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Nitinol (Memory Masters)

How are different types of metal affected by deformation and reformation conditions? If we subject wires of the same gauge: stainless steel, chrome-cobalt alloy (Elgiloy Blue and Green), and nickel-titanium (Nitinol) to consistent deformation and reformation conditions then the softer, more flexible wire will have a higher stress threshold and be more resistant to permanent deformation than the stiffer wire because of the varying proportion of specific alloys in each type of wire. I made a guide to bend the wires to consistent angles and tested them at room temperature and in a hot-water bath. At first I thought that the Elgiloy contained Nitinol so I thought that it would have a high stress threshold compared to the stainless steel. That means that it would take more bending to permanently deform the wire because of its elastic properties. What I discovered was that it had no heat-activated Nitinol content therefore was unaffected by the hot water, and no super elastic properties. Both Elgiloy wires had properties similar to steel. The Nitinol was not the heat-activated type so it also did not respond to the hot water, but exhibited the greatest flexibility, resistance to permanent deformation, and therefore the highest stress threshold. In conclusion my hypothesis was partially correct. The softest, most flexible wire (Nitinol) had the highest stress threshold and the stiffest wire (stainless steel) had a much lower stress threshold and was more easily deformed. However, even though the chrome-cobalt alloy (Elgiloy) was softer than the stainless steel, the Elgiloy had a slightly lower stress threshold than the steel. This indicates that how stiff or how soft the wire is does not have as much of an effect on its stress threshold as the chemical compounds of the wires.