

Project name: Measurement of residual stresses in an aluminium cylinder head

BEAM-TIME APPLICATION (Project) REPORT
dd.mm.yyyy - dd.mm.yyyy *(Date of the report to be added)*

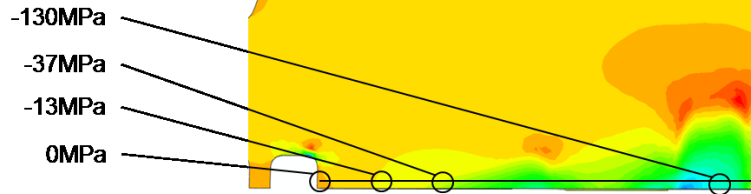
General information

Name of the rapporteur	Name of the rapporteur's organisation
Alejandro Guirao Blank	Volkswagen AG
Type of research (nanotechnology/health care/chemistry etc.)	Name of the research facility
Material science	Helmholtz Zentrum Geesthacht
Date of the measurement, duration	Location of the event
Aug 9 – 11, 2012	HEMS Beamline (P07), DESY, Hamburg
National Industrial Liaison Officer from rapporteur's country participating in the measurement	
<i>Marc Thiry, Peter Staron</i>	

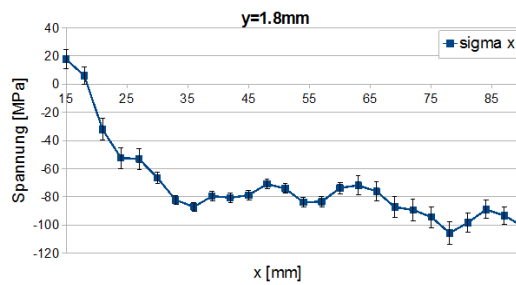
Description of the project

Research description (short summary as written in the application)
Measurement of residual stresses after quenching in an aluminium cylinder head in order to validate simulation results.
Summary of activities (experiments performed, beam-time used, preliminary overview of results, next steps and other relevant information)
<p>A cylinder head composed of a fine grained aluminium alloy was solution heat treated and quenched in water. The resulting residual stresses in a plane parallel to the burning chamber were measured. In total 139 points were measured in order to gain enough information to compare the measurements with simulation results of the aforementioned heat treatment.</p> <p>A total amount of 3 days of beam time were necessary to collect the required data. The simulated residual stresses show a good correlation with the measurements although there are areas where the simulation shows discrepancies both in the amplitude and the sign of the stresses.</p>

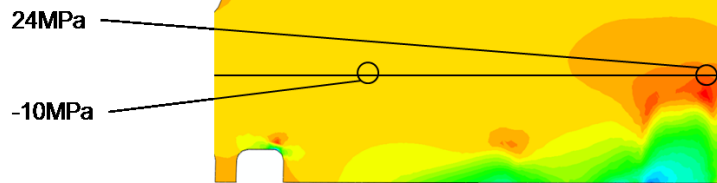
Simulation



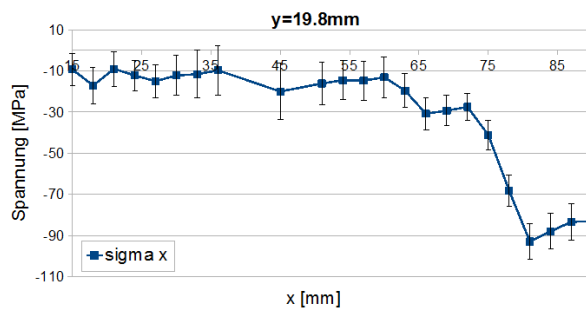
Measurement



Simulation



Measurement



Further improvement of the simulation models in particular the material modelling will be needed. The results of these improvements will also be compared against the measured data in order to evaluate them.

How would you describe cooperation and assistance from national contact points while preparing and carrying out the research at large scale facilities?
The cooperation was excellent in all areas. We received very good counselling and the reports exceeded our expectations. To improve the simulation models, additional measurements have already been booked and performed.
Other personal remarks

Annexes

Annexes (list of annexes; meeting minutes, graphical illustrations, tables and other supplementary data)