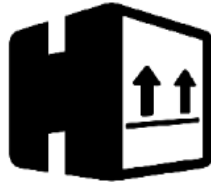
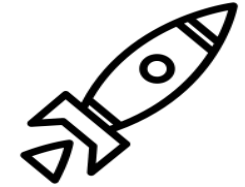


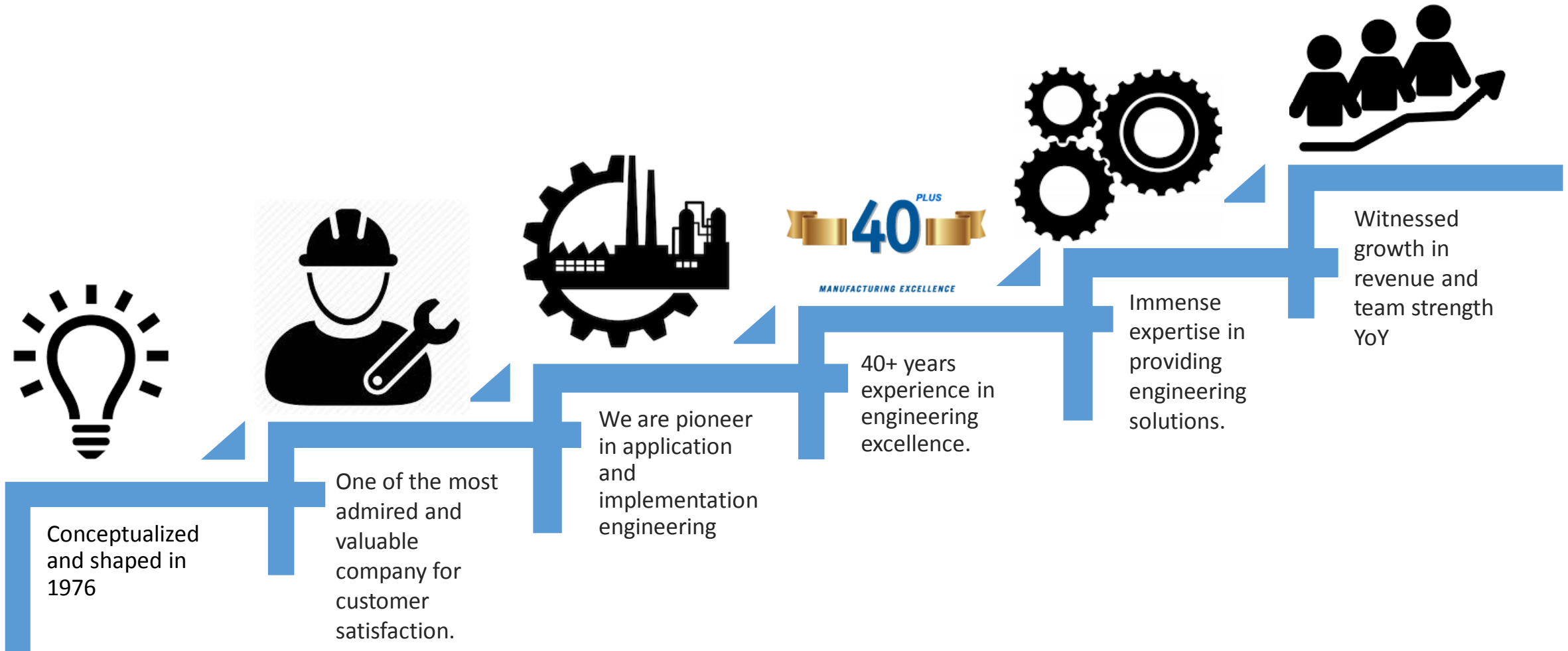
Annealing Techniques



KERONE

Complete Engineering Solutions...

Who are we...



We are accredited by...

<p>Member of AIMCAL</p>  The AIMCAL logo consists of a blue square with three horizontal white stripes and a wavy blue line at the bottom, with the word 'AIMCAL' in blue capital letters below it.	<p>Member of IHEA</p>  The IHEA logo is a red circle with a black border. Inside, the words 'INDUSTRIAL HEATING EQUIPMENT ASSOCIATION' are written in black, and 'IHEA' is in red in the center.	<p>Strategic Partners of Emitech Italy</p>  The EMitech logo features the word 'EMitech' in green and blue, with a yellow and green swoosh above it.	<p>IRQAO Certified For Quality</p>  The IRQAO logo is a green square with a blue globe in the center and the word 'IRQAO' in yellow capital letters at the bottom.
<p>Recognized and Rated by CRISIL</p>  The CRISIL logo features a blue shield with a white 'C' and the word 'CRISIL' in blue, with 'RATED COMPANY' in blue below it.	<p>CRISIL Verified</p>  The CRISIL Verified logo is a red shield with a yellow border. Inside, the words 'CRISIL VERIFIED' are written in white, with a yellow swoosh at the bottom.	<p>Member of A.M.P.E.R.E. (Europe)</p>  The A.M.P.E.R.E. logo features a globe with the letters 'A', 'M', 'P', 'E', 'R', 'E' around it.	<p>ASCB(E) Certification for Best practice</p>  The ASCB(E) logo is a blue square with a yellow checkmark and the words 'ASCB(E) Accredited Certifying Bodies' in white.

ISO 9001:2008 | ISO 9001:2015 | OHSAS 18001 | EMS 14001

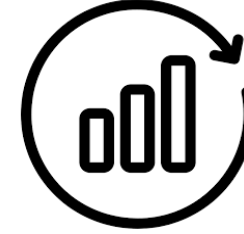
Why We...



**Highly Customized
Product**



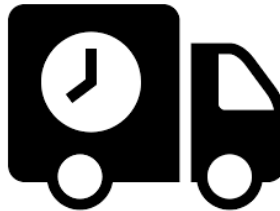
**Adherence
to Standards**



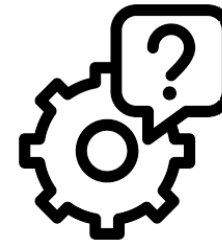
**Cost Effective
Solutions**



**Sound
Infrastructure**



**Timely
Delivery**



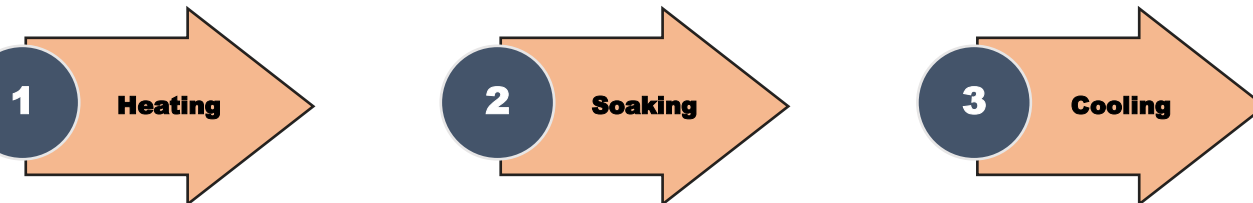
**Great After
Sale Support**

What is Heat Treatment...

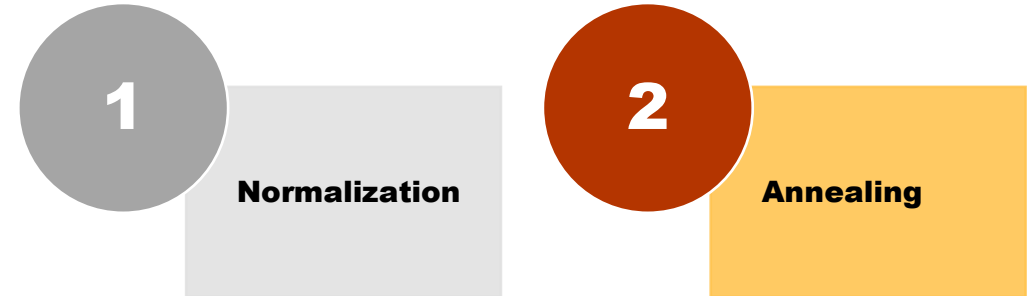
Heat treating is a series of controlled heating and cooling processing done on the material under processing to changes the physical and/or chemical properties.

Heat treatment procedure allows the polymers of material to go through the heating and cooling, this results in strengthening the mechanical and thermal properties of the material.

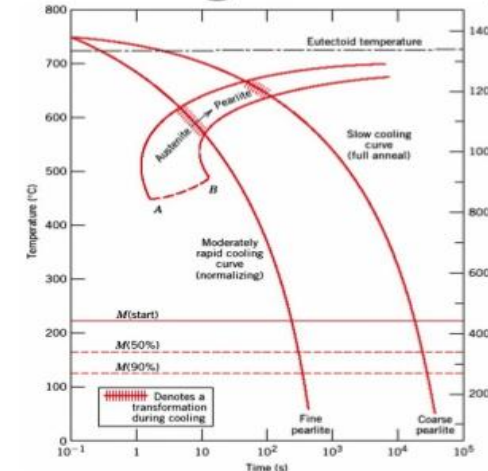
Steps of Heat Treatment...



Type of Heat Treatment...



Annealing on TTT Diagram



The cooling rate during annealing is very slow, about 10°C per hour.

Annealing Process...

- In metallurgy and materials science heat treatment process that alters a material to increase its ductility and to make it more workable is known as Annealing.
- In Annealing process material is heated to above its critical temperature, maintaining a suitable temperature, and then cooling.
- Annealing can induce ductility, soften material, refine the structure by making it homogeneous, and improve cold working properties.
- Annealing is a heat treatment that alters the physical and sometimes chemical properties of a material to increase its ductility and to make it more workable.

Why to Anneal...



Type Annealing Process...

1

Full Annealing

2

Stress Relief
Annealing

3

Spheroidizing
Annealing

4

Isothermal
Annealing

5

Diffusion
Annealing

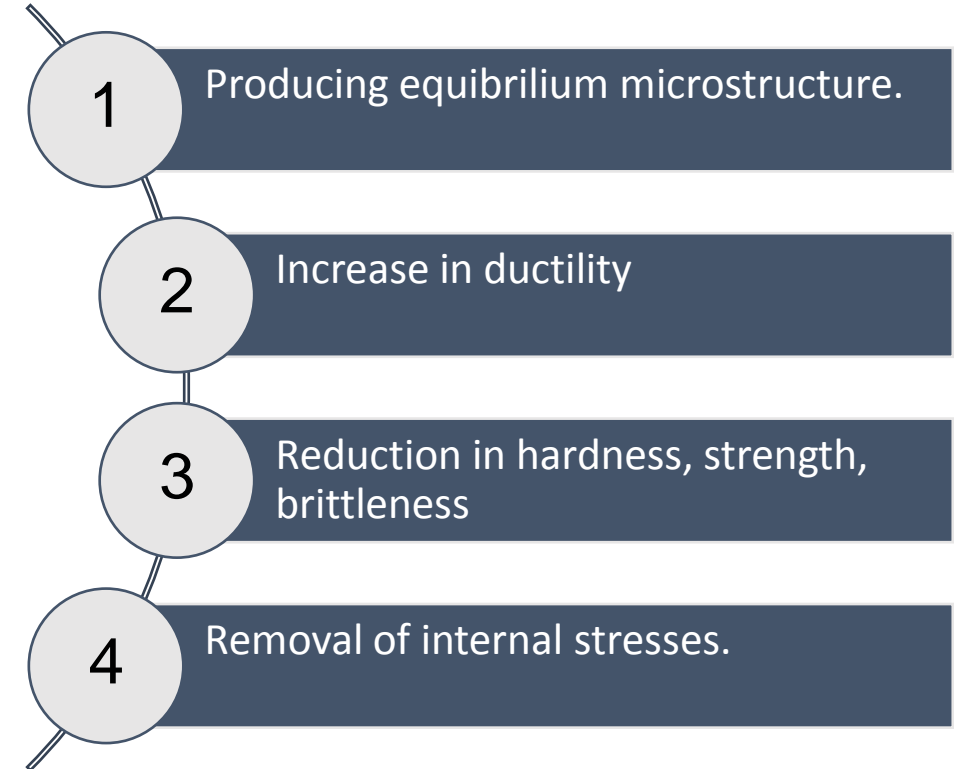
6

Incomplete
Annealing

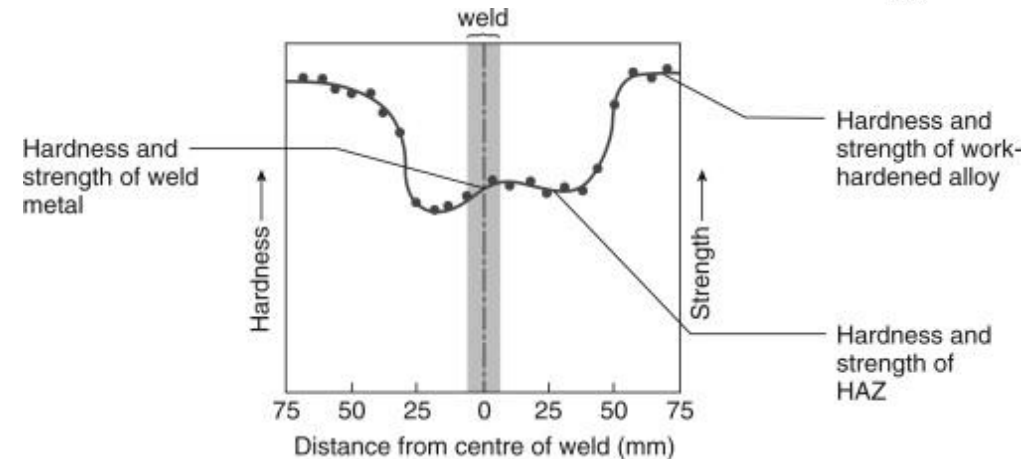
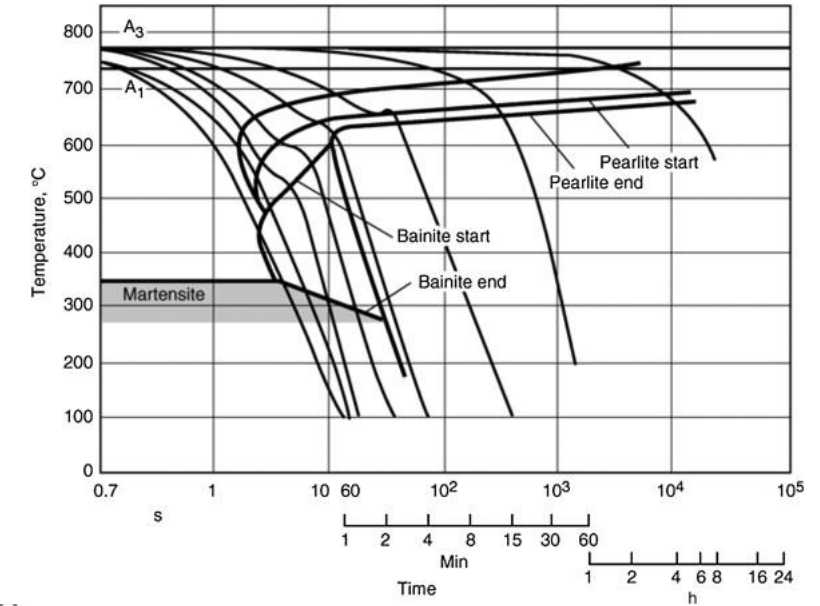
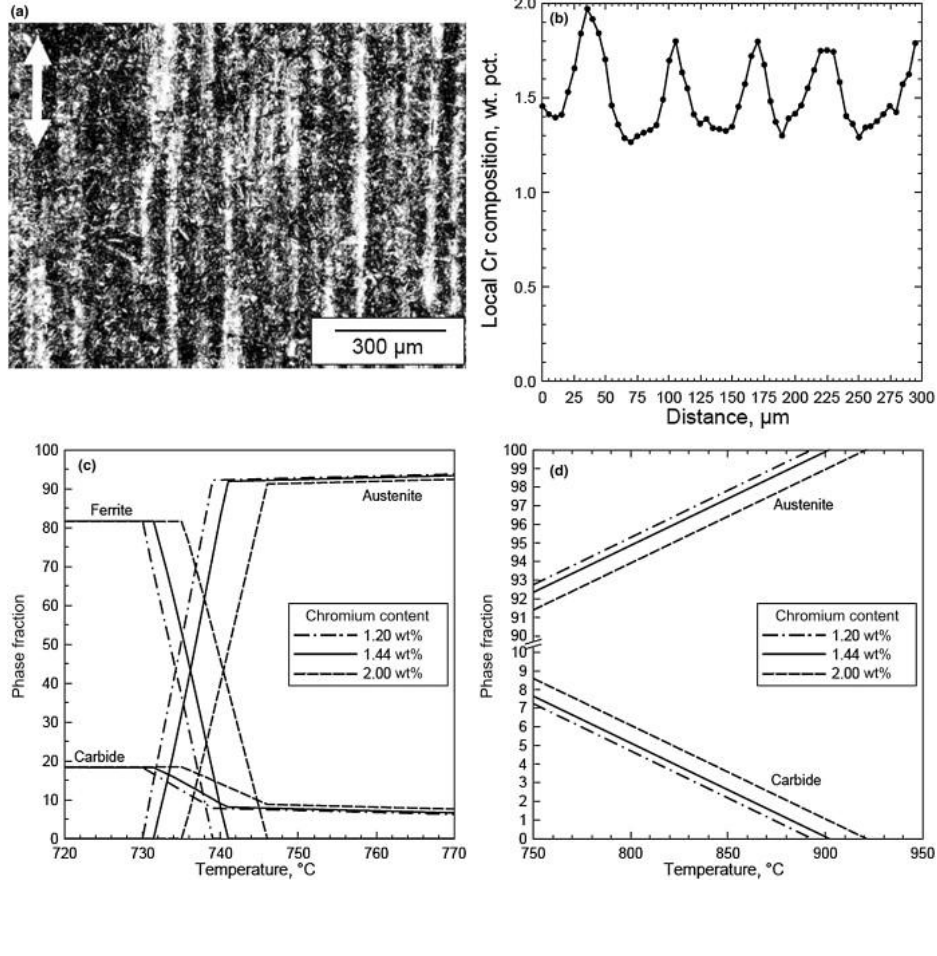
Full Annealing...

- In complete annealing, steel is heated to 30 to 50^o Celsius over the critical temperature of steel and this temperature is maintained for specified period of time, heat preservation for a period of time after slow cooling.
- The cooling rate may be about 10^o C per hour.
- Complete annealing is used in worked sheets, forging and casting made from medium and high carbon steels.
- It is to get all the changes in the properties of the metals like producing equilibrium microstructure, increase in ductility, reduction in hardness, strength, brittleness and removal of internal stresses.

Results of Full Annealing



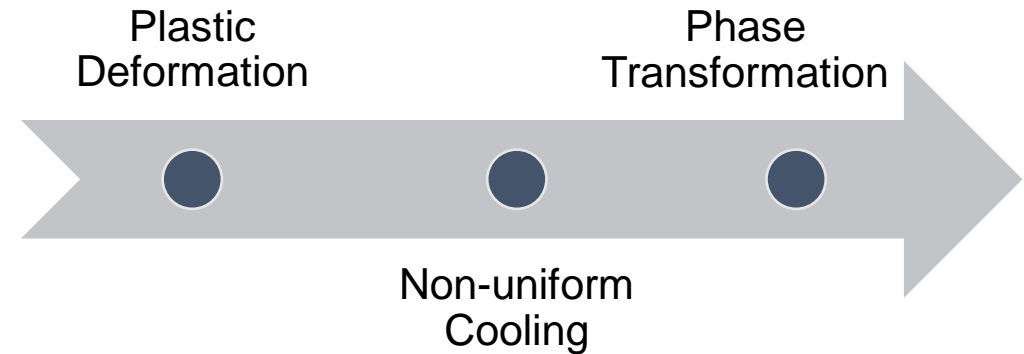
Full Annealing...



Stress Relief Annealing

- In stress relief annealing, the metal is heated to a lower temperature and is kept at that temperature for some time to remove the internal stresses followed by slow cooling.
- Large castings or welded structures tend to possess internal stresses mainly caused during their manufacturing and uneven cooling.
- No phase transformation takes place during stress relief annealing.

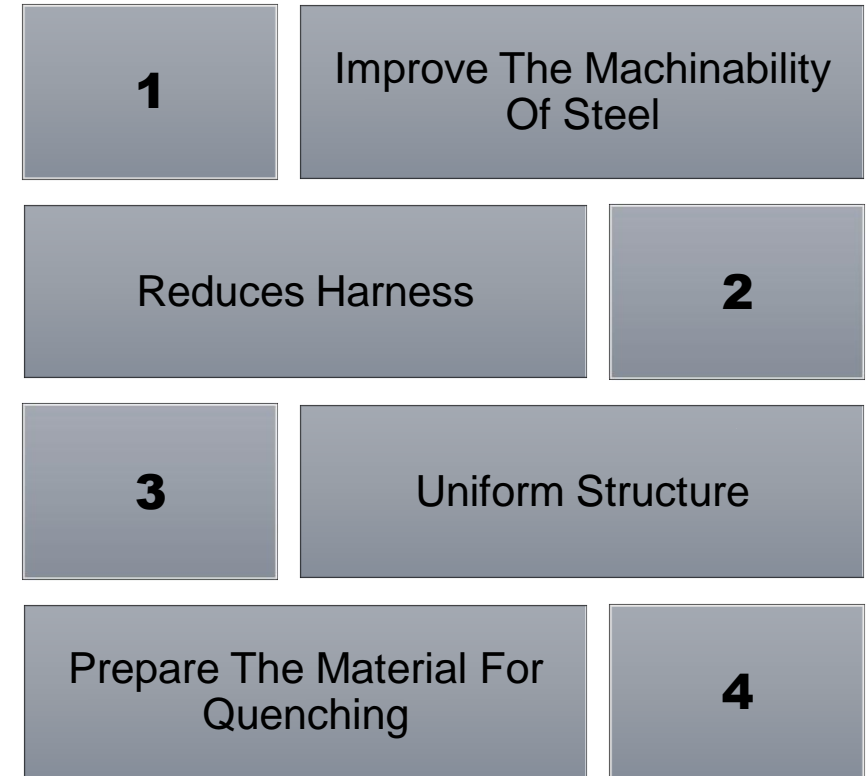
The aim of the stress relief annealing is to remove the internal stresses produced in the metal due to :



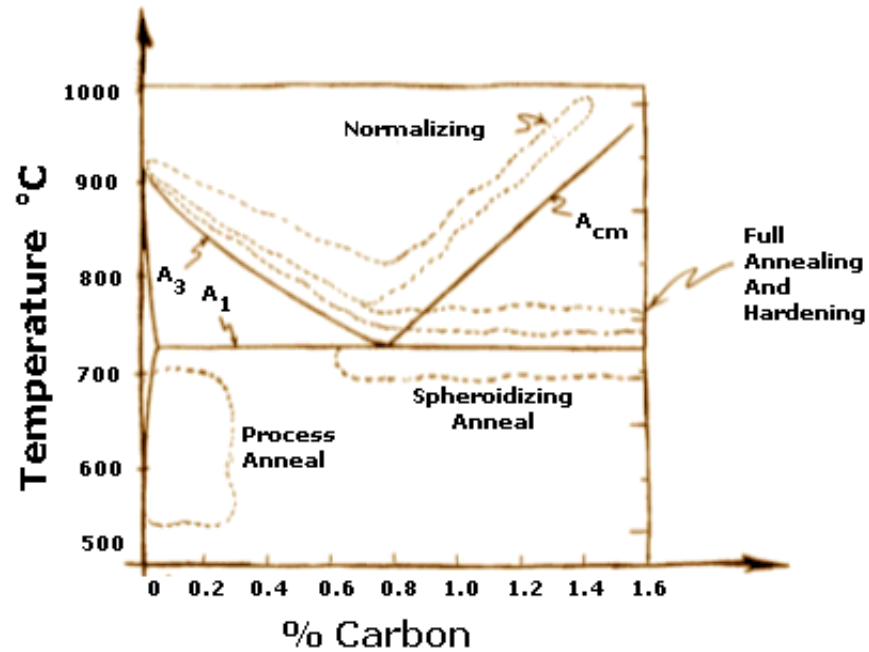
Spheroidizing Annealing

- Spheroidizing Annealing process is for high carbon and compound steel so as to improve their machinability.
- In spheroidizing Annealing, the steel is warmed to a temperature underneath A1 temperature, kept at the temperature for at some point followed by moderate cooling. The holding time changes from 15-25 hours.
- It is basically utilized for eutectoid steel and hypereutectic steel, for example, carbon instrument steel, amalgam device steel, bearing steel and so on.

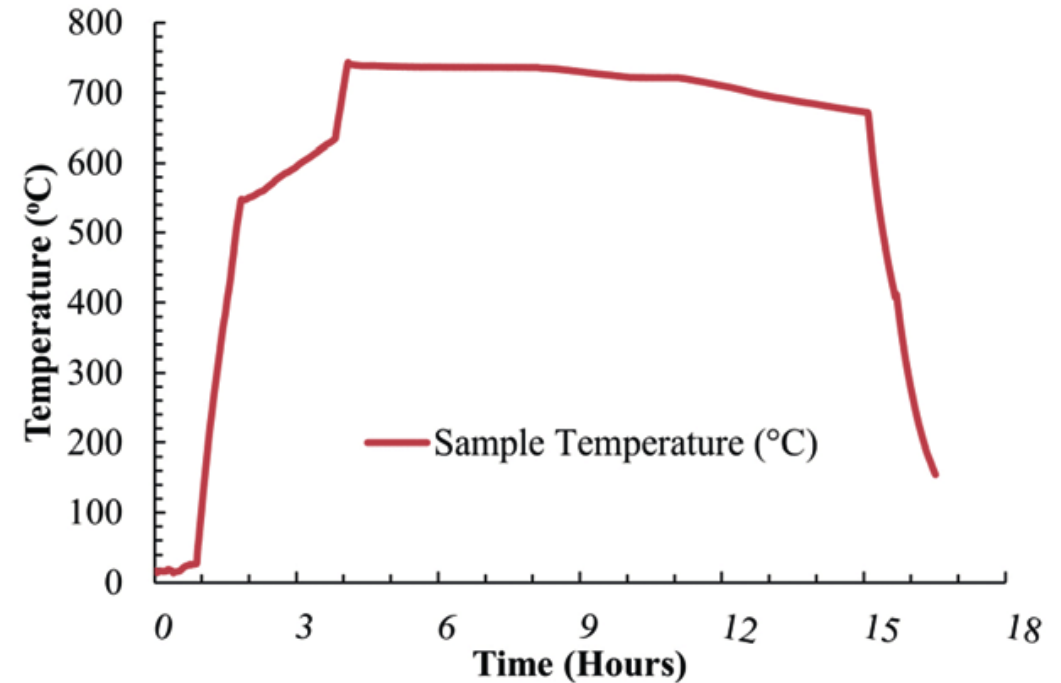
Purpose of Spheroidizing Annealing:



Spheroidizing Annealing

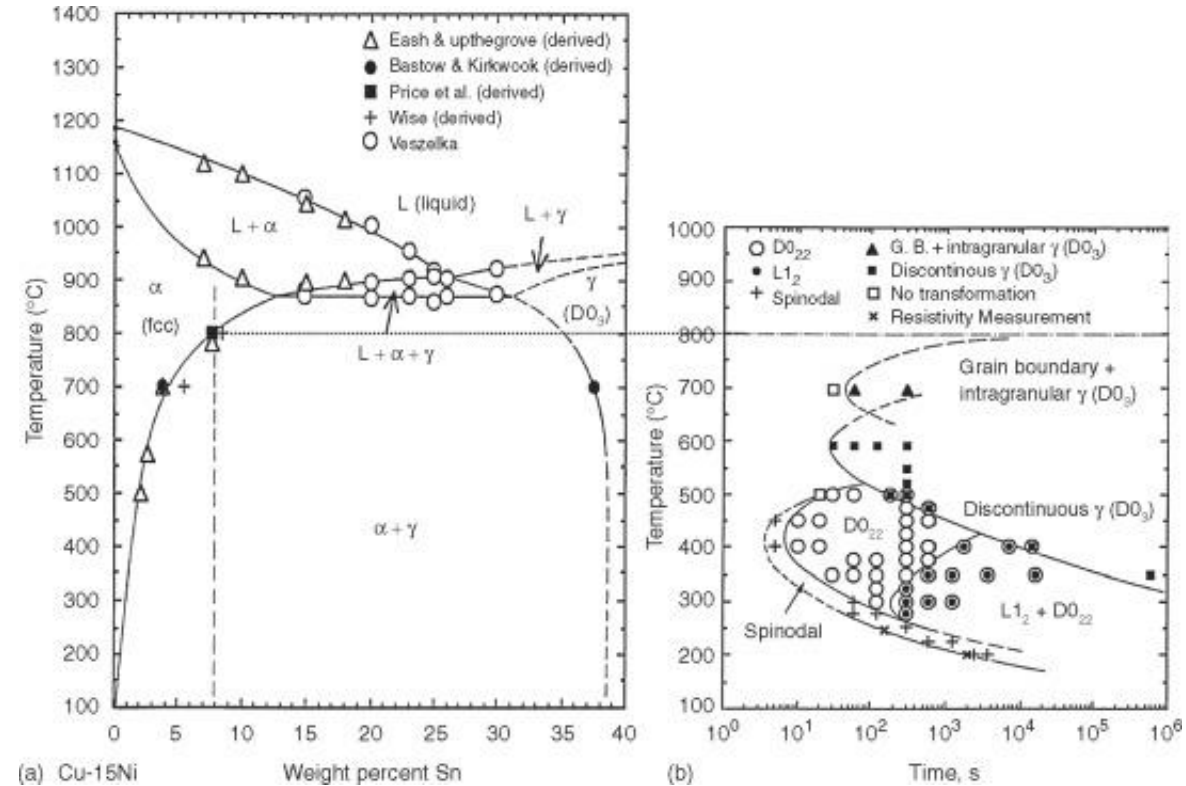


HEAT TREATMENT PROCESS



Isothermal Annealing

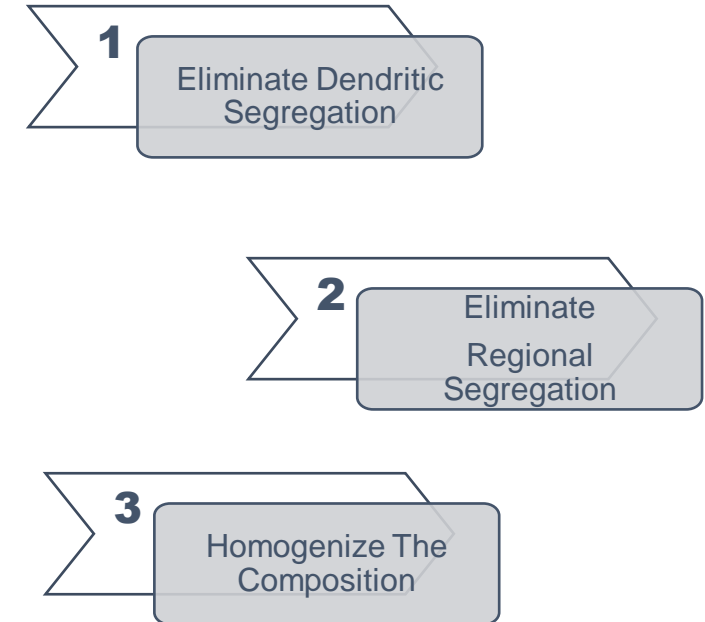
- In isothermal annealing process, the steel is heated above the upper basic temperature. At the point when the steel is heated above upper temperature limit, it changes quickly into austenite structure.
- From that point forward, the steel is cooled to a temperature under the lower basic temperature 600 to 700°C. The cooling is done by force cooling methods.
- This temperature is preserved for a specific timespan to create homogenous structure in the material.
- Isothermal Annealing, is mainly functional to low carbon and alloy steel to improve their machinability.



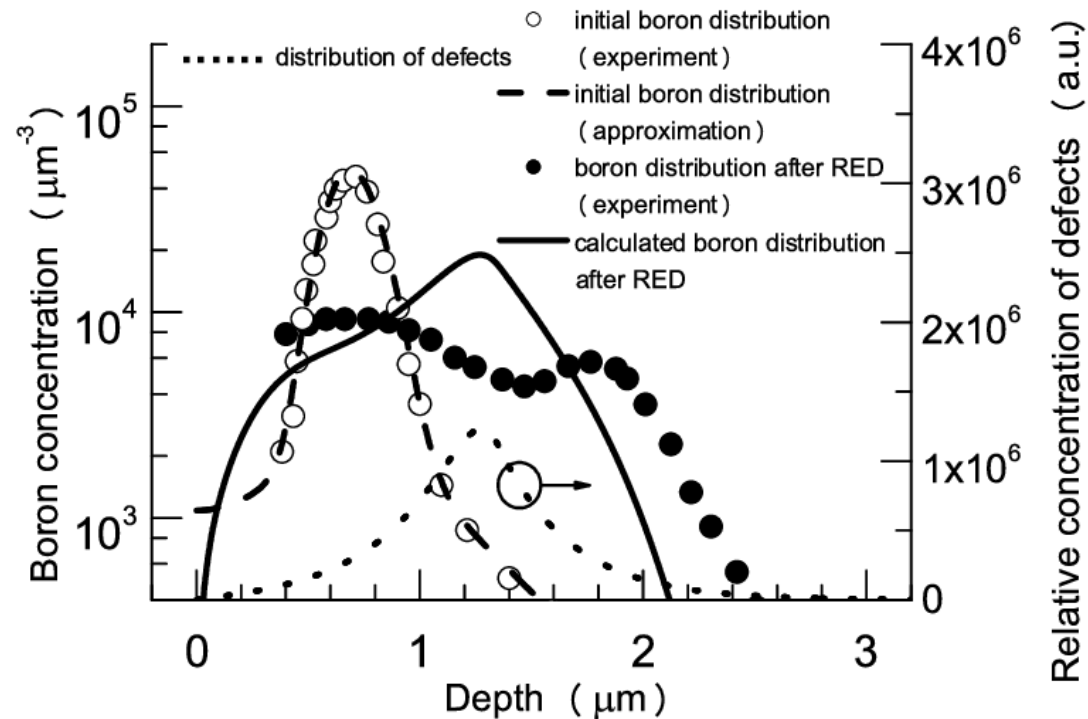
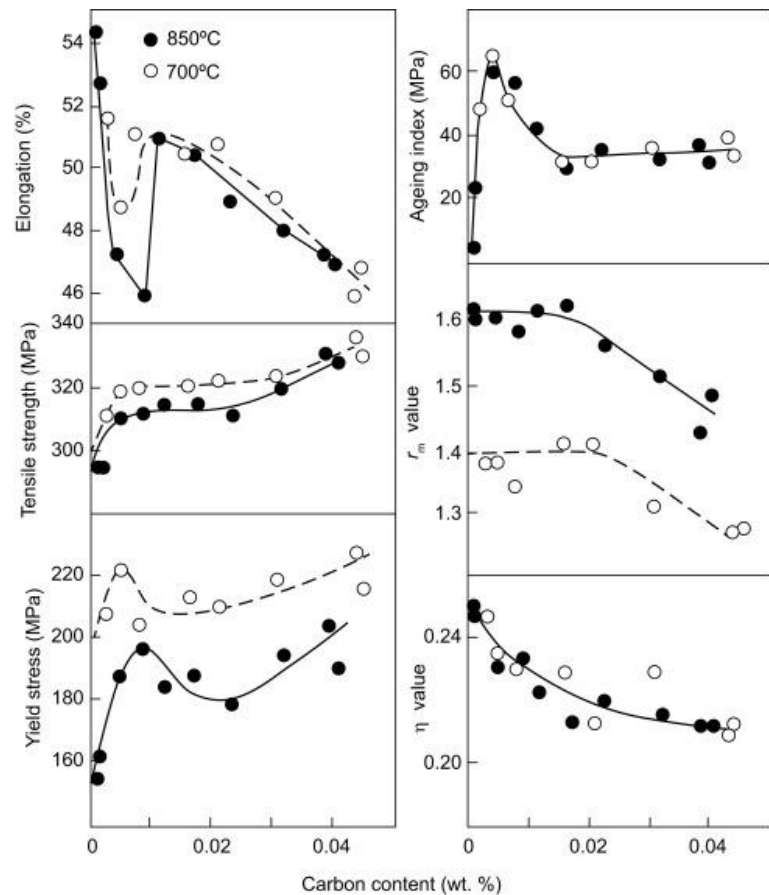
Diffusion Annealing

- In the process of diffusion annealing the iron and carbide are diffused together. This process requires higher temperature, so the steel is heated above the upper critical temperature.
- The temperature is maintained around 1000 to 1200^oCelcius.
- The heat conservation time in this course is approximately 10 to 15 hours.
- Post application of diffusion annealing, full annealing and normalizing are performed to improve the tissue.
- This process is applied to high-quality steel and segregation of serious alloy steel casting and ingots.

Purpose of Diffusion Annealing:



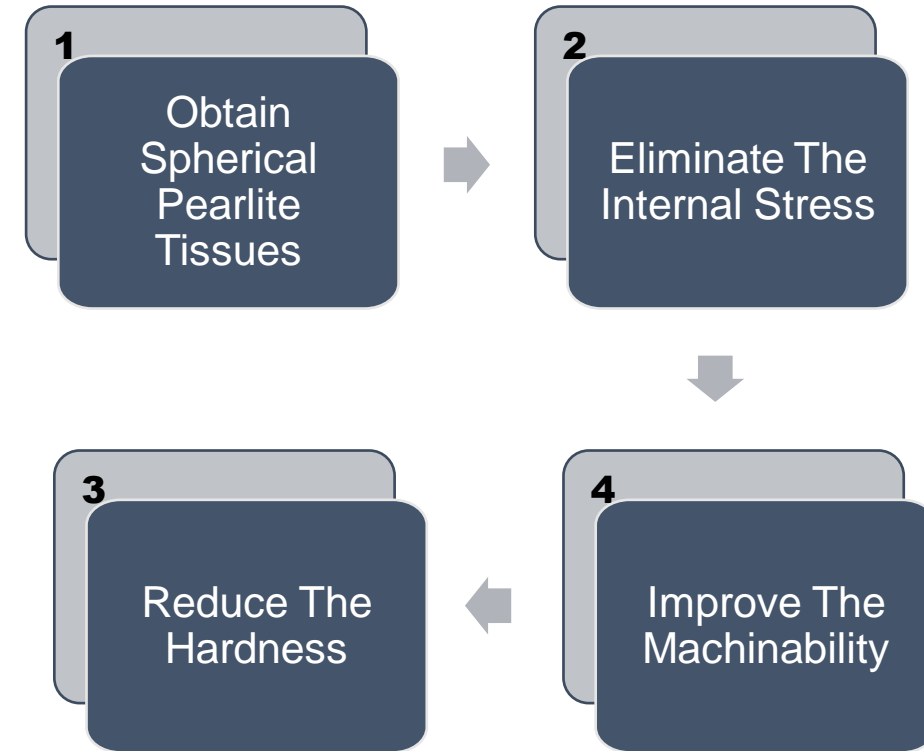
Diffusion Annealing



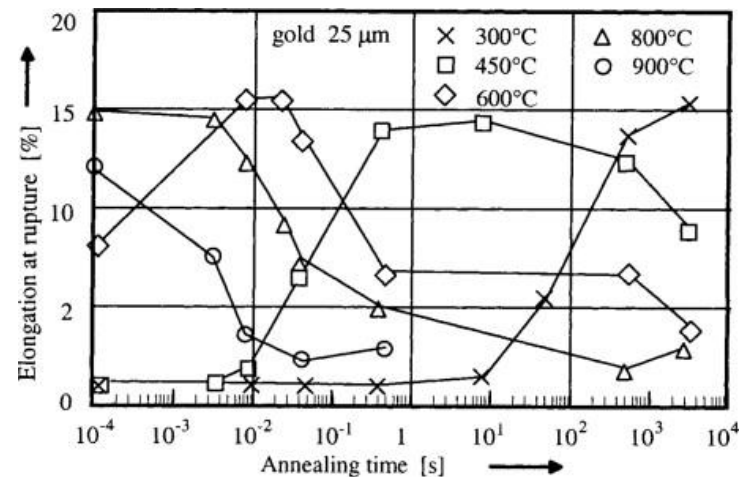
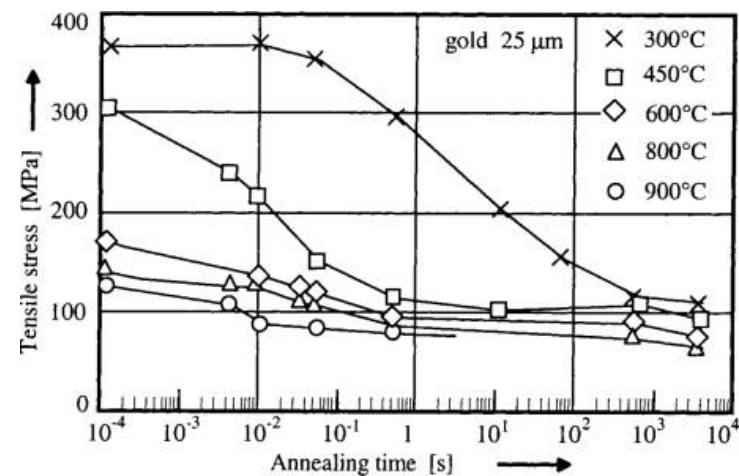
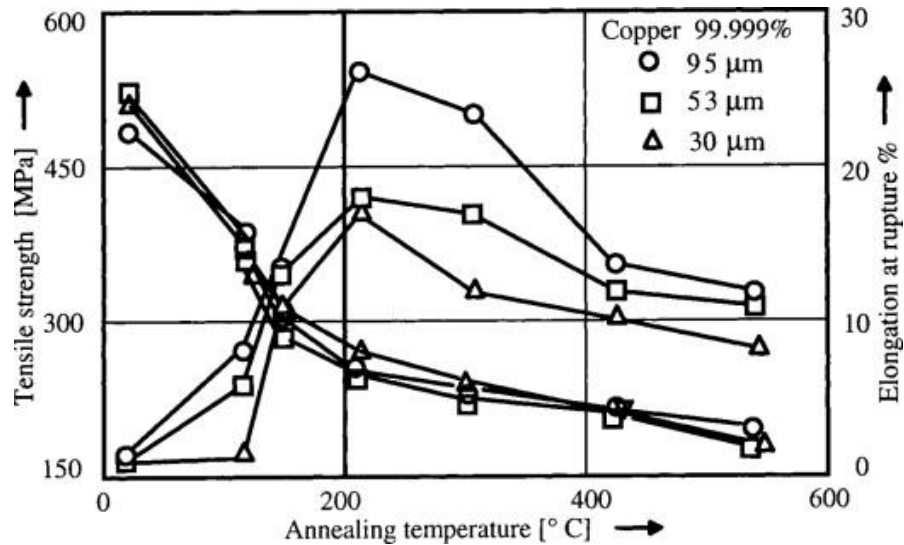
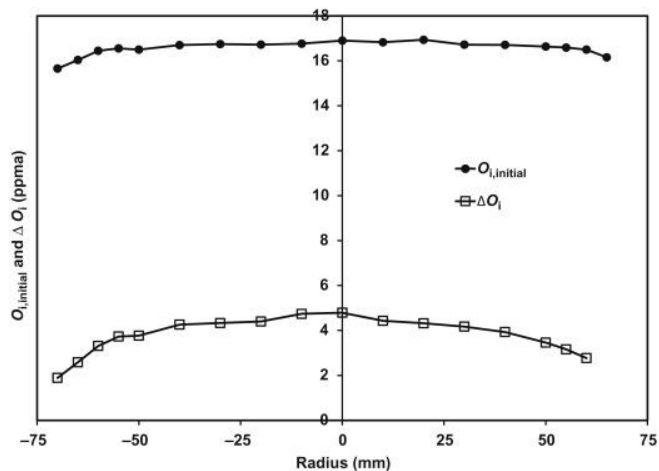
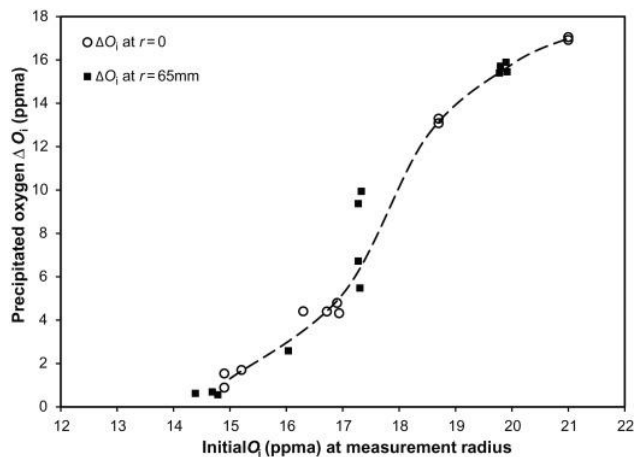
Incomplete Annealing

- In process of incomplete annealing, the steel is heated to around upper basic temperature.
- The steel of type hypoeutectic steel or hypereutectic steel are treated.
- The heat treatment process is obtained by slow cooling after thermal insulation.
- It is largely performed to get spherical pearlite tissues for the hypereutectic steel to remove the internal stress, decrease the hardness and increase the machinability.

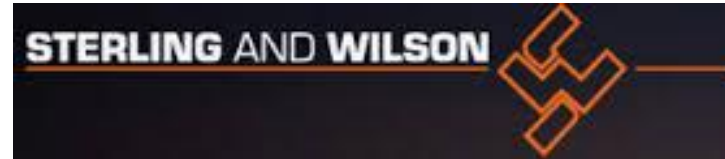
Purpose of Incomplete Annealing:



Incomplete Annealing



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Serving Across Borders...





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