

## **Abstract**

This report explores the optimization of plate-fin heat sinks using entropy generation minimization. It uses the Reynolds Transport Theorem to derive mass, momentum, and energy conservation equations and to develop fin-analysis models under various boundary conditions, which provide solutions for temperature distributions and evaluate fin effectiveness and efficiency. The total rate of entropy generation is calculated by combining heat transfer irreversibility and fluid friction losses, incorporating thermal resistance and pressure drop models. A multivariable Newton-Raphson algorithm is used to optimize fin count, thickness, height, and airflow velocity. This study reveals that identifying optimal design points will balance thermal performance with pumping power.