



## Doctoral candidate 8: Manufacturing and functional characterisation of 3D printed smart devices

<b>Host Institution</b>	Slovenian National Building and Civil Engineering Institute
<b>PhD enrolment</b>	Delft University of Technology
<b>Primary Supervisor</b>	Dr. Lucia Mancini
<b>Subject area</b>	Shape morphing materials and functional characterization by dynamic X-ray imaging

### About this doctoral project and your tasks

You will design, manufacture and characterise 3D printed SMA-based devices starting from the process parameters optimisation for printing SMA samples. The functional characterisation of 3D printed devices either by ex situ or in situ experiments by 4D X-ray phase contrast will enable correlation between the process parameters and the functional properties by observing phase formation during external stimuli.

You will focus on defining rules of design and manufacturing of 3D printed SMA-based devices for self-compliant devices. After training on 3D printing technologies and SMA materials, you will focus on the correlation of the process parameters and functional properties of SMA materials. The influence of process parameters on the composition of 3D printed parts will be investigated to optimise the printing process for functional properties tailoring. After assessment of samples on processes and functional properties, the applied research will be focused on the design and characterisation of a SMA-based self-compliant mechanism.

You will investigate proof of concepts for designing self-compliant mechanisms as well as the 3D structure and final functional properties. Finally, a prototype of SMA-based self-compliant will be manufactured and tested ex situ and in situ by 4DCT.

#### Your tasks will include:

- Methods and protocols for the design of 3D printed SMA-based devices
- optimised printing process for functional properties tailoring
- characterised SMA-based self-compliant mechanisms

### Foreseen secondments

For this project, we foresee secondments to:

- **Eng. F. Mercandelli** (2 months) at GFM (Italy)
- **Dr. S. Ghodrat** (8 months) at Delft University of Technology (The Netherlands)