
Practical
Fundamentals of
**MECHANICAL
ENGINEERING**



YOU WILL LEARN:

- Understand the principles of mechanical drawings and design
- Learn to select the correct engineering materials
- Apply specific techniques of mechanical automation in industry
- Understand principles of fluid engineering (pumps, pipes, valves, compressors)
- Learn to apply important fundamentals of machinery maintenance

WHO SHOULD ATTEND:

This introductory seminar is designed for those with little or no prior formal background, who function as managers, supervisors, engineers, planners, inspectors, designers, researchers, investors or procurers, and who seek a basic understanding of the practical aspects of mechanical engineering.



THE WORKSHOP

This workshop introduces the fundamental concepts and applications of mechanical engineering. The workshop starts with an introduction to the principles of mechanical drawings such as tolerances, symbols, sections, CAD, etc. This is followed by a discussion on the mechanical behaviour of engineering materials, e.g. stress and strain, fatigue, fracture, creep and corrosion.

Practical fundamentals of mechanical design and manufacturing methods are discussed. Principles of mechanical automation as it is typically found in industry are presented with the focus on the application of hydraulic and pneumatic systems.

The course will also introduce the various aspects of fluid engineering e.g. pumps, pipes, valves, compressors and others. The course closes off with a practical discussion on the maintenance of mechanical machinery.

PRE-REQUISITES

This is not an advanced workshop. A basic knowledge of mechanical concepts would be useful.

WORKSHOP OBJECTIVES

When you have completed this workshop, you will be able to:

- Understand mechanical design drawings
- Do basic static safety factor mechanical designs
- Identify failure modes of mechanical components
- Understand the behaviour of engineering materials and do basic selections
- Select manufacturing processes for simple designs
- Design and implement simple mechanical automation systems
- Understand the principles of fluid engineering
- Identify and select basic fluid engineering components
- Perform simple fluid engineering designs
- Select a maintenance strategy for mechanical machinery
- Recognise general mechanical problems and suggest corrective actions

THE PROGRAM

DAY ONE

INTRODUCTION

MECHANICAL DRAWINGS

- purpose of drawings
- lines, letters
- projections, views
- sections
- conventions
- dimensions
- symbols
- assemblies
- welds, bolts, keyways, rivets, etc.
- shafts and bearings
- fitting and tolerances
- couplings
- transmission components (belts, gears etc.)
- flow control equipment
- CAD
- design and drawing office practises

ENGINEERING MATERIALS

- the processing of metals and alloys
- stress and strain in metals
- normal stress and shear stress
- tensile and hardness testing
- stress and strain diagram
- alloy production and properties (stainless, copper, aluminium, cast iron etc.)
- fracture of metals
- fatigue of metals
- creep and stress rupture of metals
- types of corrosion
- corrosion control

MECHANICAL DESIGN

- design philosophies / methods / phases
- factor of safety
- codes and standards
- loads (forces, moments)
- static analysis of systems
- design for static strength
- design of fasteners and connections
- design of load-carrying members
- fundamentals practises of design-for-fatigue
- design for manufacturing

DAY TWO

MANUFACTURING

- metal production - foundry
- casting
- heat treatment
- hot working of metal
- cold working of metal
- press work and tooling
- numerical control
- machining, metal cutting (turning, drilling, boring, milling)
- shaping, sawing, broaching
- welding, brazing
- CAM
- rapid prototyping

MECHANICAL AUTOMATION

- sensors and transducers
- pneumatics
- hydraulics
- mechanical and electrical actuation
- principles of control systems
- PLCs

FLUID ENGINEERING

- pumps
- compressors
- other fluid engineering components
- design / analysis of piping systems
- principles of thermodynamics (introduction to first and second law)
- power and refrigeration systems

MAINTENANCE OF MACHINERY

- maintenance philosophies
- on-line tests / inspections
- time-based maintenance
- condition-based maintenance

CLOSING AND COURSE EVALUATION

ON-SITE TRAINING

- ✓ **SAVE** over 50% by having an IDC workshop presented at your premises.
- ✓ Customise the training to **YOUR** workplace.
- ✓ Have the training delivered when and where you need it.

Contact us for a **FREE** proposal.