EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON



Experiment Report Form

ESRF	Experiment title: In situ characterisation of the incuded cyclic phase transformations in the directed energy deposition of TRIP steels	Experiment number: MA 4541
Beamline:	Date of experiment:	Date of report:
ID31	from: 29/06/2021 to: 05/07/2021	09/09/2021
Shifts:	Local contact(s): HONKIMAKI Veijo	Received at ESRF:
15		

Names and affiliations of applicants (* indicates experimentalists):

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Report: We successfully implemented the second generation blown powder manufacturing process replicator (BAMPR-II) on to ID31 beamline. We combined ID31's high energy X-ray with our unique process replicator which is equipped with correlative ultra-fast IR imaging capability to perform a first *in-situ* correlative synchrotron XRD experiment at the ESRF. We observed phase transforamtion on the spot during the beamtime from diffraction patterns. Data analysis is on-going to reveal the coupled solidification-mechanical behaviour of AM processed TRIP steels including the stress induced multi-phase transformation and its phase evolution during the multi-layer DED-AM process.



Figure 1. BAMPRII system mounted in ID31 hutch