SAES® Getters Group and Shape Memory Alloys

The SAES® Getters Group, headquartered in Italy near Milan, is a leading supplier of advanced material solutions for scientific and industrial applications worldwide. SAES manufactures and sells metal alloy based active components for high tech industrial applications.

Continuous forefront research and innovation activities, joint developments with customers, high volume manufacturing capabilities and a worldwide sales and service network have been driving the Group’s success over the last sixty years.

By leveraging the core competence in special metallurgy and with the support of its affiliated company Memory-Metalle GmbH, SAES Getters offers a highly diversified product portfolio of shape memory alloy (SMA) semi-finished shapes and components, serving any need around industrial and biomedical applications.

HIGHLIGHTS
- In-house vertically integrated process, from ingot to shape memory component manufacturing
- 100% on-line actuator wires quality control (patent pending)
- Full flexibility in product mix
- Know-how on shape memory component implementation in final devices
- Dedicated R&D SMA department
- ISO 14001 certified company - for SMA components, quality management system conforming to ISO TS 16949:2002 standard
- Actuator wire mass production for high volume industrial applications

Industrial Applications
- Thermal and electrical actuators
- Sensors/actuators for air conditioners
- Fire protection
- Antiscald safety valves
- Circuit breakers
- Damping and vibration control devices
- Eyewear

Biomedical Applications
- Orthodontics
- Surgical tools
- Guidewires
- Implantable devices
- Orthopedics
Shape Memory Alloy Actuators

SmartFlex® is SAES Getters’ product line of shape memory alloy semi-finished shapes and components. Shape memory alloys unique property to recover shape upon heating can be effectively packaged into compact, light, powerful and silent actuators to replace alternative technologies based on wax, DC motors and electrical motors. The unmatched energy density, degree of integration and simplicity in design make shape memory alloys the new industry standard for linear and rotary actuators.

SMA actuators offer a full range of advantages:

- Reliability
- Compactness and flexibility
- Reduced cost
- Direct linear or angular movement
- Noiseless operation
- Compatibility with harsh environments
- No EMI

SmartFlex actuator wires deliver state-of-the-art performance for reliable actuators.
SmartFlex Product Portfolio

- **Alloy compositions**: shape memory and superelastic (standard As -25 °C < T < 120 °C)
- **Thermomechanical conditions**: cold-worked, straight annealed, shape annealed
- **Shapes**:
  - Round wire (25 μm < <5 mm)
  - Ribbon and strip (50 x 25 μm² < <10,1 x 0,76 mm²)
  - Thin sheet (down to 20 μm thickness and 100 mm width)
  - Springs
- **Surface finish**: electropolished, shiny black oxide, amber/brown oxide, ultra-fine polished

SAES’ proprietary production route, involving a vertical integrated manufacturing process from Ni and Ti materials to final components, enables complete process control and flexibility in product mix.

For shape memory component manufacturing, SAES Getters is committed to adopting the quality management system conforming to ISO TS 16949:2002 standard.
SmartFlex Actuator Wires

- Wire thickness: 20 μm < d < 500 μm
- Maximum stroke: 5.5%
- Force @ 150 MPa: from 5 to 3,000 g
- Number of cycles: > 200,000 (at 150 MPa, 3.5% stroke)
- Transition temperatures (at 200 MPa load):
  - AS > 90 °C
  - Mf > 65 °C
- Availability of wires with electrical crimps
- Availability of NiTi wire in silicon sleeve
Advantages of SMA Actuators

SAES SmartFlex shape memory alloy wires have been specifically developed for actuators. For linear movements of a few millimeters or angular movements of just a few degrees, use of a motor rotating at thousands of rpm coupled with gears, clutches and reducers is certainly not the best solution. Replacement of small motors or solenoids can be effectively done with SmartFlex actuator wires. Since shape memory alloy wires are much smaller for the work they do, a number of new products and improved designs on existing products can be developed.

Use of “smart materials” for actuation represents a technological opportunity for development of electro-mechanical components: the typical characteristic of shape memory alloy wires of obtaining mechanical actions if stimulated with electrical current promotes development of simple, very compact, reliable actuators.

Component makers can use SMA materials to simplify products, add new functions, upgrade performance, improve reliability and cut down component costs, while significantly reducing mechanical complexity and size.
The SAES Getters Group manufacturing companies are ISO9001 certified, the Asian and Italian companies are ISO14001 certified also. Full information about certifications for each company of the Group is available on the corporate website at: www.saesgetters.com

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