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Gas Turbine Coatings Eddy-Current Quantitative and Qualitative Evaluation

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Gas turbine blades (buckets) are among the most critical and expensive components of the engine. Buckets rely on protective coatings in order to withstand the harsh environment in which they operate. The thickness and the microstructure of coatings during the lifespan of a unit are fundamental to evaluate their fitness for service. A frequency scanning Eddy Current instrument can allow the measurement of the thickness and of physical properties of coatings in a Non-Destructive manner. The method employed relies on the acquisition of impedance spectra and on the inversion of the experimental data to derive the coating properties and structure using some assumptions. This article describes the experimental validation performed on several samples and real components in order to assess the performance of the instrument as a coating thickness gage. The application of the technique to support residual life assessment of serviced buckets is also presented.