

# **Heat Treatment of Metals**

## **MSE-S305**

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# Influence of inclusions

- Source of inclusions in steel are *impurities* and *gas reactions* during Steel making process.
- The process of complete removal of inclusions from Steel is very difficult and expensive.
- Inclusions can be classified on the basis of their chemistry.

## Example

- Oxide,
- Sulfide,
- Nitride etc.

# Influence of inclusions

➤ Oxide inclusions again can be of silicate and other types.

## *Example*

- Silicon Oxide ,
- CaO,
- MgO, etc.

➤ Oxide and Sulphide types of inclusions dominate the commercial quality Steels.

# Effects of inclusions in steel

- **Effects of inclusions in steel depend on its type *size, shape and distribution.***
- **They are also harmful for heat treatment of Steels.**
- **They are also acting as sources of hardening cracks.**
- **Hence, either for improved Mechanical properties or for heat treatment inclusions levels in steel must be controlled below certain level.**

# Influence of inclusions



- Sulphides in *light grey* with *elongated shape*

# Influence of inclusions



- Oxides in *dark grey with broken chains*