



## HPC & advanced modelling & simulation services - annular radial flow recuperator

By creating components through metallic Additive Manufacturing (AM), the time from concept generation to manufacture is greatly reduced. This offers the ability to create complex geometries and lattice structures to make lighter and more efficient components, using space more efficiently than conventional manufacturing.

### Challenges

The challenge was to design a high temperature heat exchanger to be used in conjunction with a micro gas turbine system. The integration of traditionally multiple parts into one AM component, resulted in the creation of an annular radial flow recuperator design, manufactured from Nickel alloy, Inconel 625. This annular radial flow recuperator features a similar performance to the cuboid recuperator but is an enabler to an annular architecture, requiring little additional ducting to facilitate substantially smaller systems packaging and reduce weight. Computational Fluid Dynamics (CFD) was used heavily in order to create complex flow paths promoting heat transfer whilst managing the pressure drop within acceptable limits. Combining these toolsets, a detailed design of the heat exchanger core was created in CAD\*.

### Solution

Utilising As a foundation to the design of novel and complex concepts, a highly agile HPC platform was used for CFD and FEA workloads and engineering data analysis. Offering high standards of data security, flexible access to a Cray CS400 cluster supercomputer with over 4,000 cores of computing power expedited the design

phase. Accessed on a pay-as-you-go, HPC enables greater mesh resolution and competitive advantage by arriving at a high value outcome quickly and cost effectively. Helping to analyse the behaviour of new products under development through faster, more-informed decision-making provides greater insight and feedback into the design cycle. The shape freedoms possible with AM have been fully exploited in this design whilst completely avoiding the need for supportive structures.

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