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Foil Cooling for the Rep-Rated Electron Beam Pumped Electra Laser[1] J.L. GIULIANI, M.C. MYERS, J.D. SETHIAN, Naval Research Laboratory, F. HEGELER, T. ALBERT, Commonwealth Technologies, Inc, M.F. WOLFORD, Science Applications Int., Inc., S. ABDEL-KHALIK, Georgia Inst. Technology — The Electra program at the Naval Research Laboratory is developing the science and technologies for implementation of krypton-fluoride (KrF) lasers in inertial fusion energy. Large aperture KrF lasers are pumped by electron beams which transit a foil separating the gas target at $\geq$1 atm pressure from the vacuum diode. A fraction of the beam energy is deposited in the foil and thus long term ($\geq 10^8$ shots), rep-rated (5 Hz) operation requires active cooling of the foil to prevent thermal yield relaxation and cycling fatigue. This paper will report on experimental data and theoretical analysis of two diverse approaches to foil thermal management: convective and conductive cooling. Convective turbulent cooling has been operational on the Electra main amp through the use of oscillating louvers within a gas recirculator containing the pumped lasing region. At 5 Hz the foil temperature (T_f) can be maintained at $\sim$400 ^{o}C for a 1 mil SS foil. Conduction cooling provides the simplest configuration with only the need for water channels in the ribs of the hibachi. For a 1 mil Al foil, T_f is predicted to be $\sim$140 ^{o}C at 5 Hz. Comparison of experimental and theoretical results and advanced foil materials will be discussed.

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