

# Automated design of fluid distribution systems for an additive manufactured heat exchanger

## **Background and motivation**

In recent years, additive manufacturing (AM) has greatly expanded the possibilities of manufacturing. With this innovative technology, complex structures can be manufactured compare to traditional methods easily. This increased the interest for the innovation in heat exchangers. Using complex structures enhance heat transfer in such devices pretty much. As an example, the fractal structures have a great potential. Nevertheless, these structures need mathematically defined structures to distribute fluids equally. For this purpose, this master thesis serves to develop fluid distribution systems from mathematical equations to CAD model and to automate the design of such structures. The thesis student will work within the scope of a BMWI Project "3D Process" in cooperation with Evonik Industries AG.

## **Tasks**

The following tasks should be dealt with in this thesis:

- Literature review on the fractal structures, distribution systems for this kind of structures and mathematical definition of these structures
- Developing a mathematical model to define distribution structures
- Developing flexible CAD model in order to adapt distribution structure to changing fractals
- Validation of equally fluid distribution in the heat exchanger

## **Qualifications**

- Study in mechanical, computational or chemical engineering
- Experience in 3D-Modelling and a programming language like MATLAB/Python
- Ability for imagination and mathematically definition of complex structures

This thesis can be written in German or English. At the end of the thesis, the results will be presented in an institute seminar.

Beginning of the thesis: As soon as possible

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