurate and timely advice.

Beran Instruments is a leading worldwide supplier of condition monitoring systems for rotating machines. Plant monitored includes gas and steam turbines in CCGT, CHP, nuclear and coal-fired power stations, hydro-electric generators and machinery used in petro-chem applications.

Extending the reach

Power Technology engineers have been able to utilise the rapid data acquisition and easy-to-use software provided by Beran's PlantProtech Condition Monitoring Systems to extend monitoring into a number of other areas, including combustion efficiency. These are currently

being investigated for potential inclusion within the overall condition monitoring strategy, in order to provide an early warning of other potential plant problems.

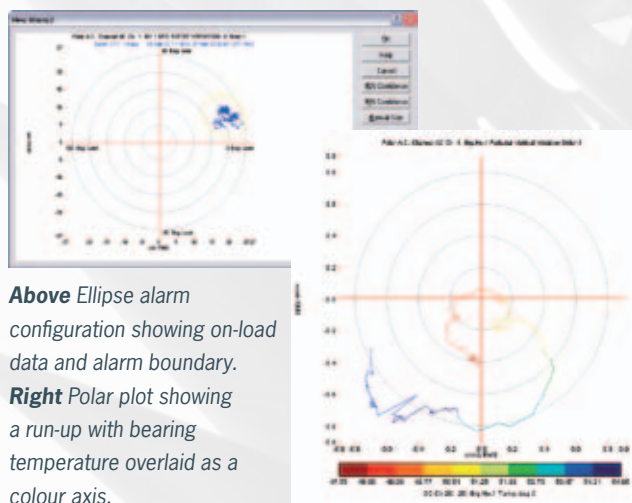
Condition monitoring brings significant commercial and operational benefits. Early diagnosis of potential plant failure enables the most appropriate remedial action to be taken at an opportune time, leading to:

- Outages reduced or eliminated
- Reduced costs through planned maintenance
- Extended plant service life

The real experts

Although expert systems are becoming available in a variety of forms, they are by no means foolproof. They can provide useful input under certain circumstances, but they may cause unnecessary trips, or fail to detect potentially dangerous situations until it is too late to avoid costly damage to the plant.

Based on their extensive experience, E.ON's Power Technology believe that rule-based alarming, in conjunction with expert analysis by engineering staff, is a more effective strategy for plant health monitoring at the present time. Until such time as expert systems are developed and proven to be reliable, then tailoring of the system alarms in conjunction with off-site experienced engineers, as at E.ON's Power Technology, provides the best plant protection through provision of diagnostic expertise to the power utilities.



Above Ellipse alarm configuration showing on-load data and alarm boundary.

Right Polar plot showing a run-up with bearing temperature overlaid as a colour axis.

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