Minutes of Meeting

VGB-Technical Committee:	**Generation and Technology**
VGB-Working Panel:	**PGMON**
	Power Generation Maintenance Optimisation Network
	40th Meeting on 24./25. 3. 2010 in Prague

Agenda

Welcome (Paul Thame)

TOP 1: Application and initial results from the Project Risk Evaluation Tool
Andrew Lythgoe, RWENpower

TOP 2: Gas Turbine Outage Support
Paul Thame, EON UK

TOP 3: LP/ SH tube failures in a HRSG
Jason Bane, ESB

TOP 4: Future Maintenance
Heinrich Grimmelt, VGB

TOP 5: Some aspects of the unit 3 generator overhaul at Amager Power Station in 2008
Henning Lundstrom, Vattenfall

TOP 6: Cooling Towers, maintenance approach
Ladislav Ullmann, CEZ

TOP 7: Aging management programme for the EDF's Nuclear fleet
Claude Degrave, EDF

TOP 8: Report about a fatal incident at the construction site of the power plant Datteln 4

TOP 9: Place and date of next venue

TOP 1: Application and initial results from the Project Risk Evaluation Tool
Andrew Lythgoe, RWENpower

Andrew Lythgoe gave a presentation on the RWE npower 'PRET' tool, used for commercially hedging the risk of late return to service from outage. A brief summary of the history of PRET was given (Alan Joslin previously presented the theory behind this tool to PGMON), along with current usage of the tool, and findings. PRET provides a high level overview of a planned outage and by entering realistic views on duration of sections of the outage and any potential overrun, a risk profile can be produced. Comparing actual outage performance to the curve that has been assumed within PRET has shown that it has the right shape. Outage RTS performance will be monitored going forward, along with the application of the tool to ensure the right decisions are made in the future concerning commercial hedging.

The presentation can be found in the closed user group.

TOP 2: Gas Turbine Outage Support
Paul Thame, EON UK

E.ON operates a broad variety of gas turbines, industrial and aero-derivative, large and small, in central power generation, combined heat and power (CHP) and gas compression applications.

E.ON Engineering supports gas turbine inspection and maintenance outages to ensure high quality work, to monitor machine condition and minimise the risk of forced outages. The support is mainly in the form of monitoring the quality of contract work and equipment parts and checking machines as they return to service.

E.ON's commitment to outage support comes from experience. Problems with maintenance work and problems with parts can prove very expensive and result in serious loss of availability. Examples are defective new turbine blades and vanes, (e.g. blocked cooling passages), surface defects or thermal barrier coating problems) or badly fitted seals and incorrect tiling.

Specific outage support activities include visual checks and work monitoring, dimensional checks of parts including white light scanning, blade air flow testing, borescope inspection, vibration monitoring and performance tests. E.ON Engineering also interact with maintenance contractors at expert level, including materials and stress analysts, to ensure that optimum decisions are made on the re-use or rejection of used parts.

The presentation can be found in the closed user group.

TOP 3: LP/ SH tube failures in a HRSG
Jason Bane, ESB

The HRSG which is the subject of this presentation is a 2-2-1, dual pressure unit (5bar LP circuit and 80 bar HP circuit), commissioned in 1999.
The gas turbines units have over 75,000 EOH and up to the reported incidents the boilers had been a reliable component.
In Q3 2008 multiple LP / SH tubes failures & separations were discovered in both boilers. The corrosion mechanism was identified as Stress Corrosion Crack driven by Sodium hydroxide "Caustic" carry over.

During the repair process drum furniture of a single unit was removed and not re-installed prior to recommissioning. Within 6 months LP steam lines welds had cracked due to SCC driven by caustic and within 12 months the LP tube damage and tube separation re-occurred in the circuit that was repaired in Q3/4 2008.
The resulting investigation identified a number of management and process deficiencies that directly contributed to this failure event.

The presentation can be found in the closed user group.

TOP 4 Future Maintenance
Heinrich Grimmelt, VGB

Some of the members of the german technical committee „Maintenance management” sat together to discuss which are the challenges for the maintenance in the near future. They identified four main topics.

1. Specification for an integrated IT System
2. Quality assurance of maintenance works on important components.
3. Practical keyfactors for maintenance processes
4. Requirements of maintenance for new technologies as CCS

These topics will determine the work of the technical committee in future. It was decided to install working groups which care about topics No two and three.

The presentation can be found in the closed user group.

TOP 5: Some aspects of the unit 3 generator overhaul at Amager Power Station in 2008
Henning Lundstrom, Vattenfall

After some years of operation the OEM supplier gave a notice with the fact that the tolerances of the generator rotor windings centring bolts were too small, this could cause a short circuit between 2 windings due to the mechanical and electrical stresses. In extreme cases it might led to a forced outage of the generator rotor.
The recommendation from the OEM supplier was to replace the centring bolts with at new type minimising the risk of short circuits.

The recommendation was based on experiences from a Germany power station with severe damages of the rotor.

The Amager generator rotor was checked before the yearly overhauls with an impulse measurement to see whether the responses from the two generator windings were identical. All measurements showed identical responses indicating no operational risks.

The centring bolts had been changed at a sister unit with the same type of generator rotor. An examination of the original centring bolts from the sister unit was that only very small operational risk could be identified. Due to this findings and due to the results from the yearly impulse responses at Amager unit 3 it was decided to operate the unit 3 generator rotor until a planned major overhaul of the unit in 2008.

In 2008 the winding centring bolts at Amager unit 3 were replaced with the new type. The original centring bolts only showed very minor defects and they had been able to operate for several years.

When taking of the wedges of the rotor windings it was discovered that the insulation had moved upwards in some of the winding slots.
An examination of the replaced insulations showed no cracks in the insulation. The insulations had only been stretched. So far it has not been possible to identify the cause for this observation. The replacement of the U formed insulations caused a 3 weeks extension of the planned overhaul period.

The presentation can be found in the closed user group.

TOP 6: Cooling Towers, maintenance approach
Ladislav Ullmann, CEZ

The Czech Republic does not have a seaside and that is why cooling towers with a natural draft are widely used in ČEZ for cooling condenser circuits of coal and nuclear power plants. The source of raw water is small and middle sized local rivers. The quality of raw water is frequently affected by weather conditions and can cause during a short period of time a huge blocking and build up of sediments in cooling fills. Visual checks of fills condition can not monitor the fills condition in time and with a sufficient precision. To make a proper visual inspection, the fills must be taken out of the supporting structure which can cause the damage to the fills.
Therefore ČEZ developed a method of evaluation of a cooling towers performance based on the knowledge of the original design data (cooling and correctional diagrams) and actual measured selected technological data to find out the criterion of an acceptable operational limit. The criterion should set the optimal balance of cooling tower performance considering the power generation efficiency and scope of maintenance (cost of maintenance) of cooling tower internals.
A „Deviation of approximation“ $\Delta = \Delta$ tp - Δ tpCH was determined as a useful tool. Reaching the limit of deviation reaches of 4°C represents the necessity to undertake further steps (visual check etc.) Measures to help carry out easy and better visual checks (hoisting blocks of fills) are also described.

The presentation can be found in the closed user group.

TOP 7: Aging management programme for the EDF's Nuclear fleet
Claude Degrave, EDF

Safety and competitiveness are the two main objectives of Nuclear Power Plants (NPP) lifetime management. In this respect, lifetime policy has to be based on an improved knowledge of ageing mechanisms. Presently, a detailed and systematic procedure is available to review the consequences of ageing degradations on Structures Systems and Components (SSC) important fo safety. This procedure will be systematically applied to the next 10-year safety reviews of the 900 MW units (started in 2009) and in the next future, to the 1300 MW units (3rd 10-year outage starting in 2015).
In agreement with this analysis, an effective maintenance (routine and exceptional) strategy has been implemented, including efficicent and qualified in-service inspections, based on monitoring and integrated feedback of experience. Routine maintenance is completed by exceptional maintenance, decided and planned at the national level for several year, is applied to generic

hazards or degradations concerning the whole fleet of NPPs or part of it. such as Reactor Vessel Head or Steam Generator replacements or main Generator Stator refurbishment.
This policy is aimed to strenghten lifetime prevision of the main equipments and to prepare major choices industrial investments for the next 10 years and more.

The presentation can be found in the closed user group.

TOP 8: Report about a fatal incident at the construction site of the power plant Datteln 4

With a video EON likes to help to communicate the details and causes of the incident to as many supervisors and workers as possible so that similar events can be prevented.

The video can be found in the closed user group.

TOP 9: Place and date of next venue

The next meeting will be held on 13./14. October 2010.
Place will be named later.

Essen, April 2010