N276. Refurbishing Rather than Replacing Reactor Coolant Pump Motors

Reactor coolant pump motors are large, complex, expansive, and critical components, requiring about two years lead time to produce. Their failure can result in unplanned outages and significant replacement costs. Quadrex Motor Service Center provides an alternative to burial and replacement of failed contaminated motors, and to attempts to refurbish on-site in facilities ill-suited to such complex tasks.

Corrective or preventive maintenance work on radioactively contaminated electric motors done within the constrains of outage schedules at nuclear installations presents unique challenges. At substantial cost, some stations keep spare motors to use if failures occur. Without spares, unscheduled motor maintenance, a forced outage due to motor failure or replacement can result in an inconvenient and expensive rush. If spares are available, contaminated motor repairs can be carried out at a more leisurely pace, either at the plant site or at a motor repair shop licensed for radioactive materials. Alternatively, the motors can be decontaminated and shipped to an unlicensed facility for repair.

The benefits of using a dedicated motor service facility are demonstrated by recent experience with the Quadrex Motor Service Center, which has 9,500 square feet dedicated to RCP motor work and is segregated into the work areas.

The building has two levels. One area, served by a 60-ton bridge crane, is high enough to remove the rotor during disassembly. The rest of the building is used for processing each of the motor parts as required for refurbishment. This area is served by a 15-ton bridge crane. The entire building is maintained at a negative pressure for contamination control and is segmented to minimize cross-contamination when working with more than one motor. Refurbishing North Anna's RCP motors is a five-step process: preparation; disassembly and inspection; repairs and modifications; reassembly and testing; and return to service.

Parts and components removed from the motor are cleaned and decontaminated following inspection. Except for special cases, to perform repairs, for example, decontamination is done for personnel exposure control or to reduce the potential for spread of contamination, and not to achieve a free-release condition. For the North Anna motor, wipe-down by hand was sufficient in most cases. The rotor was steam-cleaned to limit potential airborne contamination during the no-load test. Steam cleaning was followed by oven dry-out to assure complete moisture removal.

The most significant of the lessons learned was that stator destacking was required to rewind. The original plan was to decontaminate the stator core following winding removal, rework the core iron as necessary, and then rewind. Stator core destacking was a contingency task intended to be performed only if difficulties were encountered during decontamination or if the core could not pass a core loss test. Since replating and restacking, the stator core is expected to improve its performance, and since contamination levels should not be significantly different for the next motors, the refurbishment process for subsequent motors has been modified to proceed directly to destacking.

Taken from, "Refurbishing Rather than Replacing Reactor Coolant Pump Motors," by J.A. DeMarco, M.S. McGough, W.E. Mendez, and D.W. Heyer, <u>*Nuclear Engineering International*</u>*, October 1993, pp. 38-40.*