

MSE-305

Heat treatment of metals

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Main objectives of Heat Treatment of Metals:

- To increase strength, hardness and wear resistance (bulk hardening, surface hardening)
- To increase ductility and softness (Tempering, Recrystallization Annealing)
- To increase toughness (Tempering, Recrystallization annealing)
- To obtain fine grain size (Recrystallization annealing, Full annealing, Normalizing)
- To remove internal stresses induced by differential deformation by cold working, nonuniform cooling from high temperature during casting and welding (Stress relief annealing)
- To improve machinability (Full annealing and Normalizing)
- To improve cutting properties of tool steels (Hardening and Tempering)
- To improve surface properties (surface hardening, high temperature resistance)
- To improve surface properties (surface hardening, high temperature resistance precipitation hardening, surface treatment)
- To improve electrical properties (Recrystallization, Tempering, Age hardening)
- To improve magnetic properties (Hardening, Phase transformation)

Definition of Heat Treatment:

A combination of heating & cooling operation timed & applied to a metal or alloy in the solid state in a way that will produce desired properties.

Types of Heat Treatment Processes

Following are the **different types of heat treatment processes:**

1. Annealing
2. Normalizing
3. hardening
4. Tempering
5. Nitriding
6. Cyaniding
7. Induction Hardening
8. Flame Hardening