N146. Bringing Robotic Tensioning To The U.S.

The need to reduce occupational exposure and cut down on costs is likely to prompt U.S. utilities to adopt robotic pressure vessel stud management systems in the future. As yet, robotic stud handling and tensioning for reactor pressure vessel have been less widely used at U.S. plants than elsewhere. One reason is the lack of standardization at U.S. units.

The U.S. company, Biach Industries, which designed and built tensioners to manufacturers' specifications in the 1960s and 1970s, when most of the vessels were fabricated, found that designs differed considerably, with bolt circle dimensions changing from one vessel to the next as did stud and nut configurations. Nevertheless, in recent years, Biach has been making efforts to increase automation. The company has, for example, introduced the air-actuated Quick Disconnect (QD) tensioning system, which reportedly reduces operator exposure by up to 80% and delivers an immediate financial payback. Anticipating a continuing shift on the part of U.S. utilities toward multiple stud tensioning, circular carousel-type equipment and automatic ultrasonic stud elongation measurement, Biach is now developing what it calls a Reactor Stud Management Robot (RSMR). In this system, while handling is performed in the manner of a carousel machine, other considerations such as "off loading" of studs to racks, equipment storage and accurate positioning have dictated a more sophisticated and coordinated approach.

A key feature of the RSMR concept is that it is not seen as an off-the-shelf tool, but more as a system tailored to individual plant and utility requirements as part of a strategic long-range plan. It is aimed at moving progressively towards complete automation, in line with budgetary considerations. A major building block in RSMR is Biach's Stud Insertion Removal Tool, SIRT. Among the features of SIRT are variable torque capability to 600 ft-lb in two levels. This provides flexibility in addressing tight studs and indicates when a study is "stuck" or reaches a preset level. It also features automatic study engagement, touch screen controls, and numerical display of stud travel using a magnetic linear displacement transducer.

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