Future naval tactical Electromagnetic Launchers (i.e. Railguns) will need to be capable of repeatedly firing eight to twelve rounds per minute. Due to the 1–6 MA of current flowing through the rails, an intense active cooling system must be implemented in order thermally manage the weapon. To accurately account for the necessary amount of heat to be removed, a 3D Electromagnetic-Thermal-Dynamic model in Comsol Mulitphysics was created to solve for the thermal loading. Integrating this software with Mathworksâ€™ MatLab, various models, including an axial FP-OHP, spray/forced convection, cooling channel, and control model were tested for a repeatedly fired gun system. From these simulations, an insight could be gained to the proposition of integrating FP-OHPs into the rail as a means of passive cooling. Finally, a 2D structural optimization within Comsol and MatLab was created to evaluate the feasibility and optimization of an axial FP-OHP design. Using this optimization a Pareto optimality analysis was conducted to determine the structural sensitivity to a change in insulator properties.

From these results it was found that the currently proposed FP-OHP axial system is not sufficient enough to extract a necessary amount of heat without a secondary cooling system. Furthermore it was found that unless OHP technology progresses to point where it can be electrically isolated from the rails, it is unlikely that the system would survive the launch event.