



## REVIEW ON GAS CARBURISING CHAMBER

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### ABSTRACT

Heat treating is the controlled heating and cooling of a material to achieve certain mechanical properties, such as hardness, strength, flexibility, and the reduction of residual stresses. Many heat treating processes require the precise control of temperature over the heating cycle. Heat treating is used extensively in metals production, and in the tempering and annealing of glass and ceramics products. For maximum hardness soaking time is more as possible. The result obtained make it possible to heat treatment of both ferrous and non-ferrous metal and their alloy in order to alter their microstructure and enhance their properties for needed application in service with maximum safety and precaution place.

### INTRODUCTION

Heat Treatment may be defined as heating and cooling operations applied to metals and alloys in solid state so as to obtain the desired properties. Heat treatment is sometimes done inadvertently due to manufacturing processes that either heat or cool the metal such as welding or forming. Heat treatment is often associated with increasing the strength of material, but it can also be used to refine the grain size, relieve internal stress, to improve machinability and formability and to restore ductility after a cold working process. Heat

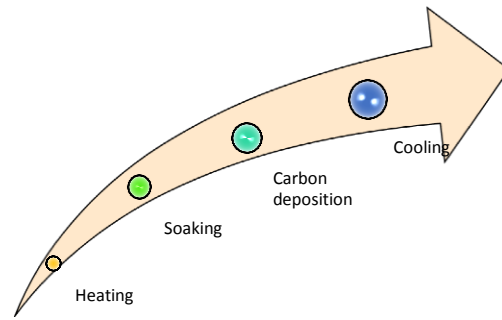
treating by using gas carburizing chamber is the deposition of carbon on a work material by controlled heating and cooling of the material to achieve certain mechanical properties, such as hardness, strength, flexibility, and the reduction of residual stresses. Many heat treating processes require the precise control of temperature over the heating cycle. Heat treating is used extensively in metals production, and in the tempering and annealing of glass and ceramics products. In order to improve the energy efficiency and optimize the load throughput, it's vital to have numerical modeling capability to accurately simulate the heat treatment processes. Heat treatment is sometimes done inadvertently due to manufacturing processes that either heat or cool the metal such as welding or forming. Heat treatment is often associated with increasing the strength of material, but it can also be used to refine the grain size, relieve internal stress, to improve machinability and formability and to restore ductility after a cold working process.

### Basic requirements of heat treatment process:-

The main requirement of the heat treatment process is the accurate control of the temperature profile. And also soaking/holding at specified temperature for obtaining uniform cross section temperature across load and work piece is another basic requirement of the heat treatment process. In

processes like carburizing, once the load reaches the soaking temperature the enriching hydrocarbon gas is added to the furnace and the load is held at the carburizing temperature for the carbon diffusion to occur until the required case depth is achieved. And the cooling cycle is determined by the required microstructure desired. And the cooling can be either liquid or gas cooling depending on the furnace.

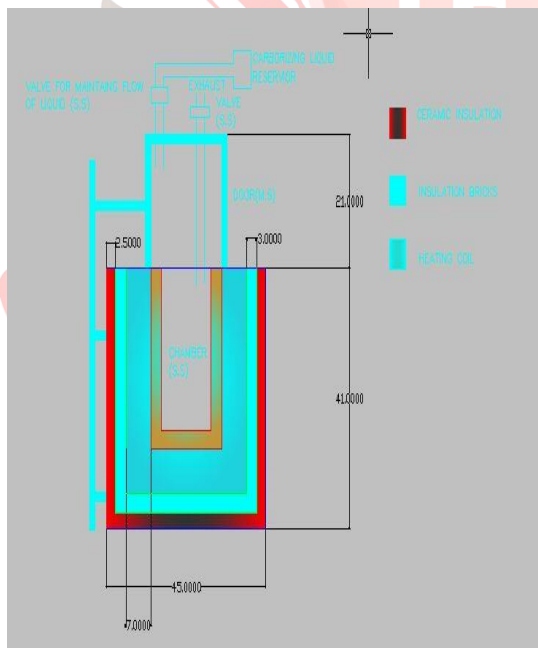
**PROCESS OF GAS CARBURIZING**



**Type of Carburizing: -**

1. Gas Carburizing
2. Vacuum Carburizing
3. Pack Carburizing
4. Liquid Carburizing

**DIAGRAM FOR GAS CARBURIZING**



First we start the furnace. After starting the furnace we will reach the temperature of furnace at 850<sup>0</sup>C. At the temperature of 850<sup>0</sup>C we open the door of furnace and insert the material sample in the retort of gas carburizing chamber. Then set the temperature of furnace at 900<sup>0</sup>C. Soaking of material sample start at the temperature of 900<sup>0</sup>C. At constant temperature of 900<sup>0</sup>C for 3 hour the heat treatment on material is carried out and the 3 hour is the soaking period. At the temperature of 850<sup>0</sup>C the flow of gas carburizing liquid start for carrying out gas carburizing process. The gas carburizing liquid i.e. LIQUID CARBON. After material sample is taken out from furnace immediately deep into the water for 15 minutes for quenching.

**COMPONENTS OF GAS CARURIZING CHAMBER:-**

In our heat treatment gas carburizing chamber we are using the following components:

- M.S Shell.
- Insulating Bricks.
- Ceramic Blanket.
- Controller.
- Contactor.

- Compensating Cable.
- Heating Coil.
- Indicator.
- Thermocouple.
- Switch and Indicator.
- S.S Valves.
- S.S Pipe.
- S.S Retort.
- PVC Flexible Pipe.
- S.S Nut & Bolt.
- Electrical Panel

### CONCLUSION

From the various obtained result the project work can be concluded that the mechanical properties vary depending upon the various heat treatment process. Hence depending upon properties and application required we should go for suitable heat treatment process. In gas carburizing chamber we increase the hardness of material. And also performance of chamber is very efficient. There is minimum heat losses because of its cylindrical in shape.

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