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The effect of SMA-training on variations of production process parameters

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Shape memory alloys (SMA) are functional materials that can both remember a previous defined shape by thermal activation and show high elastic properties. These effects are based on a reversible, diffusion less transition between the low temperature phase (martensite) and the high temperature phase (austenite).

Despite worldwide research efforts, product solutions that are based on SMA are only established in few mass-industrial applications. One main reason for this is that there are variations of industrially manufactured semi-finished SMA-products. An approach for reducing variations of the SMA-behavior due to variations in the production process can be found in the SMA-training as well.

The SMA-effect reacts sensitively to even small variations of production process parameters. The aim of the investigation is to find out if variations that are caused in the wire drawing process can be compensated by SMA-training. For this purpose, NiTi-SMA-wires are drawn with different parameters and are investigated concerning their SMA-behavior such as the stress-strain or the strain-temperature curve. The training method of stress induced martensitic transformation (SIMT) is applied with different parameters regarding temperature, number of cycles, stress and time. This is followed by reinvestigations of the SMA-behavior. The before/after comparison shows if variations of production process parameters can be inPSMenced by the SIMT-training method.

First results of this project are presented within both the full paper and the future prospects regarding the SMA production process and industrial standards.

Biography

Dennis Otibar is Mechanical Engineer, worked at Klaus Union GmbH & Co. KG in the sales department from 2002 to 2012. Since 2013, he has been a research assistant at the Chair of Production Systems of the Institute for Product and Service Systems at the Ruhr-University in Bochum, Germany. His current research project considersthe process value analysis from the production up to the application of NiTi-SMA-wires.

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