Advanced Cooling Technologies in Steelmaking, or How We Started to Appreciate the Complexity of Boiling Heat Transfer

Date: 12/07/2018
Time: 12:15
Room: C501

Dr. Vladan Prodanovic

University of British Columbia, Vancouver BC, Canada

Abstract: Boiling heat transfer is known as a very effective method for heat removal as it produces heat fluxes which can be several orders of magnitude higher than those in single phase forced convective cooling. Various cooling technologies based on boiling heat transfer have been applied in very different technologies, such as nuclear reactors, cooling of electronic components or metal manufacturing processes. In this presentation we will focus on advanced cooling technologies in manufacturing of steel products.

Runout table accelerated cooling is based on jet impingement boiling and it has become a key technology to produce thermo-mechanically controlled processed (TMCP) steel plates and strips. This controlled cooling process is used to tailor microstructures of steel and achieve desired mechanical properties of the product, which are typically specialty steels used in wind turbines, offshore oil platforms or harsh environment pipelines in the arctic region. Simulation of runout table cooling is a key design tool to produce best quality specialty steels. The status of runout table simulation approaches will be reviewed. We will see that modelling and controlling the transition boiling regime below the Leidenfrost temperature remains a challenge as heat extraction rates increase with decreasing steel temperature.

Short CV: Dr. Vladan Prodanovic is a senior instructor in the Departments of Chemical and Biological Engineering, and Mechanical Engineering at the University of British Columbia, Director of MEL in Clean Energy Engineering, Chair of UBC's Vantage College Engineering Stream, and researcher in the Centre for Metallurgical Process Engineering (CMPE). His professional interest and expertise is in the area of thermodynamics, heat transfer, fluid mechanics and clean energy.

Dr. Prodanovic received his B.A.Sc. and M.A.Sc. in Chemical Engineering at the University of Belgrade, and completed his doctoral and postdoctoral studies at UBC, after which he joined the Advanced Materials and Process Engineering Laboratory and its Centre for Metallurgical Process Engineering. As a research scientist in CMPE he had the opportunity to work on a number of research projects related to developing new materials, and collaborate with industrial partners such as ArcelorMittal, Evraz Steel, Algoma Steel, Novelis, Posco and Siemens. A particular focus of his research is modeling of jet impingement boiling. He published his work in over 40 journal and conference publications, and numerous technical reports.

As a member of UBC's Clean Energy Research Centre, and Director of the Clean Energy Engineering Master Program he teaches courses on renewable energy technologies, energy storage and energy efficiency and conservation. He also teaches first year undergraduate students in UBC's Vantage College an introductory course to engineering design and sustainable design practices.