

## New Tensioning Equipment saves critical path time in nuclear outage

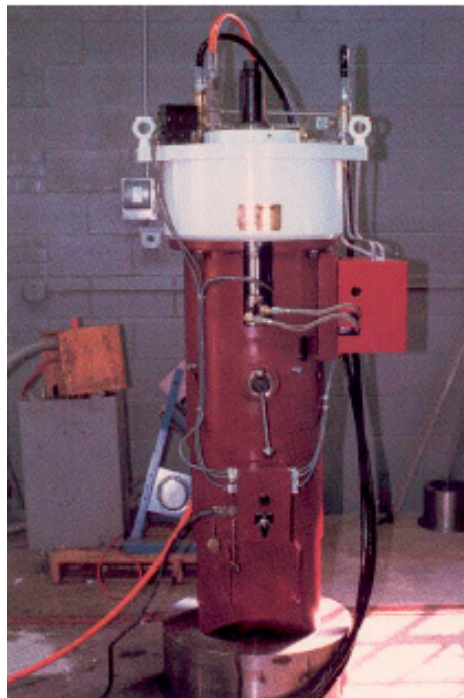
Critical path time at Tennessee Valley Authority's (TVA) Browns Ferry Nuclear Plant is estimated at \$27,000 an hour. With a Cycle 7 refueling outage on Unit 2 scheduled for fall of 1994, the station's outage planning management wanted to replace the plant's original tensioning equipment with an updated system to avoid possible delays.

The TVA, flagship of the rural electrification movement started in the 1930s, operates 29 hydroelectric plants, 12 fossil-fuel plants and five nuclear reactors in a seven-state region of the southeast. With a hold on new nuclear plant construction, the TV A places priority on optimizing online time for existing reactors, and Browns Ferry is no exception. TV A staff began discussing tensioning tools with Biach Industries, Cranford, N.J., at the beginning of the year, settling on five QD-H style tensioners after several meetings. Four would be installed to refit a four-tensioner carousel and the fifth would serve as a spare.

The new tensioners were expected to significantly reduce radiation exposure and critical path time during refueling outages. Browns Ferry personnel had considered replacement of the old, screw-on style stud tensioners with Biach's Quick Disconnect (QD) system. The QD system eliminates time-consuming threading and unthreading required by the conventional "pull" system. Engaging the entire stud end at one time, the QD produces a fast, clean attachment. In 1993, Biach introduced the latest generation of this technology, incorporating a helical stud tensioner to adapt to conventional helical thread forms. This advance eliminated stud rework or replacement requirements.

Biach agreed to meet a contract performance clause providing for specific time-task quotas and associated penalty/bonus provisions for substandard or distinctive performance. The five new tensioners, included new long-life spring loaded seals and hydraulic piston return. The hydraulic systems would be powered by a new Biach portable high-capacity "EPN" series electric hydraulic pumping unit, including built-in reservoir and digital controls. Hose assembly was field installed once the four-tensioner carousel arrangement was finalized. A Biach stud drive tool with load and torque compensation, designed for use by a single operator, was included.

Browns Ferry also ordered Biach's new electronic Stud Elongation Measurement System. The hand-held unit would save time and radiation exposure by allowing one operator to make all the elongation measurements. In August 1994, station personnel witnessed

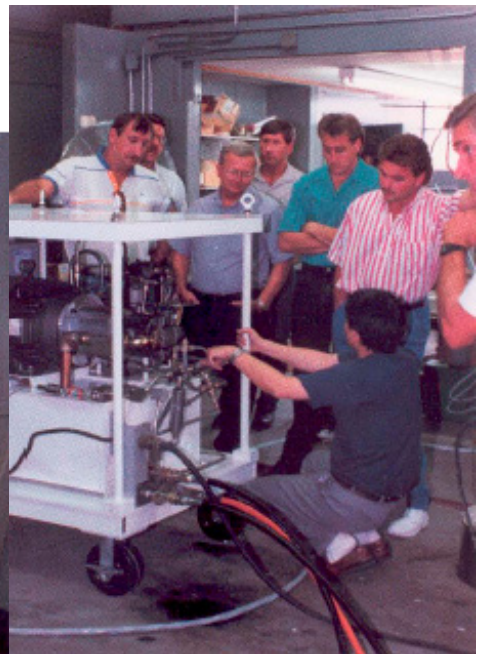


performance tests at the vendor factory and the approved equipment was shipped to Browns Ferry. Plant personnel adapted the existing Carousel to accept the new tensioners and Biach field technicians were on site to assist TV A workers learning to use the equipment. A series of mock test studs was used for testing and hands-on training. Biach personnel also helped adapt the output of data for automatic entry into the plant's measuring and test equipment calibration matrix.

### Into the outage

During the detensioning process, some tensioner seals had minor problems, but field technicians quickly diagnosed the problem, contacting the factory, which assembled the needed replacement top plates and T-rings for overnight express shipping. Critical path time was barely affected and detensioning was completed within performance criteria task-time quota.

With refueling complete, calibration calculations were needed for reassembly with the new equipment. Pressures for stud elongation had to be calculated to reflect the characteristics of the new system. As retensioning proceeded, adjustments were made to the hydraulic pressure, achieving highly accurate stud elongation. The new equipment operated well in retensioning the head and the entire procedure was completed in record time, resulting in a significant reduction from the contract quota time. Eugene Preston, plant manager, and James Maddox, maintenance and modifications manager, were both pleased with the equipment and vendor assistance. "All acceptance criteria were met or exceeded. The vendor-supplied equipment performed to our satisfaction," Preston said.



(Above) TVA station personnel witness performance tests at Biach's factory in Cranford, N.J. The approved equipment was shipped to Browns Ferry for the outage.