

Turbomachinery design modification and analysis of the axial turbine of an aeroderivative gas turbine

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Abstract

A turbomachinery design analysis of the low pressure (LP) axial turbine of an industrial gas turbine (GT) derived from a CFM56-5C2 high bypass turbofan engine is presented. A preliminary design module that analyzes the aerodynamic qualities of a compressor or turbine design was used to investigate the aerodynamic design parameters of the turbine design. The isentropic turbine efficiency was also predicted using a Smith correlation chart. Design results showed that reducing the number of turbine stages from 5 to 1 is feasible. The key LP turbine design parameters obtained along with the annulus geometry was within the acceptable standard design limit with an estimated LP turbine isentropic efficiency of 92%. The number of LPT stator blades (NGVs) and rotor blades was estimated to be 83 stator blades and 139 rotor blades respectively. However, the turbomachinery design results of the LP turbine were very satisfactory in terms of both the performance and mechanical integrity.

Keywords: turbomachinery, design, gas turbine, aeroderivative.

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