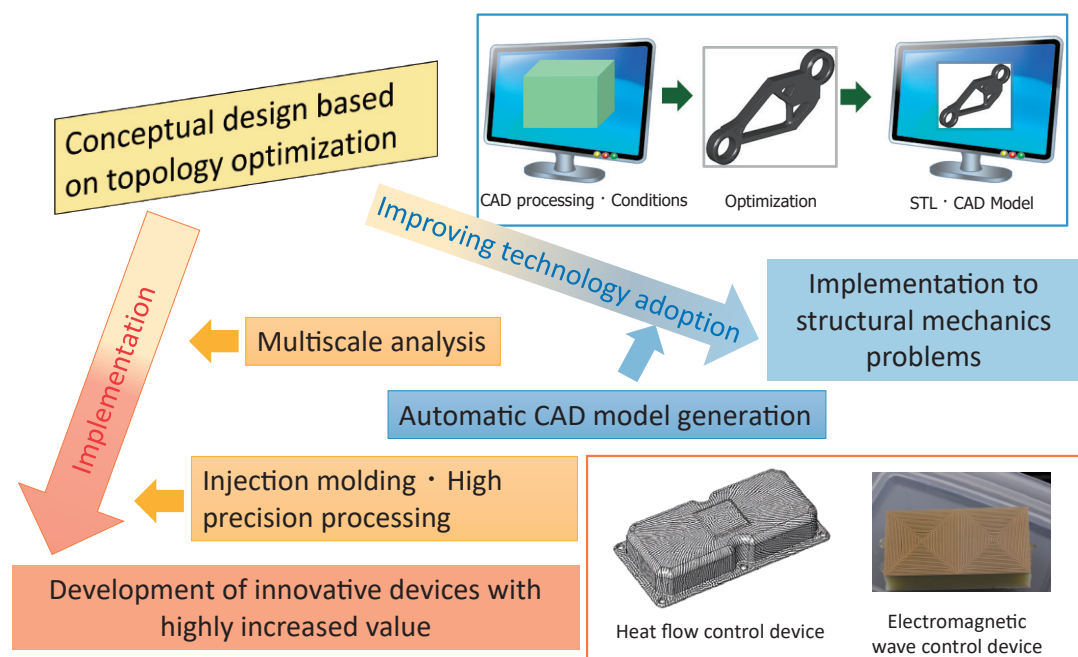


# Structure Performance Improvement by Topology Optimization

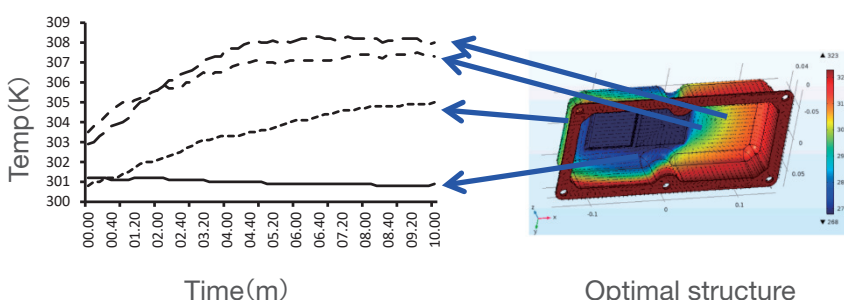
## About this Project

Topology optimization is the most flexible structure optimization method that enables morphological changes such as the number of holes as well as the shape of the structure. This method can, in addition to drastically improving performance, be used to create and design structures with new functions. This research and development project focuses on developing a conceptual design approach using topology optimization. Through the integration of topology optimization and multiscale analysis, design methods have been developed for a heat flow control device and an electromagnetic field control device with high performance and innovative functions. Mass production of these devices is also developed. Finally, in order to improve adoption by small and medium enterprises in the machine manufacturing industry, a system for automatic generation of CAD models based on optimization results was developed.

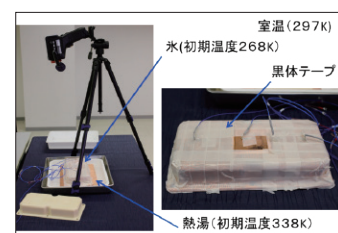


## Test Uses / Application Examples

Prototype heat flow control device (simple inverter case model)



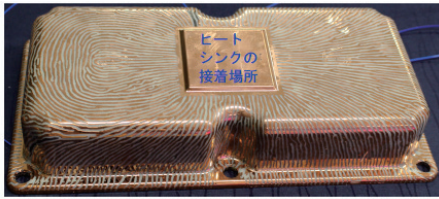
Optimal structure



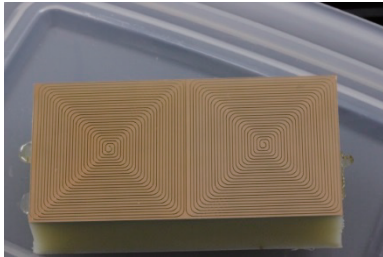
Heat performance test

## Research Achievements

### Advance device design・Manufacturing



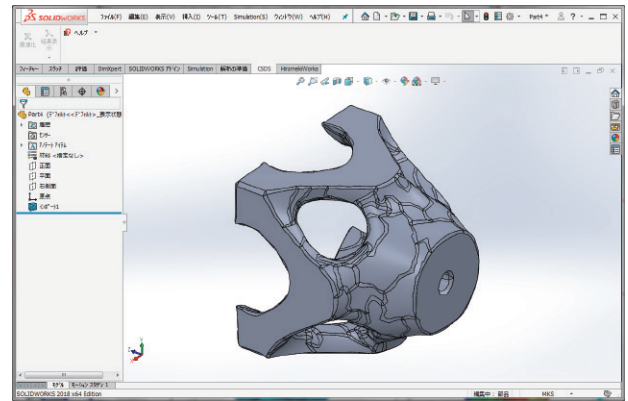
Device controlling the flow of heat by optimizing the microstructure (groove pattern)



An electromagnetic wave control device structure capable of selectively blocking electromagnetic waves of a specific frequency

### Conceptual design system

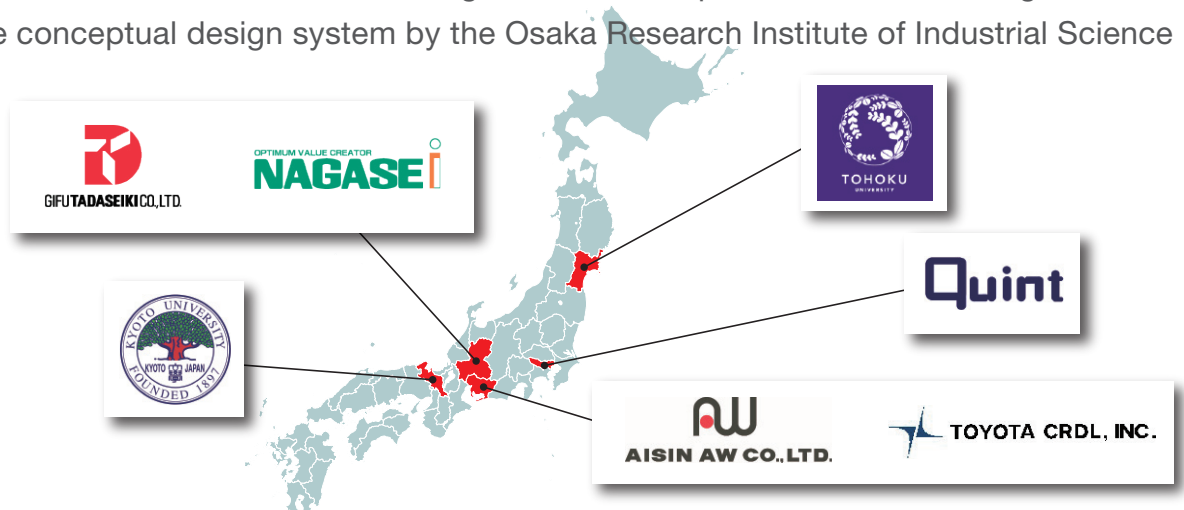
- A system linking topology optimization with 3D CAD as an add-on for SOLIDWORKS
- CAD data is automatically created from optimal results



CAD model created from a structure obtained by topology optimization

## Future Outlook

- A topology optimization consortium will be established at Kyoto University and development of design and manufacturing methods for high performance devices will continue.
- The aim is to make the software for the conceptual design system commercially available within few years. Beta version will be available for testing to various companies in the Kansai region.
- Promotion of the conceptual design system by the Osaka Research Institute of Industrial Science and Technology



Research Theme : Construction of conceptual design methods using topology optimization for rapid and creative product development

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