



ABSTRACT

USE OF NDE AND FRACTURE MECHANICS FOR  
ASSESSMENT OF REMAINING LIFE OF  
STEAM TURBINES

Tom Alley  
Duke Power Company  
Charlotte, NC, USA

Frank Ammirato, Larry Nottingham, and  
Bob Stone  
EPRI NDE Center  
Charlotte, NC, USA

Catastrophic failures of rotating turbine components, such as the Gallatin rotor burst in 1974 and the shrunk-on disk rupture at Hinkley Point in 1969, alerted the utility industry to the failure potential of these components. Such failures can cause severe financial loss; endanger personnel; and, in nuclear plants, damage safety related equipment.

To adequately predict the remaining life of a turbine rotor requires accurate information about component flaws, material properties, future operating loads, relevant failure mechanisms, and an approach to combine this information to make an assessment of remaining life.

EPRI has supported the development of improved ultrasonic test equipment for use from the rotor bore (boresonic examination) and a fracture mechanics based life assessment code called SAFER (Stress and Fracture Evaluation of Rotors). The EPRI NDE Center has supported the transfer of this technology to industry. This presentation deals with the NDE Center's transfer of the NDE and life assessment technology to industry and discusses a particular application by Duke Power Company at their Allen Plant, Unit 1 to extend the operating life of an IP/IP turbine.