CLEAN STEEL TECHNOLOGY

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Overview

Cleanliness of steel is one of the most striking quality criteria of steel today and many technical efforts made are related to this property. Increased demands of final products from steels cause an increasing precision of process control. Steel cleanliness is mainly based on the amount of non-metallic inclusions which are almost exclusively of oxidic or sulfidic nature, tramp elements such as Copper and Tin, Phosphorus, Sulphur, Hydrogen and Nitrogen. Non-metallic inclusions influence the steelmaking and steel processing badly as they can cause nozzle clogging especially during continuous casting. More severe is the detrimental effect on mechanical properties, where especially the forming behaviour is deteriorated when too many inclusions remain in steel. Tramp elements determine steel quality in two ways. First, they may influence the processing conditions of steel from ladle treatment through casting to final annealing, thus indirectly affecting the quality of steel. Second, as constituents of steel, they directly influence the mechanical properties of steel products. For example, Cu and Sn increase the tensile strength of ULC-Ti (ULC – ultra low carbon) steel grades and decrease their ductility expressed in terms of elongation. The challenge to improve cleanliness of steel shall be discussed in variety of lectures & tutorials using computer &modelling and problem solving. Overall the course will have following content: formation of non-metallic inclusions (de-oxidation, re-oxidation, refractory, ladle glaze, slag emulsification, exothermic heating in the ladle); removal of nonmetallic inclusions (gas stirring, ladle slag analysis, dissolution of non-metallic inclusion in the slag, electro-slag-remelting, filtration); input and removal of tramp elements Copper and Tin; Input and removal of Phosphorus and Sulphur; Input and removal of Nitrogen and Hydrogen; Simulation of equilibrium slag-steel-non-metallic inclusion using thermodynamical program FactSage7.0; Simulation of phosphorus distribution using thermodynamical program FactSage 7.0.

Modules	**Clean Steel Technology : July 22, 2019 - July 26, 2019** **Number of participants for the course will be limited to fifty.**
You Should Attend If…	▪ You are a Metallurgical engineer or a research scientist interested in designing equipment for secondary steel making and processing of clean steel. ▪ You are an executive, researcher from manufacturing, service and government organizations including R&D laboratories. ▪ You are a student and faculty from academic institutions interested in learning removal of non-metallic inclusions or want to simulate with FactSage for secondary steel making.
Fees	The participation fees for taking the course is as follows: **(a) Industry or R&D Laboratories: Rs 5000** per participant **(b) Faculty Members: Rs2500** per participant **(c) Students: Rs 1000** per participant The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges. The participants will be provided with accommodation with prior booking on payment basis. **Account Details:-** Account Name: CLEAN STEEL TECHNOLOGY Account No.: 8569101003397 IFSC Code: CNRB0008569

The Faculty

Prof. Olena Volkova is a Professor of Iron and Steel Technology at the TU Bergakademie Freiberg. Her research interest is Materials Science and Materials Technology.

Dr. Susanta Pramanik is an Associate Professor of Metallurgical and Materials Engineering Department, National Institute of Technology Durgapur. His research interest is Iron Making and Steel Making.

Course Co-ordinator

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