N187. Control Blade Pin And Roller Replacement

A major source of radiation exposure in U.S. BWRs is the control blades manufactured before 1982 that use cobalt-based alloys in the pins and rollers. Replacement blades use cobalt-free alloys, but such replacement typically proceeds slowly, being dictated by neutronics issues. A program with ABB Combustion Engineering is developing equipment that will replace the upper pins and rollers by stainless steel buttons in blades with remaining useful life.

The equipment is installed in a work station in the spent fuel pool. With an electrical discharge machining (EDM) electrode surrounding the roller and pin, a circular hole is cut. This operation removes all of the roller, most of the pin, and a portion of the control blade, all of which are collected in a waste container. Fine dust from the EDM operation is removed by means of a closed collection system and controlled flow of the surrounding water through an efficient filter. The cut surface is brushed, finished, and inspected. Two button halves are remotely installed and riveted together. The installation is checked by a torque test. The approach used is similar to that developed to modify 234 Swedish control blades that have been reirradiated without any problems.

The equipment was demonstrated successfully on cold control blades at Windsor, CT, in December 1991. A demonstration on irradiated blades is planned for Commonwealth Edison's La Salle BWR in May 1992. A production rate of eight blades per day is expected, a figure that should be confirmed by the hot demo. The hardware has been designed to refurbish control blades for BWR 4, BWR 5, and BWR 6 designs and for both C and D lattice designs.

This technology can reduce utility costs by cutting new blade purchases, reducing waste disposal costs, and significantly lowering personnel exposure. Refurbishing cost is estimated to be one-tenth the blade replacement cost with an exposure of 0.5 mmanSv (0.05 man-rem) per control blade.

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