



# INSPECTION AND QUALITY CONTROL IN MANUFACTURING

## PROF. KAUSHIK PAL

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**INTENDED AUDIENCE :** UG & PG students of Mechanical Engg., Automobile Engg., Welding Engg., Metallurgy, Chemical Engg, Aerospace Engg, Material Science, Manufacturing and Production Engg. etc. R&D personals in industries.

**INDUSTRIES APPLICABLE TO :** Manufacturing based industries: TATA Motors, ISRO, DRDO, Railways, BHEL, IOCL, Bharat Forge, Larsen and Toubro, Mahindra & Mahindra; etc.

### COURSE OUTLINE :

In manufacturing, quality control is a process that ensures customers receive products free from defects and meet their requirements. Inspection and measurement is needed during production for quality control because of the inherent variability introduced by the machines, tools, raw materials, and human operators which causes variations in the different quality characteristics (length, diameter, thickness, tensile strength, surface finish etc.) of the product. Inspection and testing is very important in maintaining a certain quality level in the product during production. It helps to control the quality of products by fixing the sources of defects immediately after they are detected. Several non-destructive inspection methods also help to perform in-service inspection to avoid any catastrophic failure and predict the remaining life of the product.

### ABOUT INSTRUCTOR :

Prof. Kaushik Pal is an Associate Professor in Department of Mechanical and Industrial Engineering, IIT Roorkee since 2012. He has obtained his Ph.D Degree (2009) from IIT, Kharagpur and then joined to Gyeongsang National University, South Korea for pursuing Post-Doc research. His fields of interests are surface modification of nano-materials and use of such materials in different electronic, mechanical and bio-medical applications. Currently, he is acting as reviewer of several internationally known journals and an active member of National Academy of Sciences, American Chemical Society (ACS) and Royal Society of Chemistry (RSC). Also, he is the recipient of Brain Korea (BK-21) fellowship award and DAAD fellowship award.

### COURSE PLAN :

- Week 1:** Introduction, Fundamental Concept of Quality, Role of Inspection and Measurement for Quality Control in Manufacturing, Need of Inspection, Inspection types and Principles, Design for Inspection, Destructive Inspection, Testing of Composite Materials
- Week 2:** Non-destructive Inspection-I: Visual Inspection, Dye Penetrant Inspection, Magnetic Particle Inspection, Eddy Current Inspection, Ultrasonic Testing
- Week 3:** Non-destructive Inspection-II: Acoustic Emission Inspection, Radiography, Leak Testing, Thermographic Non-destructive Testing, Advanced Non-destructive Techniques, NDT Standards, Safety in NDT
- Week 4:** Engineering Metrology: Linear Measurement, Angular Measurement, Measurement of Surface Finish, Screw Thread Metrology, Gear Measurement, Miscellaneous Measurements