

Doctoral candidate 5: Correlative phase-contrast 4DCT of shape-changing materials using synchrotron radiation and lab sources

Host Institution	Slovenian National Building and Civil Engineering Institute
PhD enrolment	University of Antwerp
Primary Supervisor	Dr. Lucia Mancini
Subject area	Multi-scale and correlative dynamic X-ray imaging

About this doctoral project and your tasks

You will develop correlative approaches to extract and merge information from multiple XCT scales and modalities to investigate shape memory polymers and alloys provided by TUD and GFM, respectively. In particular, you will develop correlative imaging tools acquiring 3D and 4D data by a single lab instrument, when possible, or by a combination of instruments based on lab and/or synchrotron radiation (SR) sources, giving access to complementary information about the investigated specimens tested under realistic conditions. Phase-contrast 4DCT with SR could represent a golden standard for designed XCT measurements and should guide DC5 to optimise data collection and reconstruction strategies through XCT lab systems. Moreover, once the data have been acquired, in order to fully exploit the results and reliably interpret the dynamic behaviour of the selected shape-memory materials, information from different probes and/or acquisition modalities will be merged. This work will require developing both experimental and computational skills by the DC working in close collaboration with methods developers (UA, FHG) and materials designers and manufacturers.

Your tasks will include:

- Sample-driven protocols to analyse specific morphotextural and/or functional properties of shape-memory alloys (SMAs) and polymers (SMPs)
- Methods to correlate 3D data acquired in static and dynamic conditions by using different probes, scales and modalities

Foreseen secondments

For this project, we foresee secondments to:

- **Dr. H. Markötter** (6 months) at Bundesanstalt für Materialforschung und – prüfung (Germany)
- **Eng. F. Mercandelli** (3 months) at GFM (Italy)
- **Prof. dr. Christoph Heinzl** (3 months) at Fraunhofer IIS/EZRT (Germany)