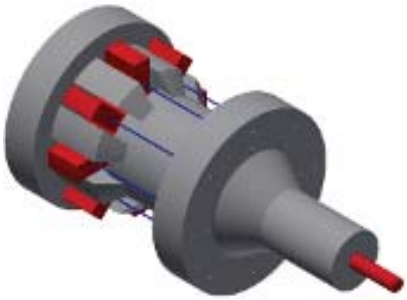
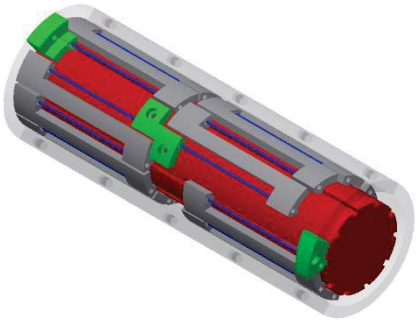
Comisión Nacional de Energía Atómica

Hes·so VALAIS WALLIS
School of Engineering





Development of shape memory based microactuators for application in external medical devices

Graduate Gaël Genet

Objectives

Development of shape memory based microactuators designed to achieve mechanical motion amplification for application in external medical devices.

Methods | Experiences | Results

Three different microactuators have been developed using shape memory allows (SMAs) as actuation method. Each actuator has its own way to achieve mechanical motion amplification (10 - 20 mm) as well as to exert the required force (20 – 50 N) to move a child arm or wrist to rehabilitate. To achieve such challenge, the SMA behaviour and the crystal structure transformation have been studied and explained, as well as the characterization of the cycling stability of different shape memory wires and ribbons. The review of some existing developments made by research teams has been included in the work and has guided the creation of this new microactuators.
The creation of a *solution generato*r has been made for one actuator allowing a quick dimensioning according to the force and stroke required.
Force tests and stroke tests has been made on each actuator to determine the application range and if it reaches the required specifications. Two actuators have reached 20 N and 66 N and improvements have to be made to determine the stroke capacity.

Bachelor's Thesis
| 2019 |

Degree programme
Systems Engineering

Field of application
Major Design & Materials

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Screenshots of a video showing the fluid actuator functioning without the Shape Memory Allow wires. The rod goes outside when pushing the white part

Setup made to deform the 10 wires of the stair actuator with the tensile machine.