ME 165
Mechanical Engineering Fundamentals

Lecture 1

Introduction

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Course Outline

- 3.00 Credit Hours
- **Internal combustion engines: Introduction to internal combustion engines and their cycles; gas turbines.**
- **Refrigeration and air conditioning: psychrometry, applications; refrigerants, different refrigeration methods.**
- **Statics of Particles and Rigid Bodies, Forces in Trusses and Frames, Relative Motion, Kinematics of Particles.**
- **Introduction to robotics.**
- **Sources of energy-Conventional and Renewable.**

Course Outcomes

- **Upon the successful completion of the course, you should be able to-**

- ✓ **Understand** the basics of using mechanical engineering knowledge in practical fields.
- ✓ **Recognize** various mechanical systems and processes like refrigeration and internal combustion engines.
- ✓ **Develop** the ability to create electromechanical systems that solves problems
- ✓ **Apply** the concepts mechanics to solve real world problems
- ✓ **Describe** various energy sources and their utilization.

Course Outline

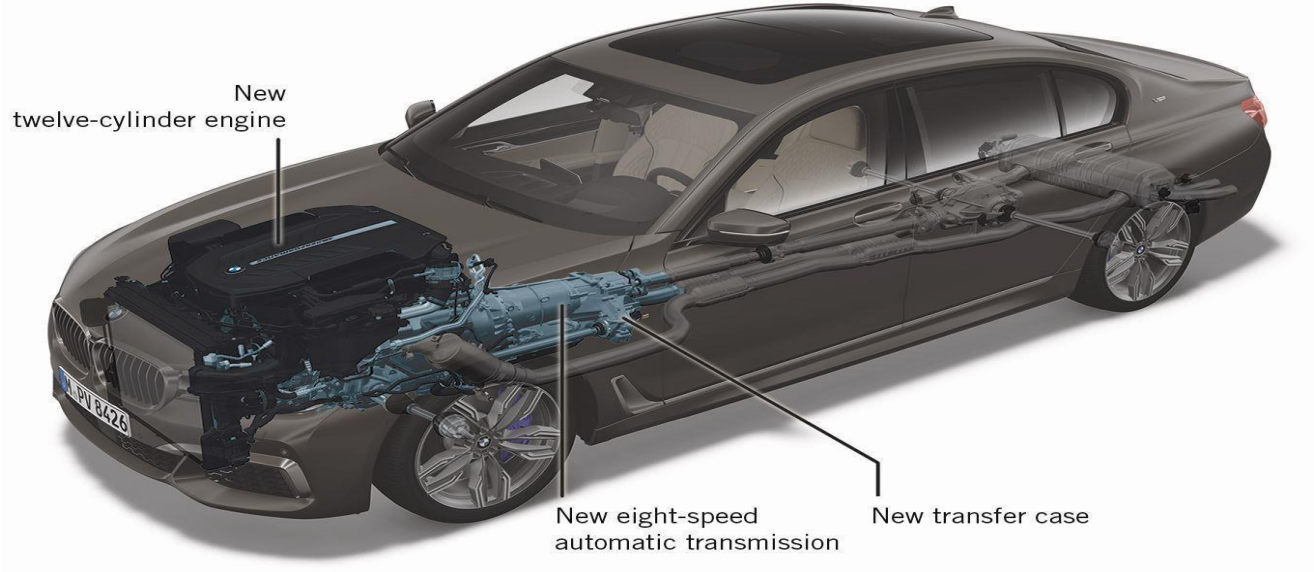
Internal combustion engines: Introduction to internal combustion engines and their cycles; gas turbines.

Source: https://www.mercedes-benz.com/en/vehicles/passenger-cars/concept-cars/vision-eqs/

Source: https://aircare.com.bd/product/elite-1-0-ton-air-conditioner-non-inverter/

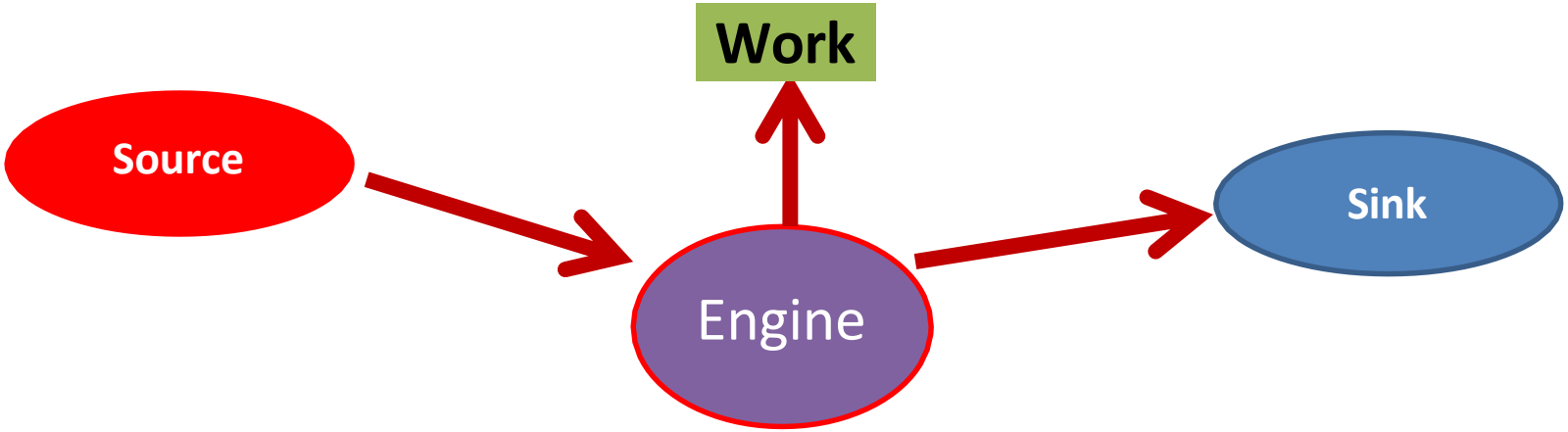
Refrigeration and air conditioning: applications; refrigerants, different refrigeration methods.

Internal Combustion Engine: Terminology and Classification



Engine

Engine: a device that transforms one form of energy into another form of Energy.



Heat engine: Transform the heat energy into mechanical energy

Classification

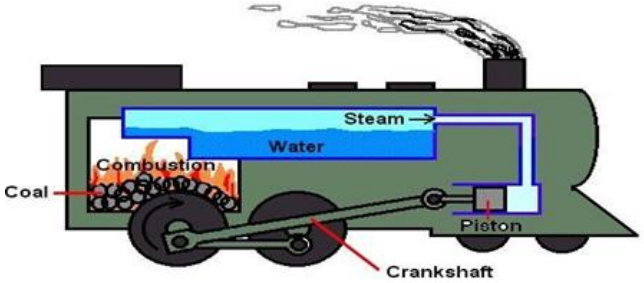
Heat Engine

External Combustion Engine (E.C.)

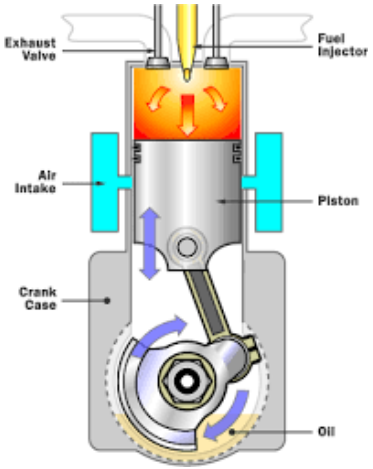
Internal Combustion Engine (E.C.)

Combustion of fuel takes place outside the cylinder

Combustion of fuel takes place inside the cylinder



External Combustion Engine

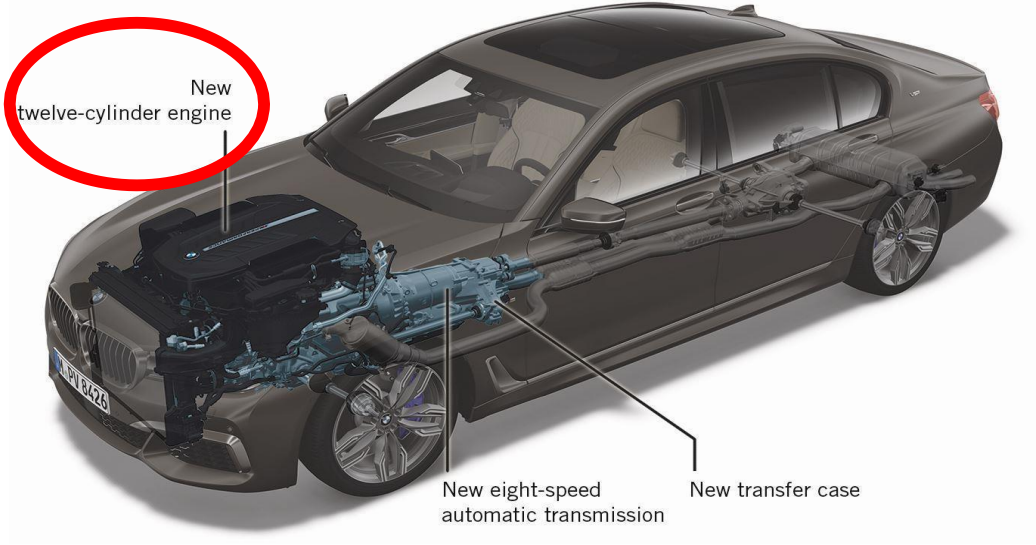


Heat Engine

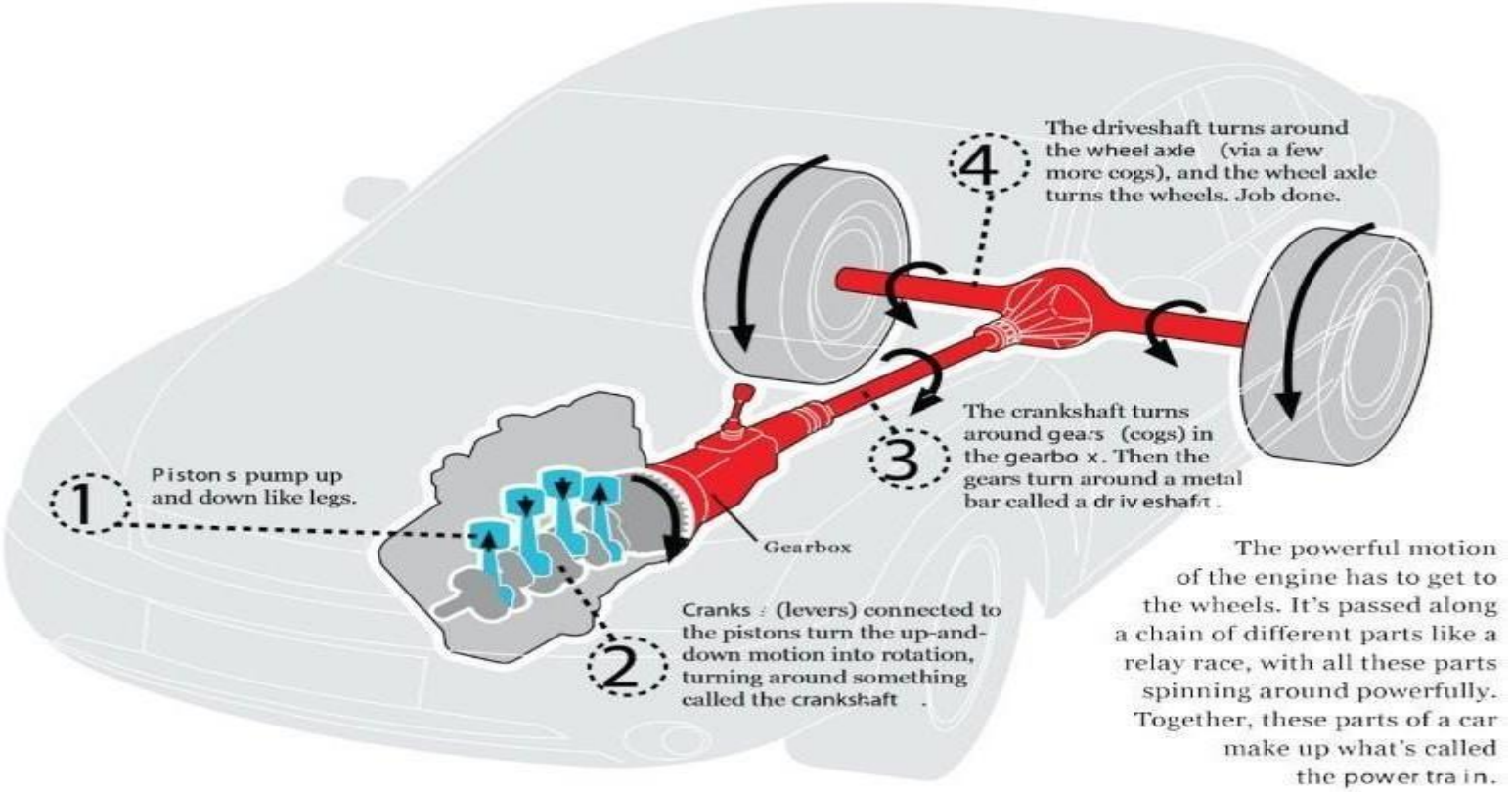
- **Heat Engine:** A heat engine is a device which transforms the chemical energy of a fuel into thermal energy and uses this energy to produce mechanical work. It is classified into two types-
- (a) External combustion engine (E. C. Engine)
- (b) Internal combustion engine (I. C. Engine)
- ***External combustion engine:*** In this engine, the products of combustion of air and fuel transfer heat to a second fluid which is the working fluid of the cycle.
- Application: In the steam engine or a steam turbine plant, the heat of combustion is employed to generate steam which is used in a piston engine (reciprocating type engine) or a turbine (rotary type engine) for useful work.
- ***Internal combustion engine:*** In this engine, the combustion of air and fuels take place inside the cylinder and are used as the direct motive force.
- Application:
  - Mainly used as "prime mover", e.g., for be the propulsion of avehicle

    i.e., car,bus, truck, locomotive, marine vessel, or airplane.
  - Other applications includes stationary saws, lawnmowers, bull- dozers, cranes, electric generators etc.

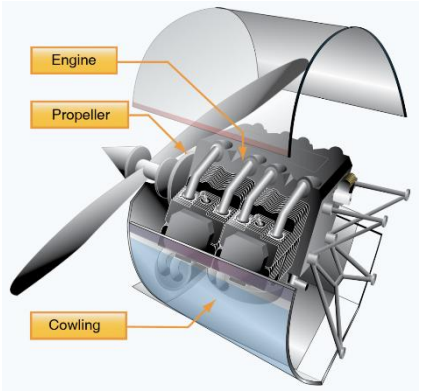
Internal Combustion Engine (IC Engine)



Internal Combustion Engine (IC Engine)



Internal Combustion Engine (IC Engine)



Internal Combustion Engine (IC Engine)

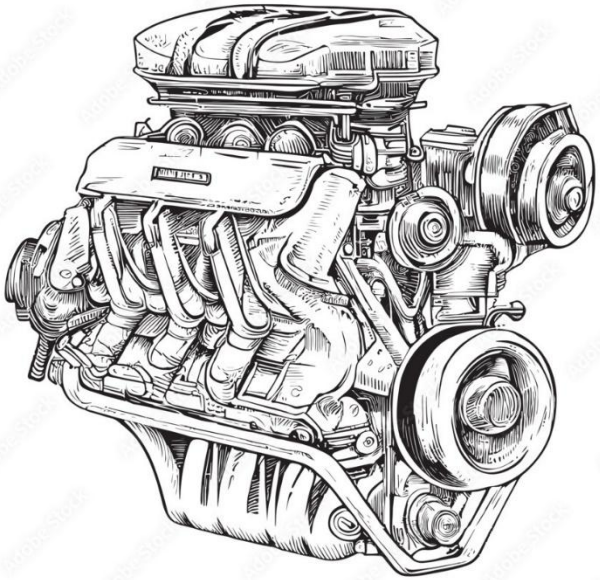
Internal Combustion Engine (IC Engine)

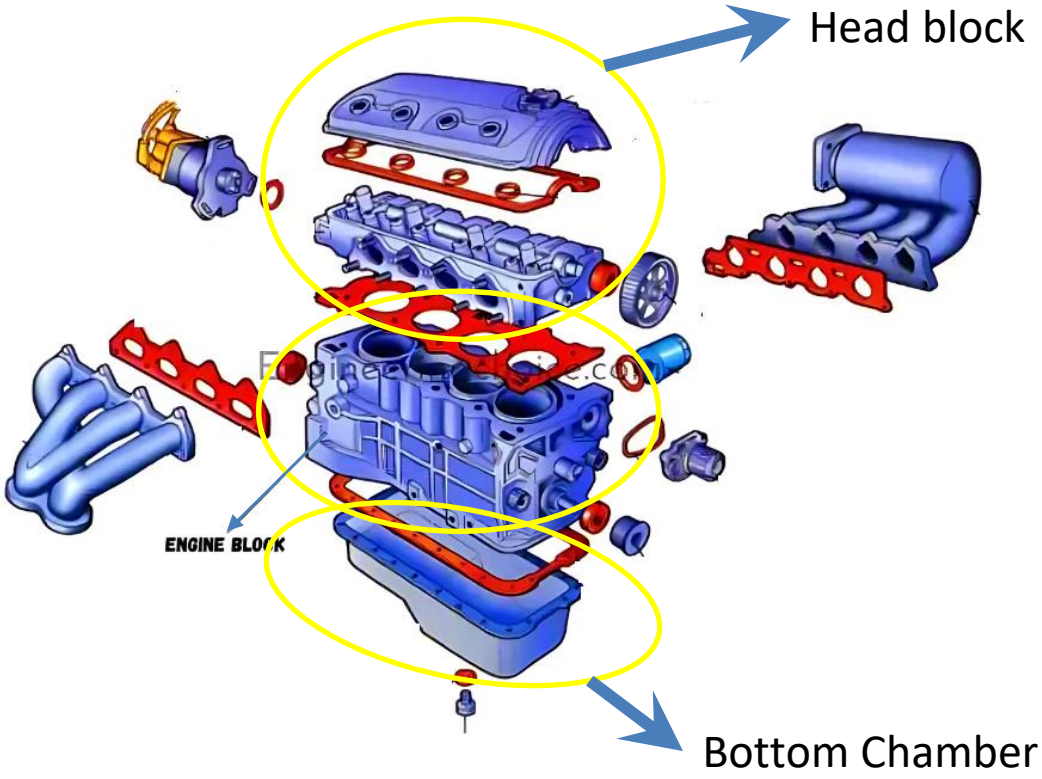
Generator

Tractor

Lawn Mower

Internal Combustion Engines - Construction





“Your potential is limitless
unlock it today”

Acknowledgement

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