

# Heat Engines

By burning fuels ( **combustion** ), heat engines are able to produce mechanical energy and use it to do work.

**Internal Combustion Engines: Combustion** of the fuel occurs inside the engine.

**First example is the gasoline engine**

The sequence of steps for the gasoline powered internal combustion engine is:

|                             |  |
|-----------------------------|--|
| <b><u>1-Intake</u></b>      | fuel and air enter the combustion chamber/cylinder   |
| <b><u>2-Compression</u></b> | the fuel/air mixture is compressed by a factor of about 8 to 1, bringing fuel and oxygen atoms closer together to improve combustion |
| <b><u>3-Power</u></b>       | fuel/air mixture is ignited by spark plug.<br>Resulting explosion pushes piston, producing mechanical energy.                        |
| <b><u>4-Exhaust</u></b>     | chemical byproducts of combustion are removed as piston pushes exhaust gases out of cylinder   |

**Second example is the diesel engine**

The fuel/air mixture is compressed by a factor of about 40 to 1. This much pressure, creates enough heat to ignite the fuel without the need for a spark plug. The diesel engine is more efficient than a gasoline engine at extracting energy from the fuel.

**External Combustion Engines: Combustion** of the fuel occurs outside of the engine.

**Example is the steam engine**

Fuel burned outside of engine cylinders was used to boil water to steam. The resulting steam expanded and pushed against a piston producing mechanical energy to do work. One drawback to steam engines is they need a steady supply of water to make the steam.