

CASE STUDY

Nuclear Industry #2700781



POWER INDUSTRIES

OIL & GAS INDUSTRIES

PROCESS INDUSTRIES

Additional Chloride Ingress Protection System (ACIPS)

Customer/End User: EDF Energy Generation Ltd

Application: CIPS Improvements

Scope: To provide complete project lifecycle from initial design through approval with client then procurement of material, build, installation and commissioning of an Additional Chloride Ingress Protection System (ACIPS) for Turbine Alternator (TA) 7 and TA8.

Product: AMS Engineering Services, Yokogawa Conductivity Measurement Products

Challenge: The Chloride Ingress Protection System (CIPS) is installed at Hinkley Point B (HPB) and Hunterston B (HNB) Power Stations to prevent contaminated feed water from entering the boilers and leading to boiler tube failures. However, recent work on the Boiler Tube Leak Safety Case had identified that the system was not adequate to provide protection against some potential condenser tube failures.

The main issue was common mode failure of the CIPS equipment, thus there was a requirement for diversity in the protection provided. The initial improvements to the CIPS consisted of an additional 2 out of 4 voted group of conductivity instruments measuring the condensate at the Condenser Extraction Pumps (CEP) common outlet.

AMS was tasked with designing, procuring, building, installing and commissioning an Additional Chloride Ingress Protection System (ACIPS) for Turbine Alternator (TA) 7 and TA8.

Solution: AMS' initial approach was to develop a temporary portable chloride monitoring system which included Emphasis assessed instrumentation and a data logging facility. This system was installed on site and data was collated over a test period of 2 weeks. The trial was a success and this formed the basis of our chosen design.

AMS produced the following:

- A Project Quality Plan which identified the key documents that were to be produced and the procedures that would be used to produce them.
- A Requirements Capture & Acceptance document which was used to record all of the customer's requirements and the corresponding AMS compliance. This document formed the basis for commercial and technical progress of the task, and was periodically reviewed to ensure requirements were being met.
- A Design Substantiation Report which gave details of the design and the design criteria, and demonstrated how the design criteria set out by the customer were met. The report substantiated the design and demonstrated how the design was compliant with good engineering practice, EN/BS codes and customer specific standards.



- A PSPEC Compliance document which outlined how the design, development, parameters and deliverable requirements of the new system meets the requirements of EDF's PSPECs as specified in their Engineering Specification.
- An EMC Compliance document which highlighted the level of compliance achieved by the new system with respect to the EMC requirements specified by the customer.
- A Mean Time Between Failures (MTBF) and Probability of Failure on Demand (PFD) study to demonstrate that the new system achieved the reliability target stipulated in EDF's Safety Case.
- Numerous technical design drawings including wiring schematics, layout drawings, general assembly drawings etc.

Key Products: AMS used the Yokogawa SC450G Conductivity Transmitters combined with Yokogawa Conductivity Probes to monitor the level of chloride in the system. The main reason for using the SC450G was that the product has undergone an EDF Emphasis Assessment. All programmable electronic equipment intended for use on systems that have a safety case claim of 10^{-1} or greater must be Emphasis assessed.

Other reputable manufacturers were also used for supplying the cabinets, valves, fittings, filters etc.

Results: By developing a system that uses 4 separate monitors for each TA and by carefully selecting the instrumentation used, this provided the customer with the level of redundancy and diversity required to satisfy the EDF Safety Case.

The new system allows station operatives to identify contaminated and potentially damaging feed water approaching the boilers quicker than the existing system which allows them to trip the reactors earlier, thus prolonging reactor and boiler life.

Conclusion: The overall project was a success. The new system was installed and commissioned on time and on budget. EDF Energy now have a fully operational Additional Chloride Ingress Protection System.



For further product information and sales please
contact the AMS sales team:

T: +44 (0) 1278 444 650
E: sales@amsensors.com
W: www.amsensors.com

