

After silicone 3D printing, Sterne focuses on 4D printing

A restructuring bandage, like a second skin? A jacket that would become waterproof on contact with water? 4D printing adds a further function to 3D printing, by a response to an external stimulus. A process that enables a change of form - the 4th dimension - explained by the dynamic properties of the material.

Leveraging 3D printing

Looking into the future, Sterne, a specialist in silicone manufacturing, has always been committed to innovation. In particular, the company has been a pioneer in additive manufacturing, developing in-house its own silicone 3D printing technologies (SiO-Shaping®), which it presents in a dedicated whitepaper (<https://www.sterne-silicone-rubber.com/3d-silicone-printing.htm>).

With each step leading to the next, Sterne is now focusing on 4D printing, convinced of the technology's potential.

4D printing

General principles

4D printing, is a static 3D printed object that can transform in response to an external stimulus. The object comes to life and become dynamic! This transformation, such as color, self-assembly, change of shape, size, texture, or any other functional property, is a response to external stimuli, e.g. light, humidity, temperature, magnetism, electricity or pH. In other words, the material is "programmed" to react.

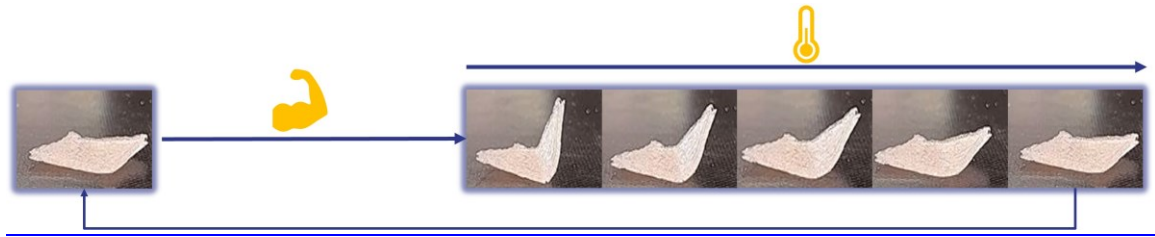
Silicone application

Can 4D printing be applied to silicone? Initial developments, carried out after a phase of adapting in-house developed 3D printers, enabled tests making it possible to print 3 different materials on a single layer.

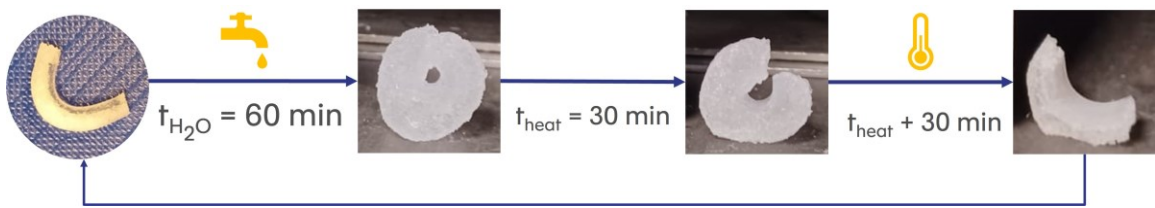
Sterne then succeeded in printing a dynamic object that changes shape when stimulated by a magnetic field.



Another changing form by reacting to heat :



In another test, a part that reacts to water by absorbing it has been printed.



Now, Sterne is working on shape memory capacity in response to an electrical stimulus, but also to other stimuli (pH, temperature, light, ...).

4D printing opens up multiple application opportunities. Sterne is keen to listen to development needs and potential partnerships, with the aim of contributing to the evolution of this technology with its silicone expertise and hoping to bring more people's projects to life. A process for the future, pushing back the boundaries of object design.