

Dear All,

The Department of Chemical Engineering is pleased to invite you to the Industry Lecture Series of the January 2024 semester. The seminar is open to all and is mandatory for first –year M. Tech students of Chemical Engineering.

The time of the lecture is as follows:

Date: 17/01/2024, Wednesday

Time: 4 :00 pm

Speaker: Mr. Mriganshu Guha (Head, TATA Steel Advanced Materials Research Center)

**Demystifying Complex Industrial Processes in a Steel Plant**  
**through Process Simulation**

**Abstract**

Often, industrial processes are complex due to far-from-ambient conditions, multi-phase, multi-component, non-ideal behaviors, and the overarching blanket of uncertainty due to sheer size/volume. Increasing concern towards not only product quality and cost but also process efficiency and effectiveness has necessitated control of complex industrial processes/equipment. Mostly, such process controls are aided with sophisticated simulation tools to better assess the scenario inside such black-box equipment. In fact, such complex process/equipment need multi-prong modeling and simulation, right from numerical modeling to physical simulation, sometimes in different stages and scales to capture the nuances and uncertainties of the process.

Iron & Steel making industry is notorious for not only producing more CO<sub>2</sub> than Steel but also for its complex processes – at every step. However, there has been significant improvement in last few centuries in terms of multi-prong process simulation tools being increasingly used in Iron and Steel making process routes leading to multi-fold improvement in process visualization & control. These improvements in enhanced process control led to higher productivity, improved product quality and of course gradually reducing CO<sub>2</sub> footprint comparable with thermodynamic and kinetic equilibrium.

Tata Steel also focussed attention on multi-prong process simulation around late-20<sup>th</sup> century after major process equipment modernisation in it's Jamshedpur plant and came a long way, since then. Blast furnace producing molten iron for subsequent steel making is considered to be the 'workhorse' or 'heart' of any integrated steel plant and is indeed one of the most complex reactor/equipment present. Series of individual numerical models with physical simulations including scaled-down models, along with different integrated (in terms of level) numerical model and corresponding physical simulation have now led to efficient process control at most of the blast furnaces within Tata Steel leading to record level of process efficiency and productivity.

Thanks & Regards,

Anand (Course Instructor, Room No A-306)