GENERAL PROBLEMS WHEN JOINING SHAPE MEMORY ALLOYS

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The shape memory alloys (SMA) are part of the category "advanced materials" as they are also named, alongside the technical ceramics, composite materials (thermoplastics materials, metallic materials), amorphous materials, micro-crystalline materials etc. There are many sciences - disciplines that should work together to study permanently the implications of each developing stage. It is a presentation of general problems when joining of shape memory alloy.

Several undesired aspects appeared during the fusion welding process were [4, 9, 10]:

- brittleness due to the oxygen, hydrogen and nitrogen solubility
- loss of superelasticity, of the shape memory effect, respectively in HAZ
- forming of the intermetallic compounds such as Ti_2Ni or $TiNi_3$, which are brittle and do not present the shape memory effect.

The solid state welding processes, such as friction welding, resistance welding and diffusion welding are attractive for SMA joining as they present potential for achieving the joint, with small microstructural changes. Welds can be obtained at relatively reduced temperatures as compared with the fusion welding [9, 10].

Following in service necessities, a lot of tests have been made to obtain SMA joints, some of them being patented. Such a patent exists for the brazing of Nitinol with other materials, as for example titanium. It uses a flux with halogen, which removes the titanium oxide from the surface of the Nitinol and deposits a layer – a metallic coat to prevent the further oxidation. There is no certitude that the shape memory effect in the joint will be kept. It seams that this type of joining can be used only when mechanical continuity is necessary and in the situations when the existence of the shape memory effect is not necessary for the joint [8, 9, 10, 11].

The special properties of the SMA lead to the extension of their use in more and more different fields [9, 10].

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