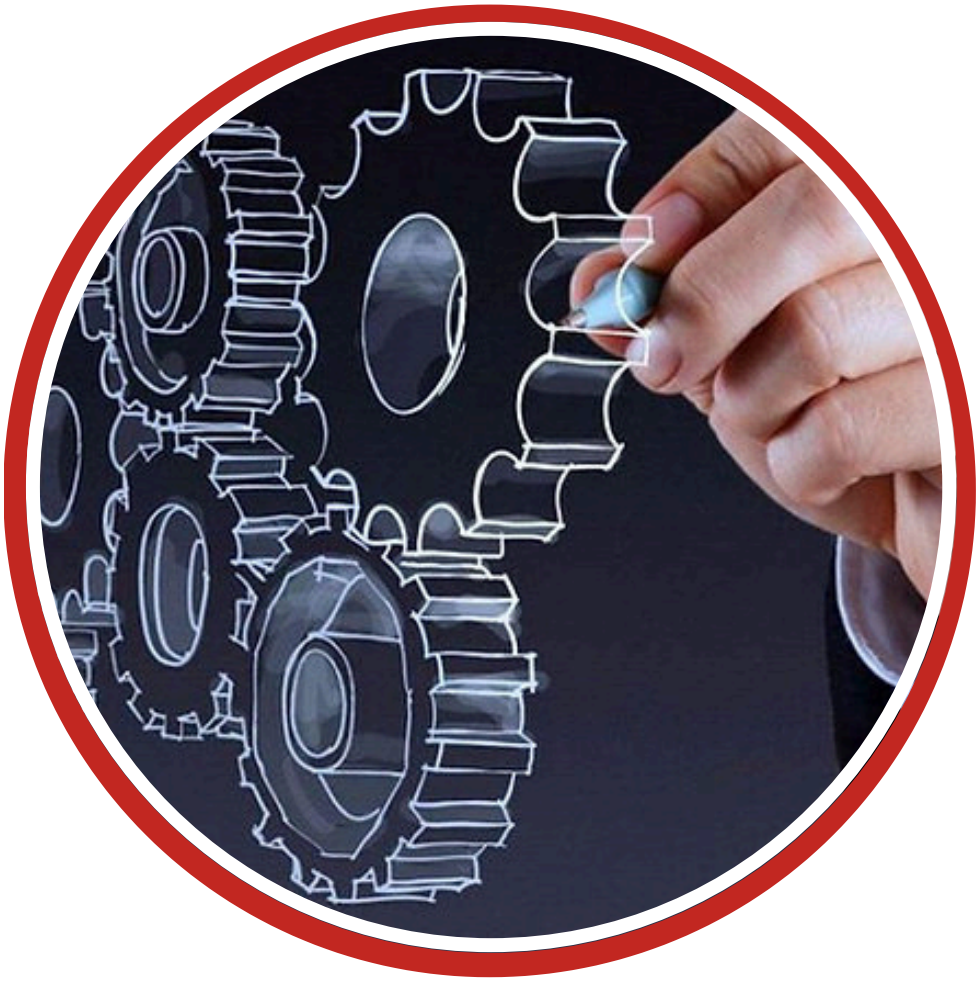
Mechanical Engineering for Non-Mechanical Engineers



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Mechanical Engineering for Non-Mechanical Engineers

Overview

This course provides non-mechanical engineers and other professionals with an introduction to the core subject areas of mechanical engineering. Engineering as a profession is becoming increasingly multidisciplinary and is also combining with other professions. People can find themselves working with mechanical engineers without understanding the technical language or the key engineering principles.

Course Objectives

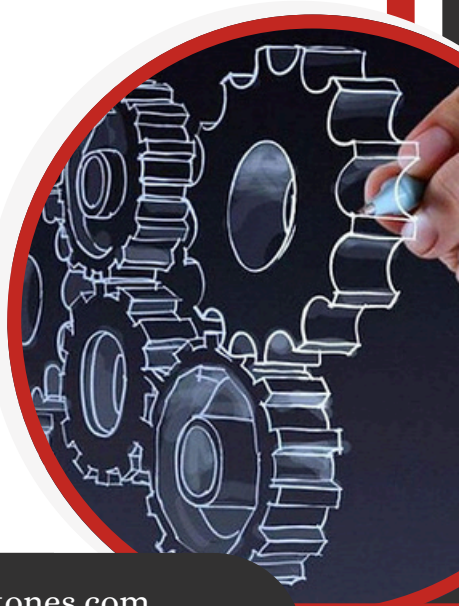
At the end of this course, the participants will be able to:

- Basic mechanical engineering concepts such as force, work, power, moments and torques
- The importance of common engineering material properties in relation to component life and failure
- Basic design for static strength
- How to select appropriate gears and bearings
- How to perform simple design and selection of piping systems and related components
- How to monitor, control and analyse vibrations
- How to set up an effective but simple inspection and maintenance program (including lubrication)

Course Content

1. Mechanical Engineering Basics

- Units and engineering quantities
- Mechanical drawings and interpretation
- Friction types and applications
- Stress-strain relationships and material properties
- Heat treatment and material failure modes



2. Mechanical Design

- Design principles and factors of safety
- Static equilibrium and stress analysis
- Threaded fasteners, keys, riveted joints
- Fatigue strength considerations

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Course Content

3. Gears and Bearings
- Gear types, terminology, gear trains, and gearboxes
- Gear troubleshooting and selection
- Bearing types, load considerations, and installation

4. Mechanical Drives
- Belt, chain, hydrostatic, and hydrodynamic drives
- Couplings, clutches, brakes: types and selection

5. Prime Movers
- Internal combustion engines, electric motors
- Hydraulic/pneumatic motors and gas turbines
- Selection criteria and application comparisons

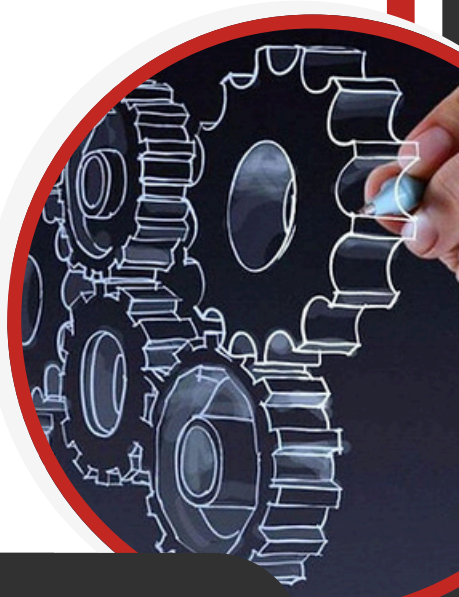
6. Fluid Engineering
- Viscous flow, Reynolds number
- Pipe sizing and selection
- Pumps, valves, fittings, seals, and gaskets
- Piping diagrams and system analysis

7. Heat Transfer Theory
- Thermodynamic laws and thermal cycles
- Heat exchangers and troubleshooting
- Conduction, convection, radiation, heat pumps, HVAC

8. Mechanical Vibrations
- Single/multiple degrees of freedom systems
- Amplitude, frequency, natural vibration
- Vibration sensors and condition monitoring

9. Manufacturing & Production
- Casting processes, heat treatment
- Hot and cold working, machining operations
- Welding, brazing, CAD/CAM, and rapid prototyping

10. Maintenance Engineering
- Maintenance types: corrective, preventive, predictive
- Lubrication, downtime reduction, failure analysis
- Condition monitoring and non-destructive testing (NDT)



Mechanical Engineering for Non-Mechanical Engineers

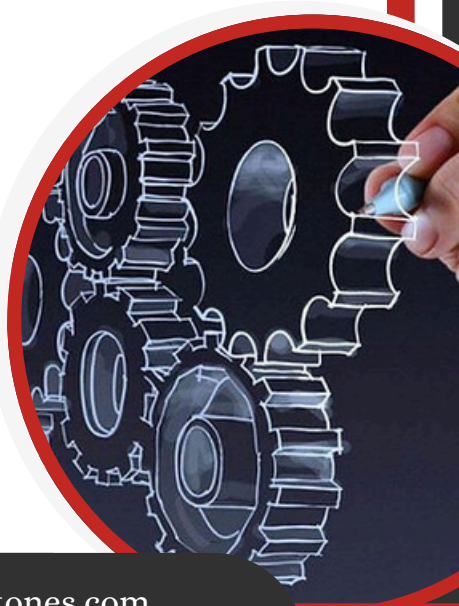
Targeted Audience

Anyone with a need to understand the use, care, installation, or the economics associated with mechanical machinery, Consultants, Consulting engineers, Chemical engineers and technicians, Design engineers, Electrical engineers and technicians, Industrial and commercial plant and facilities engineer, New graduates, Operators, Plant Engineers, Managers and Supervisors, Plant operations and maintenance personnel, Process control Engineers, Technicians and Supervisors, Professionals who want to upgrade their knowledge in mechanical engineering, Project Engineers, Property Managers, Sales Engineers, Service Contractors

Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be employed before and during the course, as applicable. These methods are aimed at enhancing individual and group interaction while maximising learning. Some of these methods are:

- Online Pre-post Test
- Colourful Visual Aids
- Gamification
- Self-Assessment Instruments
- Simulations
- Case Studies
- Videos
- Group Exercises & Discussions
- Role plays
- Indoor & Outdoor games



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