MSE-402

Fuel furnace and refractory

Dr. Alka Gupta

Furnace:

A furnace is an apparatus used to melt metals for casting or to heat materials to change their shape for example, rolling, forging etc. or heat treatment for properties change.

The choice of fuel is directly related to exhaust or flue gases from the fuel therefore the type of fuel chosen is important. As an example, Solid fuels generate particulate matter, which will interfere the materials placed inside the furnace.

For this reason:

- Induction and arc furnaces use electricity to melt steel and cast iron.
- Most furnaces use liquid fuel, gaseous fuel or electricity as energy input.
- Melting furnaces for nonferrous materials use fuel oil.
- Oil-fired furnaces mostly use furnace oil, especially for reheating and heat treatment of materials.

- Light diesel oil (LDO) is used in furnaces where sulphur is undesirable.

Furnace ideally should heat as much of material as possible to a uniform temperature with the least possible fuel and other costs.

For an efficient furnace operation, complete combustion of fuel with minimum excess air is an important criterion.

Furnaces operate with relatively low efficiencies (~ 7 %) compared to other combustion equipment such as the boiler (efficiencies approx. > 90 %). This is caused by the high operating temperatures in the furnace.

For example, a furnace heating material to 1200°C will emit exhaust gases at 1200°C or more, which results in significant heat losses through the chimney.