



# WORK SYSTEM DESIGN

## PROF. INDERDEEP SINGH

Department of Mechanical and Industrial Engineering  
IIT Roorkee

**INTENDED AUDIENCE :** All Engineering Students and Faculty

**INDUSTRIES APPLICABLE TO :** All the industries using work system theory to improve their productivity and effectiveness.

## COURSE OUTLINE :

Work System Design deals with the systematic examination of the methods of doing work with an aim of finding the means of effective and efficient use of resources and setting up of standards of performance for the work being carried out. The systematic examination of work involves what is done? And how it is done? As well as what is the standard time to do the work? This is required to have an in-depth analysis of all the elements, factors, resources and relationships affecting the efficiency and effectiveness of the work being studied. The course also aims at scientifically establishing the time required for a qualified worker to carry out a work element at a defined rate of working. Ergonomic aspects of work system design are also included in the course contents. The scope of this course is not only limited to the manufacturing applications but it is also relevant for service sector industry.

## ABOUT INSTRUCTOR :

Prof. Inderdeep Singh is currently working as Associate Professor in Department of Mechanical and Industrial Engineering at Indian Institute of Technology Roorkee. He has taught among others, the industrial engineering courses such as Production Planning and Control, Product Design and Development, Work System Design, Industrial Management and Quality Management. He has been actively involved in the National Mission Project on Education Through ICT (NME-ICT) of Government of India. He has completed three video and one web course under the National Programme on Technology Enhanced Learning (NPTEL). He has developed suitable pedagogical methods for two under-graduate courses of Mechanical Engineering.

## COURSE PLAN :

- Week 01 :** Work System Design: Introduction, Introduction and Concept of Productivity, Measurement of Productivity, Productivity Measures, Productivity Measurement Models
- Week 02 :** Factors Influencing Productivity, Causes of Low Productivity, Productivity Measurement Models, Productivity Improvement Techniques, Numerical Problems on productivity, Case study on productivity.
- Week 03 :** Work Study: Basic Concept, Steps Involved in Work Study, Concept of Work Content, , Techniques of Work Study, Human Aspects of Work Study.
- Week 04 :** Method Study: Basic Concept, Steps Involved in Method Study, Recording Techniques, Operation Process Charts, Operation Process Charts: Examples.
- Week 05 :** Flow Process Charts, Flow Process Charts: Examples, Two-Handed-Process Charts, Multiple Activity Charts, Flow Diagrams.
- Week 06 :** String Diagrams, Principles of Motion Economy, Micro-Motion Study, Therbligs, SIMO Charts.
- Week 07 :** Memo-Motion Study, Cycle graph and Chrono-Cycle Graph, Critical Examination Techniques, Development and Selection of New Method, Installation and Maintenance of Improved Methods.
- Week 08 :** Work Measurement: Basic Concept, Techniques of Work Measurement, Steps Involved in Time Study, Time Study Equipment, Performance Rating.
- Week 09 :** Performance Rating: Examples, Allowances, Computation of Standard Time, Numerical on Computation of Standard Time, Case Study
- Week 10 :** Work Sampling: Basics, Procedure of Work Sampling Study, Numerical Problems on work sampling, Introduction to Synthetic Data and PMTS, Introduction to MTM and MOST
- Week 11 :** Ergonomics: Basic Concept, Industrial Ergonomics, Ergonomics: Anthropometry, Man-Machine System-1, Man-Machine System-2
- Week 12 :** Case Study of Office Chair, Case Study of Tower Crane Cabin, Case Study of Car Seat, Case Study of Computer System, Case Study of Assembly Line.