



# STEEL QUALITY : ROLE OF SECONDARY REFINING & CONTINUOUS CASTING

**PROF. SANTANU KR. RAY**

Department of Metallurgy and Material Science  
IIT Madras

**INTENDED AUDIENCE :** Undergraduate, post graduate and graduate students of Metallurgical and Materials

**INDUSTRIES APPLICABLE TO :** All steel producers and users will be interested in this course

## **COURSE OUTLINE :**

Quality of steel plays an important role in imparting the specific application requirements to the product. Cleanliness as well as absence of defects are two broad facets of the quality of a steel product. Aim of this course is to give a brief introduction to the importance of secondary refining and continuous casting in achieving the desirable cleanliness and surface quality of cast and hot rolled steels

## **ABOUT INSTRUCTOR :**

Prof. Santanu Kumar Ray has been the Steel Chair Professor in the Department of Metallurgical and Materials Engineering of IIT Madras since March 2016. He did his B.Tech ( Hons ), M.Tech and Ph.D , from IIT Kharagpur . He spent 35 years at the R & D Centre of SAIL . For a brief period of 6 months he was the Principal of Seacom Engineering College in Kolkata. His areas of interests are commercial implementation of new developments in secondary refining and continuous casting of special and alloy steels.

## **COURSE PLAN :**

**Week 1:** Concept of steel quality , Typical examples of common defects

**Week 2:** Present scenario of quality demands , Application-specific requirements of residuals and NMIs

**Week 3:** Limitation of primary steelmaking , Importance of different secondary refining processes

**Week 4:** Requirement of Calcium injection , Cleanliness measures intundish and mould

**Week 5:** Nature and distribution of exogenous entrapments in casting, their sources

**Week 6:** Role of caster & casting process on quality , Cast structure and dendrite size

**Week 7:** Role of mould oscillation , Effect of steel chemistry and segregation

**Week 8:** Deleterious effect of P and S ,Role of strength & toughness of solid shell

**Week 9:** Factors responsible for bulging vis-a-vis depression behavior , Brittle temperature regions for different steel grades

**Week 10:** Influence of secondary cooling on cast quality , Typical cracks and other defects

**Week 11:** Remedial measures to control quality issues , Grade-specific casting parameters

**Week 12:** Identification of genesis of quality problems through metallurgical investigation