aalberts surface technologies

ISOTHERMAL ANNEAL

Benefits

Relatively soft ferrite-carbide aggregate microstructure for good machinability.

Process

Isothermal anneal is a two-stage process involving austenitizing the material first at preferred temperature and subsequently cooling to and holding at a specific temperature to complete the transformation.

Stage 1 - Austenitizing:
The material is typically austenitized between 1650°F – 1740°F depending on the grade of steel and the temperature used for future processing. It is not unusual for the end user to specify both the temperature and the soak time required for the process. After austenitizing, the material is brought out of the furnace and control cooled to a specific temperature above the lower critical temperature and held there before it goes into the transformation furnace.

Stage 2 - Transformation:
Holding the material above the lower critical temperature leaves part of the austenite untransformed. The transformation temperature used depends on the grade of steel and the final microstructure and hardness that are required in the material being processed. In the transformation furnace, the material is cooled at a single (Iso) temperature for sufficiently long time to complete the transformation which provides the expected properties.

Materials

Isothermal process is best suited for material grades such as 86B20, 20MnCr5, 8640, 4140 and 4320. Plain carbon steels are usually not processed with Isothermal anneal as it doesn't provide any additional benefits compared to normalize or full anneal processes.

Applications

The isothermal anneal process is used for achieving specific microstructure and hardness in certain grades of steel that are not possible with normalize or full anneal processes. Below are some of the applications and components where this process is predominantly used.

- Pinions
- Ring gears
- Planetary gears
- Sungears
- Transmission components
- Sector Shafts