

Hydro Turbine Steels

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Erosion in hydro power plant has proven to be a great problem from a long time which occurs mainly due to suspended silt particles in water which flows through the turbines components and impacts at high velocities during the normal operating condition. And also metal loss due to cavitation phenomenon particularly in the trailing edges of runner blades leads to severe erosion damages in turbine components. The service life of presently used hydro turbine stainless steel is affected by the hardness, carbide size, process conditions as well as porosity. Thus the assessment of both cavitation as well as silt factors are prerequisite for the quantitative prediction of erosion damage behaviour of the turbine components. Also the identification of critical erosion and cavitation intensity zones are important from the view point of selection of specific coatings on those regions to achieve improved service life. The formation of erosion damage mechanisms in the base hydro steel materials shall pave way for development of high performance coating materials with improved service life. As the cavitation and silt erosion resistance properties are directly affected by the coating process conditions, optimization of these parameters is necessary for achieving improved life expectancy in hard coatings. The erosion resistance of thermal spray coatings have been studied in depth using cavitation and silt erosion test setup, respectively. The supporting tests such as porosity, hardness microstructure, surface roughness, indentation toughness and cavitation/silt damage assessment have been carried out on coating materials. The silt erosion test have been performed at different velocities and impact angles of the jet nozzle. The mechanism of metal removal has been identified and studied from the point of view of surface degradation.

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