

An Effective Monitoring of Calandria Reactor Surface using A Low-cost Thermal Infrared Camera and A CCD Camera.

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Abstract

In this paper an approach to enhance inspection performances for calandria reactor area of Wolsung nuclear power plant through the technique of superimposing thermal infrared image into real CCD image is introduced. Thermal infrared imaging is a highly promising technology for condition monitoring and predictive maintenance of electronic, electrical and mechanical elements in nuclear power plants. We have developed a visible CCD/thermal infrared inspection head module for these monitoring purposes, which we use in conjunction with the PULNiX TM-7CN CCD camera and a FLIR THV510 thermal infrared camera. In the occurrence of thermal abnormalities on observation points and areas of calandria reactor area, unusual hot image taken from thermal infrared camera is mapped upon real CCD image. We used a circular pattern of pressure tubes placed on the front surface of the calandria reactor as plate for camera calibration needed to match the FOV between thermal camera and CCD camera. The performance of the technique has been evaluated in the experiment carried out at Wolsung nuclear power plant in the overhaul period. The results show that localizations of thermal abnormalities on calandria reactor surface can be estimated accurately.