

Heat Treating Sterling Silver For Hardness

Jewelry manufactures/ craft-man might find that sometimes, the jewelry pieces are too soft for further work in the processes like filing, polishing and as a finished jewelry to wear.

There is a solution to this problem! We may not realize that in our daily work, we probably have used one of the steps in the method to make the jewelry pieces workable. It is called "heat treatment".

Heat treatment is done by giving heat to the jewelry pieces so as to change the microstructure of metal to change the properties such as strength, hardness, toughness. The chemical property can also be changed for example corrosion resistance. Heat treatment can be used after casting or during the fabrication work. In many occasions, this is to increase hardness or spring effects of the pieces to suit the purpose, or to increase its ductility.

The whole heating process generally compose of "annealing", to increase ductility to the items which has been worked and harden. To complete the full annealing, the temperature needs to be high and long enough time so the metal recrystallization to the stage where the metal grains become smaller and strain-free. The pieces of jewelry is in its most ductile stage.

Annealing should be done using torch with reducing flame or in the furnace. Adding heat should be gradually increased for certain items to prevent fire cracking. The temperature for the fully annealing for sterling is about 650 Celsius and in most cases for 20-30 minutes in the heat to get the full stage annealing. Make sure that the heating is also even for the whole piece. After this temperature is reached, quench the article into room temperature water to stop the process when the full re-crystallization is reached. Bench work can be performed after this stage.

As the fabrication work continues, re-annealing may be required when the pieces become too hard to work with.

The second step in the heat treatment process is "age hardening or precipitation hardening." This step is to apply heat to put the order into the metal transformation. This step is needed to bring back the strength of the metal, resulting in increased hardness.

In terms of process, single phase and second phase occur to form the final structure. In this stage heat is applied using a furnace by selecting a temperature around 285-300 Celsius for 1-2 hours and let the piece cool down to room temperature without additional quenching. The oven temperature and the room temperature together with the time length used in the process is important to achieve the best result. Do not over do this with too high temperature or too long process, you may lose the intended hardness.

In certain circumstances for example sterling jewelry cast with gems in place but more hardness is required, one may skip the annealing stage and go for the age hardening alone.

For jewelry maker, annealing and aged hardening are the two important processes of interest indeed.