

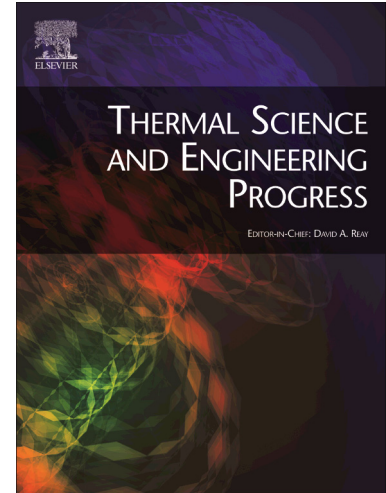
Accepted Manuscript

Multi objective geometric optimization of phase change material based cylindrical heat sinks with internal stem and radial fins

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PII: S2451-9049(17)30251-2
DOI: <https://doi.org/10.1016/j.tsep.2017.10.003>
Reference: TSEP 67

To appear in: *Thermal Science and Engineering Progress*



Please cite this article as: S. Sridharan, R. Srikanth, C. Balaji, Multi objective geometric optimization of phase change material based cylindrical heat sinks with internal stem and radial fins, *Thermal Science and Engineering Progress* (2017), doi: <https://doi.org/10.1016/j.tsep.2017.10.003>

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1 Multi objective geometric optimization of phase change
2 material based cylindrical heat sinks with internal stem
3 and radial fins

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7 1

8 **Abstract**

9 This work presents the results of the multi objective geometric optimization
10 of a phase change material based (PCM) cylindrical heat sink with thermal
11 conductivity enhancers (TCEs) in the form of an internal stem with radial
12 fins. The effect of change in the geometric distribution of the TCEs on
13 the performance of the heat sink was studied while maintaining the total
14 volume of TCEs constant. The ratio of the volume of the TCEs to the
15 cavity was also fixed constant at 10%. Initially, experiments were carried
16 out on a cylindrical heat sink with a PCM fill ratio of 99%. A constant heat
17 input of 6W was applied at the bottom of the heat sink through an electrical
18 heater. The PCM used is n-eicosane and the heat sink is made of aluminium.
19 Numerically obtained results from ANSYS Fluent 15.0 were compared with
20 in-house experimental results to determine the heat transfer coefficient from
21 the walls of the heat sink. The heat sink and TCE parameters namely the
22 diameter of the cavity, the height of the cavity, the diameter of the stem, the
23 number of fins and the thickness of fins were treated as design variables. For

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Preprint submitted to *Thermal Science and Engineering Progress*

October 3, 2017

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