

- Bachelor or Master Thesis-

„ Influence of lubricant addition on cooling regimes during spray cooling of heated surfaces “



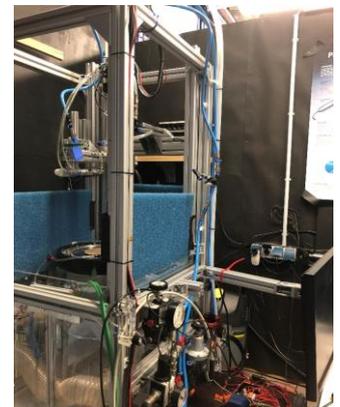
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The process of spray cooling of extremely hot surfaces is realized at the Institute for Fluid Mechanics and Aerodynamics (SLA) in cooperation with several industrial partners. Spray cooling is often used in different industrial applications for cooling of very hot surfaces, such as cooling of tools and working parts during the forging processes in metallurgical industries. Very often, lubricants are added to the working fluid of the spray to assist cooling and to reduce wear. Although many phenomena related to the impingement of pure water spray onto a hot surface are already understood, the influence of the presence of lubricants or other additives in the liquid remains largely unknown. Therefore, the development of reliable models for the heat flux prediction during the spray cooling with lubricant addition remains also open.



The goal of the planned Master Study is to experimentally investigate the hydrodynamic mechanisms and heat transfer during the interaction between spray and hot surface and to identify the effects of the lubricants on the outcome of spray impact. The existing experimental installation for spray cooling will be possibly further modified to enable the usage of water-lubricant mixtures. At the beginning, white industrial lubricant will be added to the working fluid, whereas the various parameters, such as: lubricant concentration, mass flow etc., will be varied in the experiments. Another type of lubricant which can be described as a graphite based lubricant dispersion will be used as well. The spray impact will be observed using the high speed video imaging. The heat flux will be measured for various wall temperatures. Finally, the influence of the lubricants on the spray impact outcome and regimes will be characterized.



Over: impingement of the water spray onto the hot substrate

Under: existing experimental installation for spray cooling

Prerequisites:

- Knowledge of Fluid Mechanics and Thermodynamics
- Passion for experimental research
- Motivation & autonomous working capabilities
- Preferable knowledge of MATLAB and LabView

Working assignments:

- Research of relevant literature and introduction into the topic
- Handling and eventual modifications of the existing experimental installation
- Selection of the relevant parameters which will be varied
- Performing experiments
- Evaluation and documentation of results

Beginning: as soon as possible

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