

N390. A Primary Containment Vessel Inspection Robot At Tokyo Electric

Tokyo Electric Power Company operates 15 BWR type reactors. Many types of robots and remotely operated or automatic systems are in use at these reactors. So far the main objectives in using robots have been: - Lowering the radiation exposure of operation and maintenance personnel - Decreasing the outage period - Improving quality of work

More recently priority is being given to robots which reduce the work load of the plant personnel and are more user friendly. One of the robots developed based on these considerations is the Primary Containment Vessel (PCV) inspection robot. The interior of the PCV of a BWR is inaccessible during normal operation because it is exposed to high radioactivity and has a nitrogen atmosphere. However, one needs a means of monitoring important components such as Reactor Pressure Vessel, recirculating pumps, and primary piping. The PCV inspection system consists of a visual inspection robot fitted with a television camera, and an acoustic temperature and monitoring robot which is fitted with a microphone and an infrared camera. These components give the robot system three functions:

The visual inspection function can detect steam leaks and other abnormalities. The acoustic function can find unusual vibrations of rotary equipment or steam leaks. The thermal monitoring function finds unusual overheat or hot substance leaks by measuring temperature distributions on equipment surfaces

The visual monitoring robot weighs 10 kg, the sound temperature robot 13 kg. The whole system is conveyed by means of a self propelled system mounted on monorails.

The PCV inspection system has passed two cycles of demonstrations tests, and has been installed at Fukushima Daiini 3 and Kashiwazaki-Kariwa 4 to monitor the PCV interiors while the units are in operation.

For more, "Remote Technologies at Tokyo Electric Power", Nuc. Eng. Intl., 1995 Remote Technology Report, pp. 6-7.