

Computational design and optimisation of pin fin heat sinks with rectangular perforations

The benefits of using pin heat sinks (PHSs) with single, rectangular slotted or notched pin perforations, are explored computationally, using a conjugate heat transfer model. Results show that the heat transfer increases monotonically while the pressure drop decreases monotonically as the size of the rectangular perforation increases. Performance comparisons with PHSs with multiple circular perforations show favourable heat transfer and pressure drop characteristics. However, the reduced manufacturing complexity of rectangular notched pins in particular provide strong motivation for their use in practical applications. Detailed parameterisation and optimisation studies into the benefits of single rectangular notch perforations demonstrate the scope for improving heat transfer and reducing mechanical fan power consumption yet further by careful design of pin density and pin perforations in PHSs