

Abstract Submitted
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Evaluation of NiTi and NiPdTi Shape Memory Torque Actuators

ALAN THOMPSON, JEFF SHARP, Marlow Industries, Inc. — This work presents the evaluation of some thermal-mechanical transformation properties of NiTi and NiPdTi shape memory alloy (SMA) torque tubes processed under differing conditions. NiTi is the dominant alloy used in SMA applications, but its transformation temperatures are too low for certain applications. The substitution of Pd for Ni raises the transformation temperatures. One of the goals of our work is to determine if the NiPdTi alloy can be processed to achieve mechanical properties comparable to those of NiTi. Experiments employing a custom thermal-mechanical torque tube tester were conducted on Ni₅₀Ti₅₀. The transformation temperatures, recoverable and creep strains, and positive work done during the martensite-to-austenite transformation were obtained as a function of the number of cycles and loads. NiPdTi torque tubes are currently being fabricated for comparison. Graphical presentations of the percent strain versus temperature will be presented to demonstrate the transformation and mechanical behavior for the NiTi and NiPdTi SMA torque tubes at 10, 300, 500, and 600 cycles. Work per cycle versus load and versus number of cycles will be presented.

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