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Nitinol Paperclip, Worlds Smartest Paperclip
Product ID: SS3885

Background

Nitinol is a metal alloy of nickel (Ni) and titanium (Ti), known for its unique properties of shape memory and super elasticity (also called pseudo elasticity). It is a "smart material" because it can return to a pre-determined shape under specific temperature or stress conditions. The name "Nitinol" is derived from its elemental composition (Nickel, Titanium) and its place of discovery, the U.S. Naval Ordnance Laboratory (NOL).

Key Properties

Shape Memory Effect: When nitinol is cooled below its transformation temperature, it is in a malleable phase (martensite) and can be easily deformed into a new shape. When subsequently heated above this temperature, it undergoes a change in its crystal structure (to the austenite phase) and forcefully returns to its original, "remembered" shape.
Super elasticity: In a specific temperature range just above its transformation temperature (austenite phase), nitinol can withstand extraordinary amounts of deformation (up to 10-30 times more than conventional metals like stainless steel) and return to its original shape immediately upon the removal of the load, without permanent deformation.
Biocompatibility and Corrosion Resistance: Nitinol is highly resistant to corrosion and is biocompatible, making it suitable for use within the human body.
High Damping Capacity: Nitinol can absorb vibrations, which makes it useful in various engineering applications.
This paperclip exploits the property of Nitinol metal alloy that makes it want to return to the shape it was originally formed in when produced. This property of Nitinol alloy is known as the "memory effect". This Nitinol wire paperclip is produced at a temperature of @600 Degrees Celsius and formed into the paperclip shape at that time. When you receive it, the "memory" has already been "programmed" into it. You can deform the paperclip (don't go to extremes here) and then heat it up with hot water or open flame (lighter). When heated, the metal magically re-forms itself into a paperclip. Way cool!

Instructions

Deform the paperclip. Don’t go to extremes! Child supervision during demonstration is important here! We recommend not bending the wire more than 110 degrees. Place the deformed wire into a hot water bath of @175° F / 80° C. The wire will almost, as if by magic, reform itself into its original shape. **We highly recommend the hot water method for safety, but an open flame can also be used in a pinch.** Happy experimenting!