A RECENT STATE OF KNOWLEDGE ON LOW-PRESSURE STEAM TURBINE ROTATING BLADES CORROSION

STREJCIUS Josef, JANOUŠEK Jaromír, SVOBODA Jaroslav

Research Centre Rez Ltd., Rez, Czech Republic, EU

Abstract

Several corrosion mechanisms are relevant to the LP turbine blades, including pitting, stress corrosion cracking (SCC), corrosion fatigue (CF) and erosion-corrosion (E-C). Considerable work has been performed to understand the individual mechanisms and the environmental conditions that lead to each of them. However, little progress has been made in understanding the interactions between these damage processes. For example, little is known about the transition of corrosion pits to cracks and the early stages of crack propagation. Different forms of corrosion are not necessarily operating independently. In some cases, one form of corrosion leads to another. For example, pitting can lead to crack formation and SCC, and erosion can lead to stress concentrations and CF. The corrosion resistance of materials used depends on the service environment. Many factors play a role in the corrosion. The pH, the oxygen content, and the specifics of the steam chemistry all affect corrosion susceptibility and subsequent pitting rates and CGRs. Considerable effort has been put toward understanding how these factors influence corrosion. This paper provides a summary of the most recent literature on corrosion mechanisms in LP steam turbines. Literature from various sources has been reviewed and summarized. The primary sources of information were corrosion science and corrosion engineering journals and corrosion conference proceedings and several Electric Power Research Institute (EPRI) technical reports. The literature review is followed with a gap analysis, during which several avenues for future research are identified.

Keywords: LP turbine blade, corrosion, pitting, stress corrosion cracking, corrosion fatigue

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