

SPHEROIDIZE ANNEALING

Benefits

- Produces soft parts for cold forming applications
- Provides maximum ductility
- Improves machinability in hypereutectoid (carbon content between 0.77 - 2.0%) and tool steels
- Cold forming produces near net shape parts which helps in cost savings
- Cold forming can be performed at room temperature with no need for heating billets or parts

Process

Spheroidize annealing produces microstructure of globular carbides in a ferritic matrix. This microstructure is achieved in a few different ways:

- Prolonged holding of material slightly below the Ac1 temperature
- Heating and cooling the material alternately between Ac1 and Ar1

For a given grade of steel spheroidized microstructure provides the lowest possible hardness compared to others. With the low hardness, spheroidized microstructure lowers flow resistance in material which is ideal for cold formation. Typically, spheroidized annealed parts are coated with phosphate and lubrication to facilitate cold forming.

This microstructure is also preferred in applications where maximum ductility is desired. In material such as 52100 the machinability is considerably improved with this process. However, low carbon steels are not spheroidize annealed for improving machinability as the material will become very soft and gummy.

Materials

Spheroidize annealing is performed on low and medium carbon steel for cold forming applications and in hypereutectoid and tool steels for improving machinability. Strip coils and wire rods up to 1080 grades are spheroidize annealed for multiple applications.

Applications

- Input/output shafts
- Trunnions
- Alternator pole cores
- Transmission components
- Bearing components