Microstructural evolution of NITINOL and their species formed by atmospheric plasma spraying

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Abstract
A most used structural material, mild steel which is prone to catastrophic failure is studied to enhance the surface properties with the application of NiTi using atmospheric plasma spray (APS) technique. Near equiatomic Ni-Ti composition is popular for its shape memory effect and superelastic behaviour. In this investigation, atmospheric plasma spray is a cost effective as well as the user friendly process in which a homogenized elemental mixture of Ni and Ti powder has been taken as feeder materials. Physical and mechanical properties have been revealed for the coating materials using scanning electron microscopy (SEM), energy-dispersive spectroscopy (EDS), x-ray diffraction (XRD) and Vickers hardness testing machine. Particle erosion wear test has been studied to find out the principle of material removal and brittle/ductility behaviour on the coating surface. It is clear that the mechanical properties of the substrate (mild steel) enhanced fivefold with the application of NiTi alloy. A detail microstructural behaviour has been explained before erosion and after erosion. There is an increase in hardness is due to the formation of intermetallic of NiTi and oxide phases on the surface of the coating.
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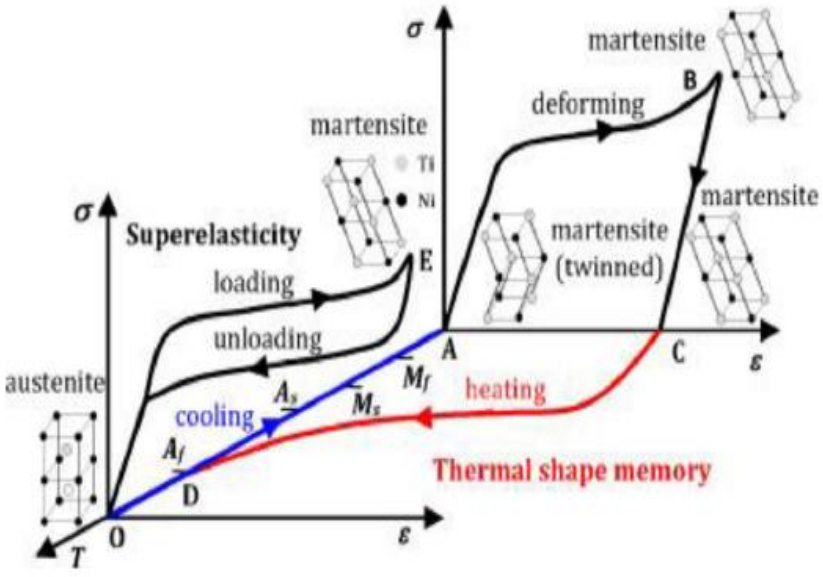

Figure: Stress-strain-temperature diagram of NiTi alloys.