Application News

SHIMADZU

MATERIAL TEST i20

Tensile Test on Shape Memory Alloy Materials with Shimadzu Universal Testing Machine, Model Autograph

Progress of the fundamental research on metal has elicited discoveries of new phenomenon in metals, which has encouraged the development of newly functioning materials. One such achievements is shape memory alloys, developed on the basis of the thermoelastic martensitic transformation.
The following is an introduction of tensile tests on shape memory alloys with the Shimadzu Universal Testing Machine, Model Autograph, a machine widely used for testing and evaluating the physical properties, strengths and behaviors of various materials.

Tensile test of NiTi type D1.0 shape memory alloy wire

Fig.1 shows a load–elongation curve and the result of data processing.

Test conditions

Grip : wedge type 2ton chuck
Load rate : 3mm/min.
Load range : 100kgf/full scale

Following the linear range produced by the elasticity deformation of the parent phase, the specimen shows a seeming plastic deformation after the yield point. Thereafter, the stress shows another increase, nearly ending in breakage after another plastic deformation.

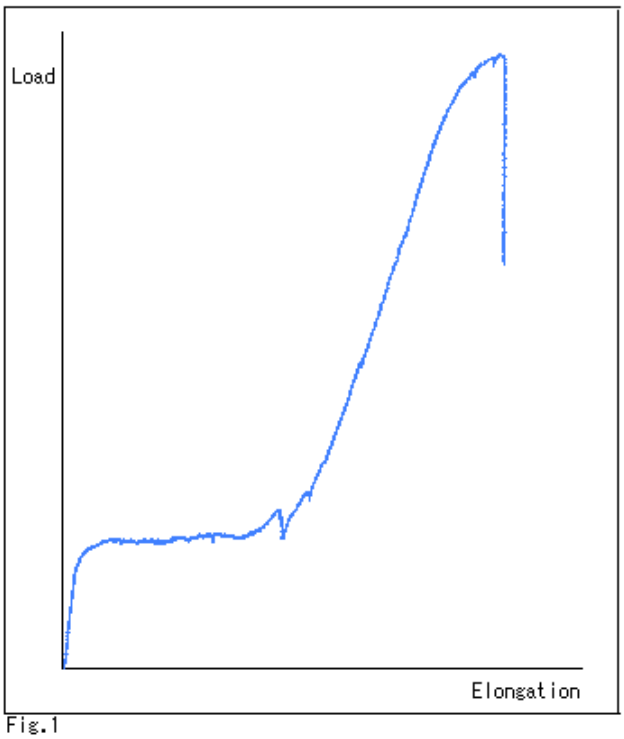

Fig.1
Tensile Test of NiTi type D 1.0 shape memory alloy wire

Repeated loading test on NiTi type D1.0 shape memory alloy

Test conditions

Grip : wedge type 2 ton chuck
Loading rate : 3mm/min.
Load range : 50kgf/full scale

The seeming elastic deformation, which disappears when the load is released, never appears again, even if load is applied repeatedly. This holds time until the specimen is heated so that a reverse transformation occurs in the parent phase, causing the specimen to return to the initial crystal phase; in other words, to such a state that a seeming elastic transformation happens – a shape memory effect.

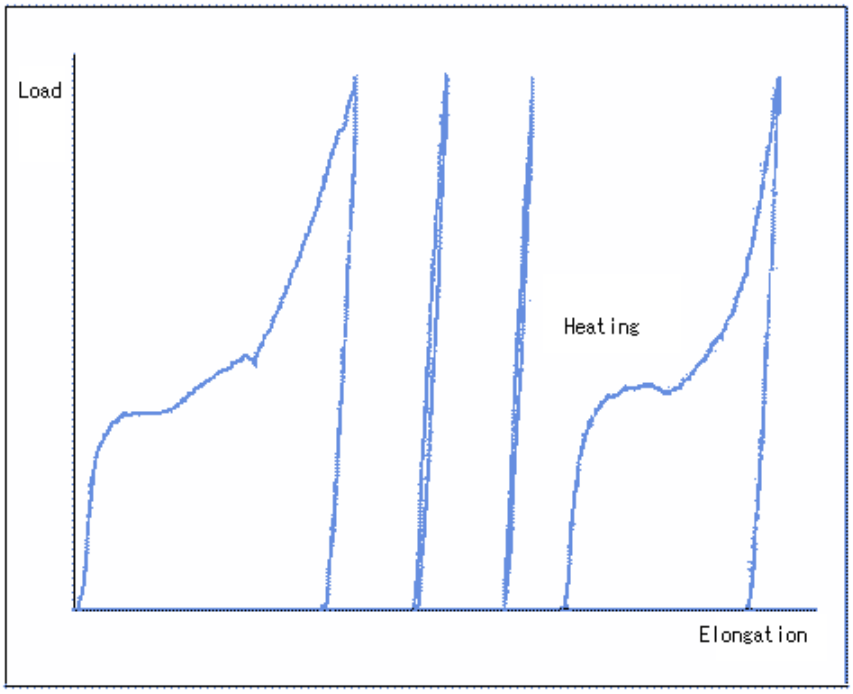

Fig.2 Repeated Load Test on NiTi type D 1.0 Shape Memory Alloy Wire

* Please be advised that data obtained before the implementation of the current Weights and Measures Law may be presented in terms of gravimetric unit.

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