

Computational Study and Wear Prediction of Steam Turbine Blade with Titanium-Nitride Coating Deposited by Physical Vapor Deposition Method

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Abstract : This work investigates the wear of a steam turbine blade coated with titanium nitride (TiN), and compares to the wear of uncoated blades. The coating is deposited on by physical vapor deposition (PVD) method. The working conditions of the blade were simulated and surface temperature and pressure values as well as flow velocity and flow direction were obtained. This data was used in the finite element wear model developed here in order to predict the wear of the blade. The wear mechanisms considered are erosive wear due to particle impingement and fluid jet, and fatigue wear due to repeated impingement of particles and fluid jet. Results show that the life of the TiN-coated blade is approximately 1.76 times longer than the life of the uncoated one.

Keywords : physical vapour deposition, steam turbine blade, titanium-based coating, wear prediction

Conference Title : ICMETA 2014 : International Conference on Mechanical Engineering : Theory and Application

Conference Location : Paris, France

Conference Dates : July 21-22, 2014