



Internal Combustions Engines



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## Introduction:

This program provides in depth knowledge about internal combustion engines of various types electrical power generators/gas turbines in power plants/aircraft engines of all kinds/car engines. Different aspects will be presented such as materials, designs and selection criteria.

## Targeted Groups:

- Engineering directors and managers
- Research engineers and scientists
- Experienced technicians and drafters
- Those involved in vehicle design or engine application who would like to understand the engineering principles underlying an engine's resulting performance

## Course Objectives:

- Presenting a historical introduction to internal combustion engines, showing their types, and a detailed explanation of each type according to the required cycle, and how to use them in converting chemical energy into thermal energy and then into kinetic energy, and how to benefit from it in each type.
- Display the main parts for each type of internal combustion engine and display the sub-parts for each part of the engine
- Clarify the way each part of the engine works and its components, its role in the engine operation process and its connection with the parts before and after the engine.
- Clarify the process of designing and manufacturing parts

## Course Outline:

### **Unit 1: A historical introduction to internal combustion engines, and an explanation of the types of internal combustion engines**

- Fundamental operating principles
- Early internal combustion engine development
- Characteristics of internal combustion engine
- The Wankel engine
- Stratified charge engines
- Prospects of internal combustion engines

### **Unit 2: Types of internal combustion engine works, and the**

## **components and subsystems of different types of internal combustion engines.**

- Thermodynamic principles
- Combustion and fuels
- Spark ignition engines
- Compression ignition engines
- Induction and exhaust processes
- Two-stroke engines
- In-cylinder motion
- Turbocharging

## **Unit 3: Applications and performance of internal combustion engines.**

- Zero-dimension modelling
- Application of modelling to a turbocharged medium-speed diesel engine
- Mechanical design considerations

## **Unit 4: Different equipment used in the operating systems of internal combustion engine**

- Quasi-steady engine instrumentation
- Experimental accuracy
- Measurement of exhaust emissions
- Chemiluminescence
- Oxygen and air/fuel ratio analysers
- Exhaust smoke and particulates
- Determination of EGR and exhaust residual ER levels
- Determination of the air/fuel ration from exhaust emissions

## **Unit 5: Monitoring the benefits and risks of internal combustion engines**

- Size of engine
- Power to weight ratio
- Small power requirement applications
- Portability
- Variety of fuels
- Fuel Cost
- Engine emissions
- Scale power generation
- Noise generated due to detonation of fuel

## **Unit 6: Explain the dangers of internal combustion engines and**



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## **ways to prevent damage and to use them correctly and safely. In addition to maintenance requirements**

- Internal combustion pollution
- Electric battery vehicle pollution
- Heating Burn
- Chemical burn and fume explosion
- High pressure air :gas cylinders vacuum