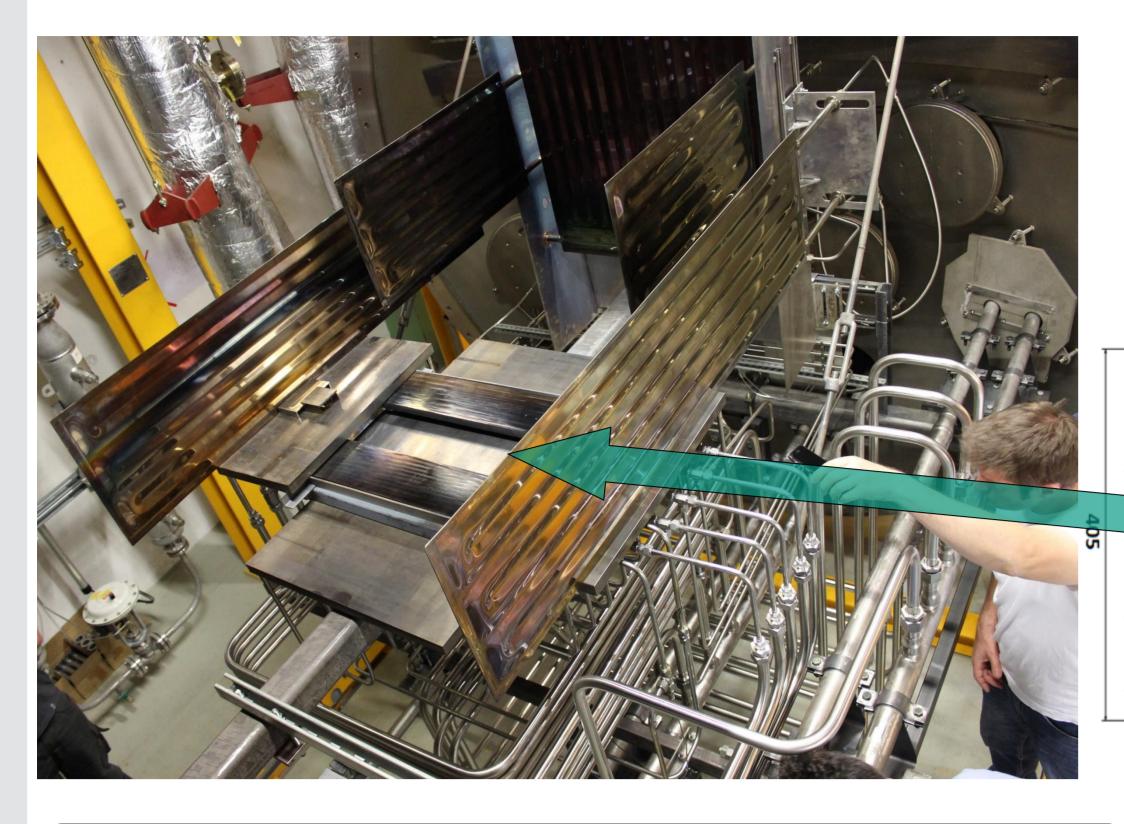
P4.221

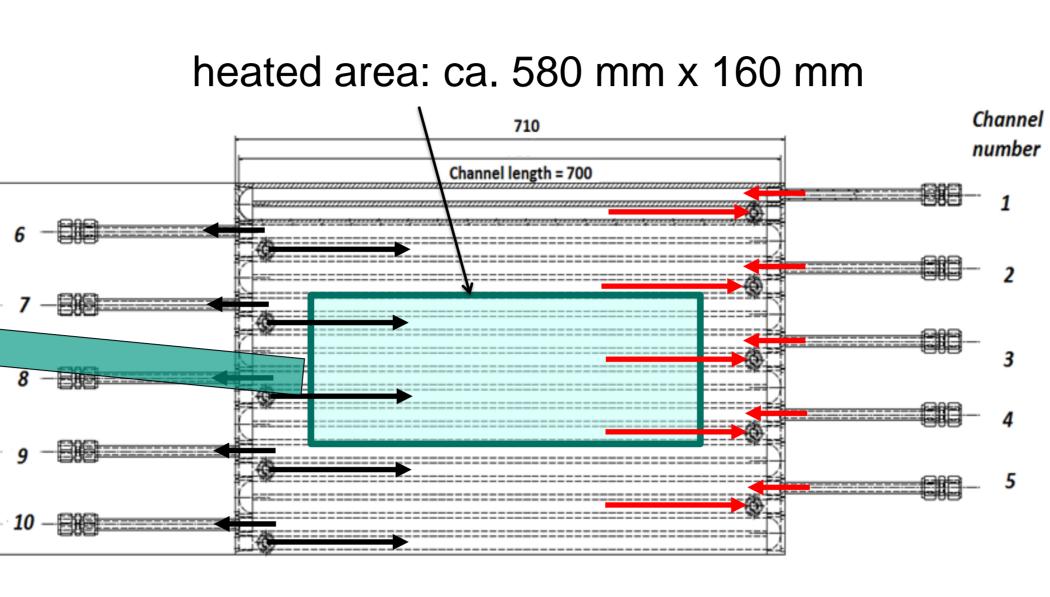
Karlsruhe Institute of Technology

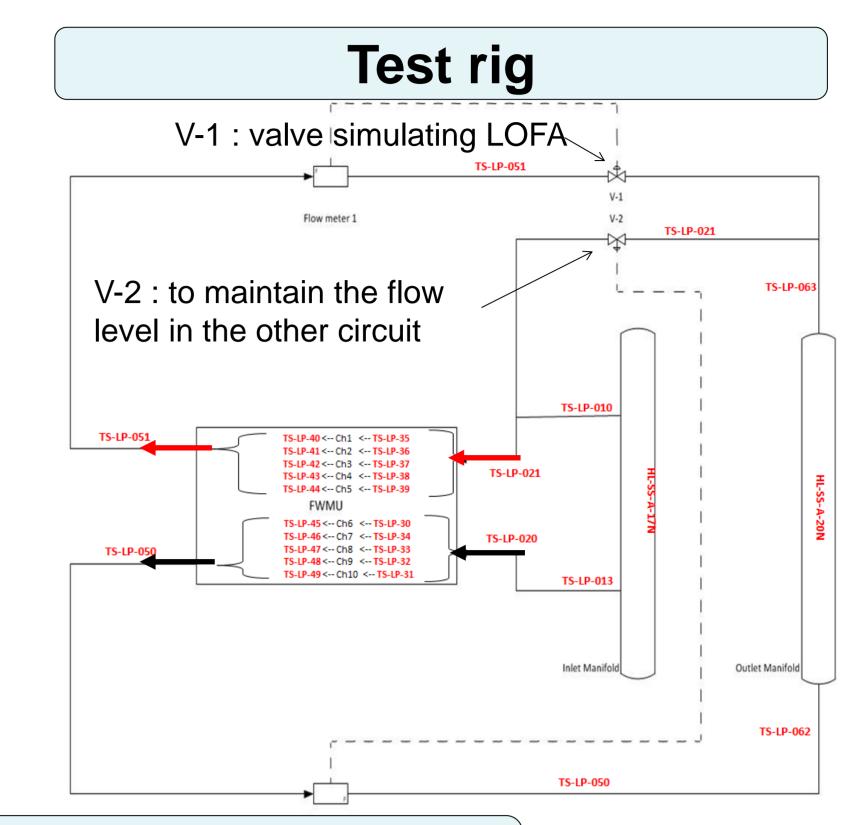
Experimental investigation of a Helium-cooled Breeding Blanket First Wall under LOFA conditions in view of code validation

Bradut-Eugen Ghidersa, Valentino Di Marcello, Andre Kunze, Xue Zhou Jin, Robert Stieglitz Karlsruhe Institute of Technology (KIT), Institute for Neutron Physics and Reactor Technology (INR), Karlsruhe, Germany



He-cooled Breeding Blanket First Wall mock-up





Test Set-up

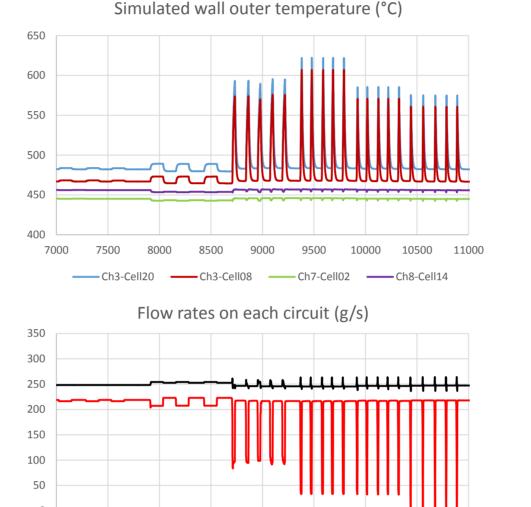
Mock-up:

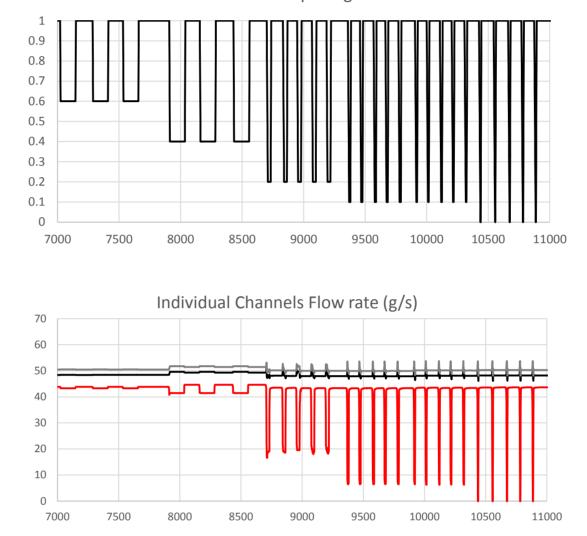
- 10 channels with 15x15 mm² each,
- plasma side wall thickness is 3 mm,
- material is P92

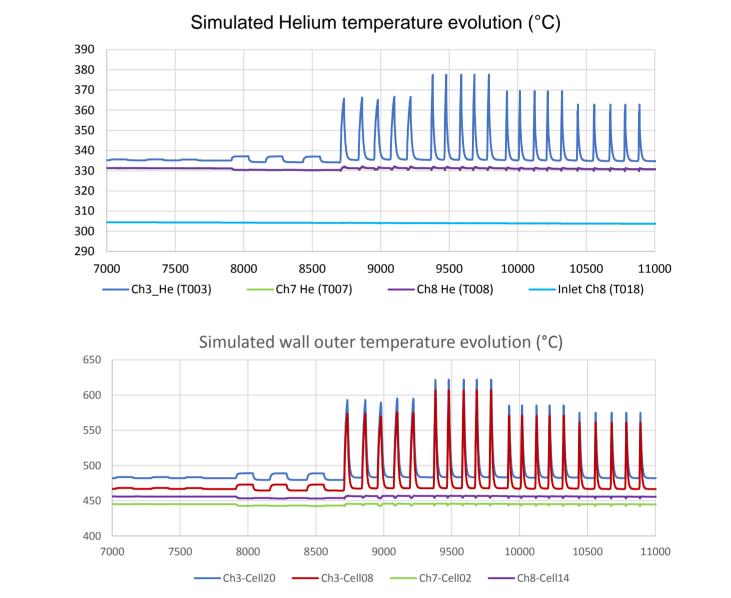
Operating conditions:

- Helium inlet temperature: 300°C
- Helium pressure: 80 bar(a)
- Total helium flow: 500 g/s (about 250 g/s per circuit; 50g/s per channel)
- 2 valves to control the flow in each circuit
- Heat flux: 300 kW/m² by electron beam heating

RELAP5-3D Simulation of the experiment

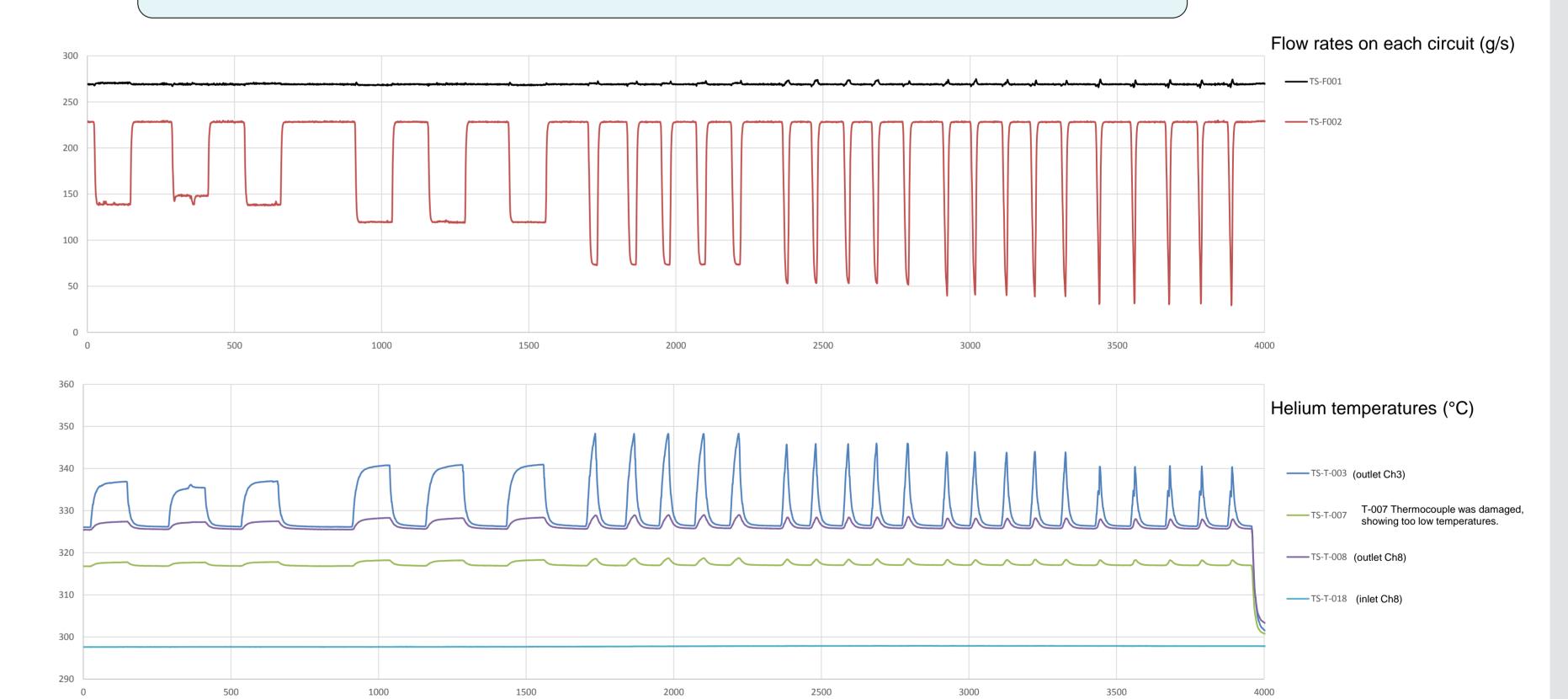


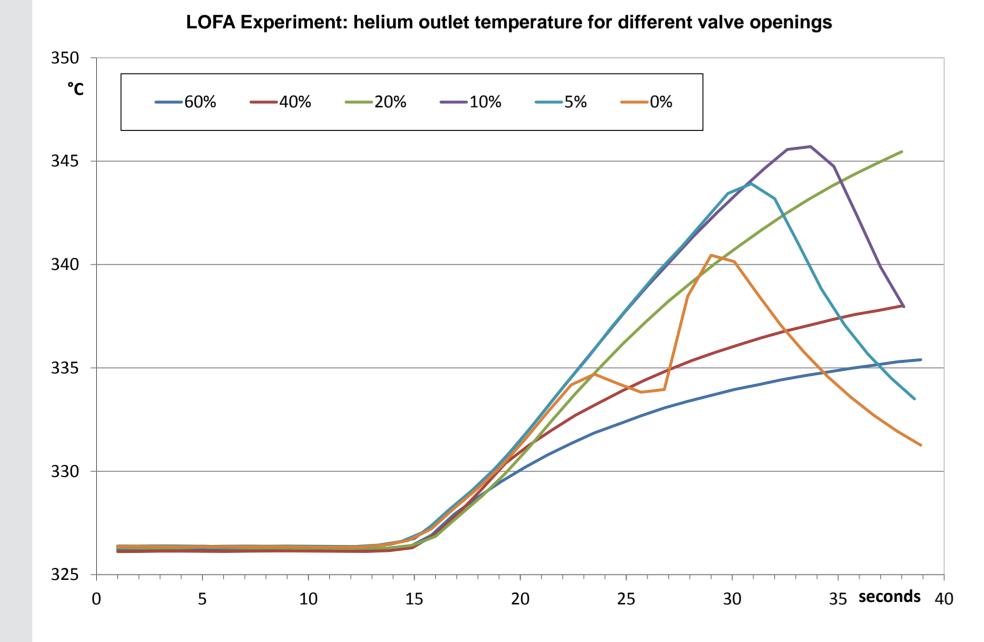


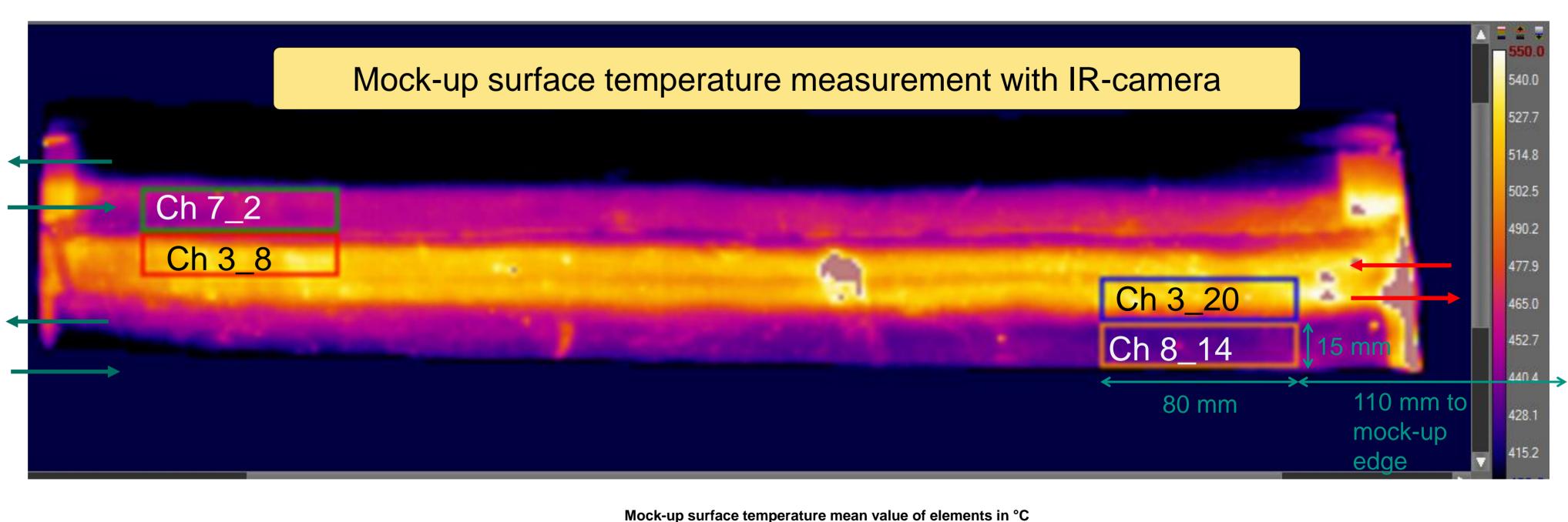


LOFA Experiment: mass flows at different valve openings Initiating LOFA (valve starts to close) -60% opening -40% opening –20% opening —10% opening —5% opening -0% opening seconds

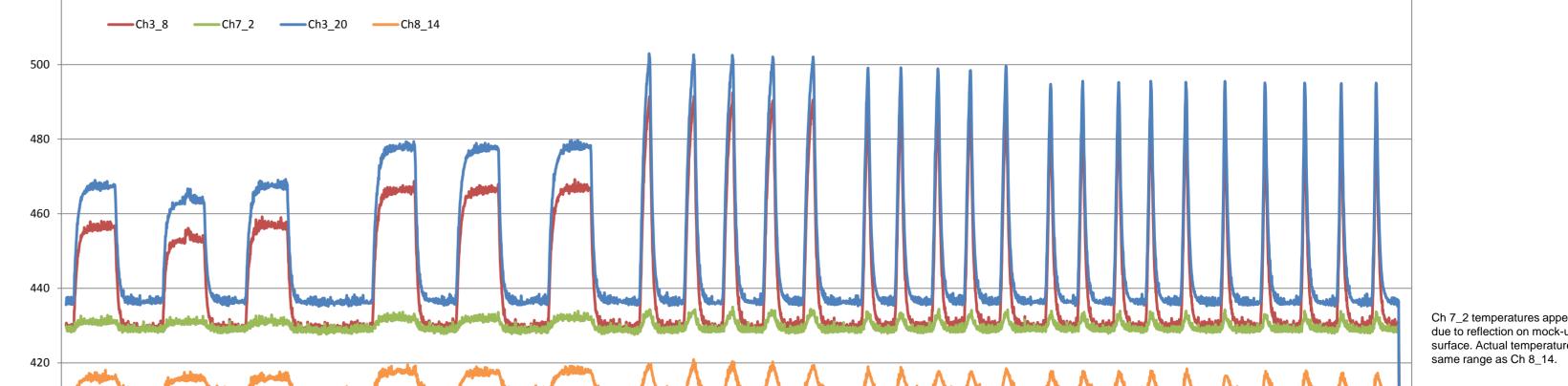
Experimental results for full and partial LOFA







In the Experiment the valve was opened again to return to full cooling when the mock-up surface temperature exceeded 500°C



17:18:23

17:25:35

Ch 7_2 temperatures appears higher due to reflection on mock-up surface. Actual temperature is in the

17:11:11

17:39:59

17:47:11

17:32:47