

Report on

TEQIP Sponsored Short-Term Course on

Industrial Metallurgy and Quality Control

February 11-16, 2019

Organized by

Discipline of Metallurgy Engineering and Materials Science, IIT Indore

(Coordinators: Dr. Santosh S. Hosmani and Dr. Rupesh S. Devan)

Objectives:

Various metals and alloys have wide applications in many industries. Metallurgy is the key factor in automotive, nuclear, chemical and aerospace industries. Therefore, the precise understanding of metals/alloys and their behavior in actual use are required for almost every engineering and science professionals. In any manufacturing industry, “quality” of the engineering-components is of prime importance, and it depends on the structure, properties, and processing. Therefore, the quality control and R&D departments of every industry require the manpower who understand materials, manufacturing processes, quality control approaches, and able to anticipate the root-cause of failures for preventive measures. This course deals with the fundamentals of industrial metallurgy, related case-studies, and quality control aspects. This course involves lectures by industry professionals, who have significant experience in quality control.

In this regard, the main objectives of this course are as follows:

- To have an overall understanding of the scientific and engineering aspects of ferrous and non-ferrous alloys, microstructures, properties, failure analysis, and quality control
- To be familiarized with the industrial case studies and research scope in Metallurgy Engineering and Materials Science.

Participants:

Total **74** participants attended this course, out of which **52** were from TEQIP sponsored institutes, **01** were non-TEQIP institutes, and **21** were from IIT Indore.

Course Modules:

The following course modules were covered in this course:

- Basic Metallurgy: Steel Production, Microstructures, and Heat-Treatments.
- Advanced alloys in industrial applications.
- Industrial failure analysis and case studies.
- ISO/IEC 17025 laboratories management system for quality, administrative and technical operations.
- Metallurgical Quality Control (e.g., Material selection, feasibility review, and testing, etc.).
- International Testing Standards: Theory and Practice.

Speakers:

The sessions in the short-term course were conducted in six days by 7 speakers (out of which 4 experts were from industries and 3 were from MEMS, IIT Indore). Details of the faculties are mentioned below:

Sr. No.	Name of Faculties	Affiliation
1.	Dr. Shantanu Madge	Eaton India Innovation Center
2.	Mr. Manish Jain	Tata Motors Ltd.
3.	Mr. Abhay Chauthai	Bharat Forge Ltd.
4.	Mr. Akshay Joshi	KCTI-R&D, Bharat Forge Ltd.
5.	Dr. Santosh S. Hosmani	MEMS, IIT Indore
6.	Dr. Rupesh S. Devan	
7.	Dr. Hemant Borkar	

Description of Event:

A six days TEQIP short term course on “Industrial Metallurgy and Quality Control” were organized by Discipline of Metallurgy Engineering and Material Science during 11th – 16th February 2019. Dr. Santosh S. Hosmani and Dr. Rupesh S. Devan were the coordinators of this course. Total 74 participants were registered for this course (out of which 52 were from TEQIP sponsored institutes, 01 were non-TEQIP institutes, and 21 were from IIT Indore). The program began with a very brief introduction by Dr. Santosh S. Hosmani and inaugural address by Dr. Parashram Shirage, Head of MEMS. They welcomed all the delegates and spoke about the relevance and importance of this course. Dr. Shirage gave information about IIT Indore and Discipline of MEMS. After the inauguration session, formal lectures were started.

Various sessions in this course were conducted by 7 speakers, out of which 4 were from industries and 3 were from MEMS, IIT Indore.

Dr. Shantanu Madge from Eaton India Innovation Center delivered lectures on metallic glasses and additive manufacturing of alloys. In the afternoon session, Mr. Manish Jain from Tata Motors Ltd. emphasized on the advances in automotive steels, heat treatments and few case studies of heat-treated engineering components.

Mr. Abhay Chauthai from Bharat Forge Ltd enlightened the participants with his vast knowledge and experience of more than 35 years in the field of Quality Control. He covered different aspects of Quality Control in which the focus was on Metallurgical Design Review and Review of Technical Specifications, Engineering Process-Print to PPAP etc. He also covered session on material selection, feasibility review and case-studies of failure analysis.

Mr. Akshay Joshi from KCTI-R&D, Bharat Forge Ltd. gave lectures on different standards for laboratory management system covering the aspects of ISO 17025 for Quality Administration and Technical Operations. He also conducted detailed sessions on International Testing Standards and Uncertainty Measurements.

Dr. Hemant Borker conducted the detailed lecture on Advanced Non-Ferrous Alloys and related processes.

Dr. Santosh S. Hosmani conducted sessions covering the topics related to Forging and Surface Processing of Automotive components, Failure Analysis and metallurgical case-studies etc. He was continuously guiding participants after each lecture by other speakers to summarize and emphasize the key points of the lecture.

Dr. Rupesh S. Devan conducted very informative and in-depth sessions on Advanced Characterization of materials: FESEM, EDS, TEM and XPS.

This course also covered lab sessions for the participants. Participants visited the following labs of MEMS: Metal Forming and Surface Engineering, Polymer Technology, Welding technology, and Casting. Participants learned about the working principle of CNC wire cut EDM machine, Tribometer, forging technique, sheet metal forming operations, high vacuum arc melting, bottom stir casting, tube sealing unit, virtual welding, cold metal transfer welding, TIG, MIG, contact angle measurement, UV visible spectroscopy, and electro spinning etc.

On the last day, session of rapid-fire quiz was conducted. The participants gave wonder response to this quiz session. Finally, this course was concluded by the feedback, certificate distribution and photography sessions.

Participants had appreciated all lectures and continuously interacted with the speakers during the sessions and tea-breaks for further guidance. Overall, participants have expressed their full satisfaction with the course and arrangements. They expressed their desire to participate again in such courses in future.



Photo 1: Dr. Shantanu Madge giving his talk on Additive manufacturing of alloys



Photo 2: Mr. Manish Jain delivering lecture on Advances in automotive steels



Photo 3: Mr. Abhay Chauthai talks on Metallurgy quality control



Photo 4: Mr. Akshay Joshi explaining about Uncertainty in measurements



Photo 5: Dr. Santosh S. Hosmani explaining about Forging and Surface Engineering.

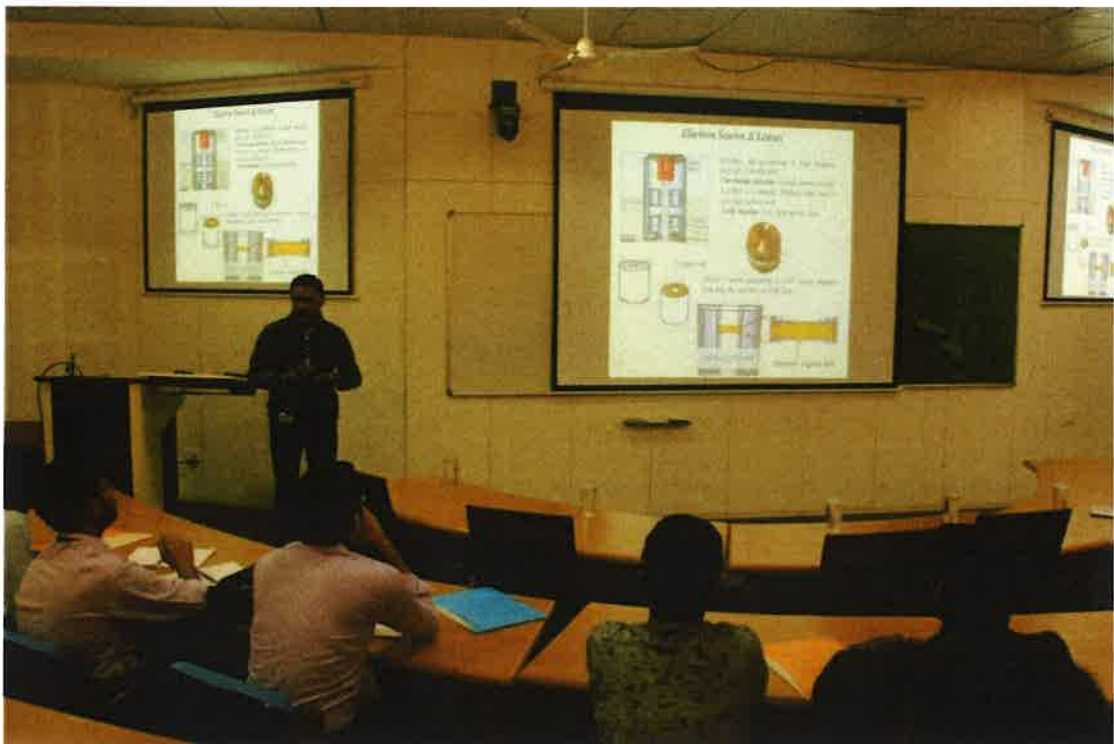


Photo 6: Dr. Rupesh S. Devan explaining about Materials Characterizations



Photo 7: Acknowledgement and Interaction with the speaker, Mr. Abhay Chauthai from Bharat Forge Ltd.



Photo 8: Certificate distribution



Photo 9: Group of participants with course Coordinators: Dr. Santosh S. Hosmani and Dr. Rupsh S. Devan



Photo 10: Group of participants with course Coordinators: Dr. Santosh S. Hosmani and Dr. Rupsh S. Devan