## 3472. State-of-the-Art Weld Repair Technology for High Temperature and Pressure Parts

### Volume 3: Turbine Casing, Piping, and Header Utility Survey, Vendor Survey, and Bibliography

As the U.S. fleet of fossil power plants ages, utilities are forced to perform more and more repairs on such components as turbine casings, main and reheat piping, and headers components that have experienced high temperature degradation. This report presents information from two surveys on the weld repair technologies currently used by utilities and repair organizations to extend the life of high temperature, high pressure components.

According to the 28 utilities who participated in the survey, nearly two-thirds of all weld repairs to turbine casings and related components are performed by a repair vendor or by the OEM. Steam chests were the single most often repaired component, with valve bodies, nozzle chambers, and bolt/stud holes also listed. Many utilities discussed the use of various nickel-based welding filler wires for temporary repairs (1-3 years life expectancy). Interestingly, 40% of all repairs appear to have resulted in subsequent cracking. Nearly 60% of respondents reported the use of specialized welding techniques such as temperbead welding or low stress (peening) methods. Girth weld repairs accounted for over 90% of all weld repairs performed on piping/headers, while seam welds accounted for the remaining 10%. The shielded metal arc welding process was reported as the process of choice for most vendors and utilities. Approximately 60% of those responding reported that piping/ header repairs are performed by in-house staff, while a similar percentage reported utilization of vendors. Some 25% reported the use of both in-house staff and vendors.

This survey indicated that specialized welding techniques such as temperbead welding or low stress welding (peening) methods are commonly applied to repair turbine casings by vendors and utilities in lieu of postweld heat treatment. However, until recent changes in at least one of the codes, temperbead welding was not recognized for piping and header repair. Recent changes should assist utilities in performing cost-effective weld repairs without the need of high temperature (1100° F, 593°C) postweld heat treatment.

*For more information see: EPRI TR-103592-V3, Final Report, November 1996,106 pages.*