

## BELL ANNEALING FURNACES

The Farayand Bokhar's Bell Annealing Furnaces Represents The Latest Technology In Steel Industries

Annealing is a softening process for metal that reduce internal strain caused by work hardening and facilitates recrystallization and grain growth. When metals are formed or processed, strain hardening occurs, decreasing ductility and increasing hardness. This hardening leaves metals brittle, often causing cracking or breaking during successive operations. For many applications, these residual stresses within the structural makeup of the molecules must be alleviated. Annealing returns the ductility to the metal allowing for future operations and processing. Both ferrous (iron-based alloys such as steel and stainless steel) and non-ferrous metal (such as bronze, copper and aluminum) use this process. This raw material is cleaned to eliminate rust, scaling, dirt, and other impurities. Cleaning can be performed using acid pickling or mechanical methods, depending on the application. The metal is then placed in a furnace where it is heated to meet metallurgical requirements. Variations exist within the process depending on the type of metal being annealed and the desired outcome. It is frequently advantageous to heat the metal within a controlled atmosphere, such as nitrogen or hydrogen, to prevent chemical reactions from occurring between the metal and elements in the air. The furnace heats the metal, usually through convection and radiation, to a desired level where it is either held constant or cycled. After the heating, a controlled cooling brings the metal back to room temperature.

### THE MAIN ADVANTAGES OF A BELL- TYPE ANNEALING FURNACE ARE:

- . Excellent temperature uniformity
- . Consistent product quality
- . Good production rates
- . Low operating costs
- . Efficient use of furnace asset by cooling with inner cover
- . Saving in shop floor space requiring less capital investment and reducing material handling

The annealing process is composed of several stages. First, the coils are tilted into the right position using an upended (coil tilter), and placed on the annealing base. The coils are then stacked three to five high on the base. This coil stack is protected with a cover and sealed at the base. Then, the heating hood (furnace) is lowered onto the stack. The annealing is performed under protective gas atmosphere. The protective gas, usually Nitrogen, is blown into the furnace by the base fan. After the allotted annealing time, the heating hood is replaced by a cooling hood for controlled cooling of the coils in the protective gas atmosphere. The coils are then loaded on a coil transfer car by another coil tilter and carried off.

The Farayand Bokhar Group proved that, this complicated process will have a great result under its visions.

Bell Annealing is a type of annealing that derives its name from the shape of the furnace used during the process. Bell Annealing heats batches of metal which are placed on a base assembly, enclosed by an inner cover, and covered by the furnace. An overhead crane is used to load the base and move the equipment when the furnace is suspended from the crane, it looks like a "bell". The base assembly is the source of convection and the main method of heat transfer to the charge. The inner cover seals in the desired atmosphere and protects the charge from the burner's direct heat. Keeping contaminants out of the annealing atmosphere prevents chemical changes as well as eliminating the formation of oxides and soot on the metal. The forced-cooler replaces the furnace at the end of the heating cycle and uses air and sometimes spray water to accelerate the cooling of the outside of the inner cover. Bell furnaces are used to anneal both strip and wire coils. Bell furnaces are used to anneal both strip and wire coils. Furnaces designed for strip are generally of a "single-stack" configuration. The base diameter accommodates on coil centered over the base fan. The strip coils are stacked on top of one another, separated by convector plates. The circulated atmosphere flows up the sides and back down to the fan through the center of the coil.

FB Group lead by one of the industry's most experienced technical and management team we've combined in-hand research and development with new alliances and technology acquisition to deliver a history of patented technology and products.

Exporting our technology and products to our clients in Middle East has proved that the quality and after sale services of Farayand Bokhar has satisfied its clients.

As the name suggests "Hydrogen Annealing" is nothing but the annealing process which is carried out in ambient hydrogen atmosphere at elevated temperatures. Annealing is a heat treatment that is carried out to relieve internal stresses such as hot/cold shuts etc. All that were induced during fabrication process, (mostly during casting). This process involves three distinct microstructural changes in the material observed during controlled heating.

1-Recovery 2-Recrystallization 3-Grain growth

Hydrogen Annealing is nothing but annealing or heating the component up to 200-300 degree Celsius in ambient hydrogen atmosphere in the furnace.

Hydrogen + Nitrogen gas mixture. Therefore its more efficient and effective and is widely used in heat treating cast and welded components. Mostly this is carried out for steel parts since if used for other metals (such as silver), Hydrogen may form blisters and could cause embrittlement. Some other uses of Hydrogen Annealing.



