aalberts surface technologies

ANNEALING

Benefits

- Increased Ductility and Malleability
- Enhanced toughness
- Relieve stress and strain
- Refine grain size or structure
- Increased machinability

Process

The annealing process involves heating the material above its austenitizing temperature followed by controlled cooling in the furnace. By controlling the cooling rate, the hardness and the ductility of the material can be controlled. Annealing brings the material to its initial strain-free state via three stages - recovery, recrystallization, and grain growth.

Stage 1 – Recovery
Recovery involves the removal of defects or dislocations produced during cold- or hot-working.

Stage 2 – Recrystallization
In the recrystallization phase, new strain-free grains are formed which replaces the damaged or dislocated grains produced during cold- or hot-working.

Stage 3 – Grain growth
Grain growth involves coarsening of grains after recrystallization, which further lowers the hardness and imparts ductility to the material.

Materials

Annealing process has applications in wide-ranging materials such as medium-to-high carbon steel, tool steel, stainless steel, and titanium.

Applications

Annealing is typically an intermediate step during the manufacturing of medium- and high-carbon steel parts. A part will be cold- or hot-worked then sent to an annealer to soften the material and bring it back to a strain-free state before further processing (machining, stamping, etc.).

Below are some of the applications and components where this process is predominantly used:

- Crankshafts
- Gears
- Shafts
- Transmission components