



## Topology optimization of heat exchangers and heat sinks

**Haertel, Jan Hendrik Klaas; Lei, Tian; Alexandersen, Joe; Engelbrecht, Kurt; Lazarov, Boyan Stefanov; Sigmund, Ole**

*Publication date:*  
2017

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Haertel, J. H. K., Lei, T., Alexandersen, J., Engelbrecht, K., Lazarov, B. S., & Sigmund, O. (2017). *Topology optimization of heat exchangers and heat sinks*. Abstract from Danish Days 2017 on Caloric Materials and Devices, Roskilde, Denmark.

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## Topology optimization of heat exchangers and heat sinks

**Jan H. K. Haertel<sup>1</sup>, Tian Lei<sup>1</sup>, Joe Alexandersen<sup>2</sup>, Kurt Engelbrecht<sup>1</sup>,  
Boyan S. Lazarov<sup>2</sup>, Ole Sigmund<sup>2</sup>**

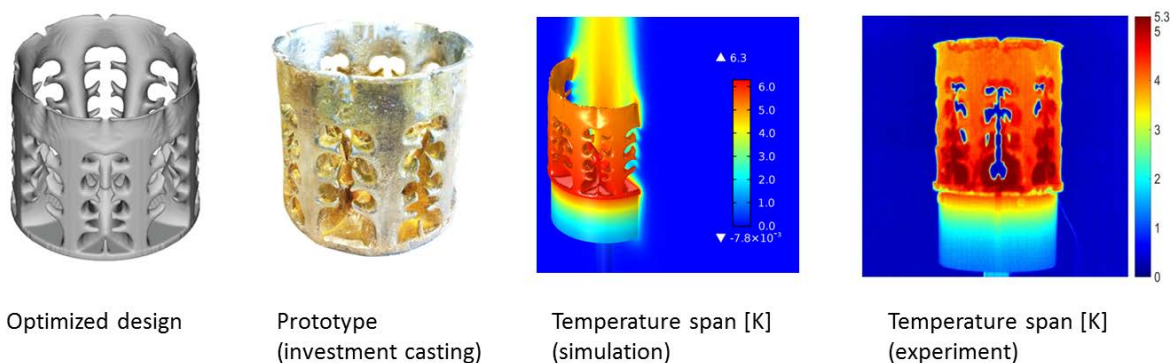
<sup>1</sup>Department of Energy Conversion and Storage, Technical University of Denmark

<sup>2</sup>Department of Mechanical Engineering, Technical University of Denmark

jkhk@dtu.dk

Efficient heat transfer is critical for the overall performance of caloric devices. Topology optimization [1] is concerned with optimizing a material distribution within a design domain under given constraints. In contrast to size and shape optimization, topology optimization does not rely on an initial design parametrization which can lead to reduced development time and identification of unintuitive and unanticipated designs. Topology optimization of thermofluid systems has for example been treated in [2] for forced convection problems and [3] for natural convection problems.

Work within our group deals with density-based topology optimization of heat exchangers and heat sinks as well as fabrication and experimental validation of these devices. Figure 1 shows a heat sink design generated using a thermofluid natural convection topology optimization model and the corresponding prototype fabricated by investment casting of Britannia alloy. Moreover, the temperature span over the heat sink predicted by simulation and experimentally measured with an IR camera is depicted.



*Fig. 1: Optimized heat sink design, fabricated prototype, and simulation and experiment based validation results.*

### References

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