Turbine Airfoil Leading Edge Film Cooling Bibliography: 1972–1998

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Film cooling for turbine airfoil leading edges has been a common practice for at least 35 years as turbine inlet gas temperatures and pressures have continually increased along with cooling air temperatures for higher engine cycle efficiency. With substantial engine cycle performance improvements from higher gas temperatures, it has become increasingly necessary to film cool nozzle and rotor blade leading edges since external heat transfer coefficients and thus heat load are the highest in this airfoil region. Optimum cooling air requirements in this harsh environment has prompted a significant number of film cooling investigations and analytical studies reported over the past 25 years from academia, industry and government agencies. Substantial progress has been made in understanding the complex nature of leading edge film cooling from airfoil cascades, simulated airfoil leading edges and environment. This bibliography is a report of the open-literature references available which provide information on the complex aero–thermo interaction of leading edge gaseous film cooling with mainstream flow. From much of this investigative information has come successful operational leading edge film cooling design systems capable of sustaining airfoil leading edge durability in very hostile turbine environments.

Keywords: Film cooling, Airfoil cooling, Leading edge, Gas turbine

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