

KEYWORDS: Three-dimensional shape, flexible, modular, easy to wind, inflatable fabric structures, deformable material, multiple shapes

BACKGROUND

Numerous applications require structures with a compact, space-saving and contracted configuration at rest. Many patents describe inflatable fabric structures, but the empty shape of these structures at rest is of the same as the final three-dimensional object. To date, there is not easily activatable and deformable material that can quickly take multiple shapes in the industry. As a result, manufactured objects often lack the adaptability needed to perform multiple functions.

DESCRIPTION

The invention consists of a material composed of several superimposed, flexible and quasi-inextensible waterproof layers. Two consecutive layers are assembled by gluing or waterproof stitching along lines that define a network of channels. Inflation of these channels, by pressurization of an internal fluid or by chemical swelling of an internal matrix, leads to an effective contraction of the non-isotropic structure. The structure thus deforms into a non-developable three-dimensional shape which is programmed by the geometry of the channels. This transformation also induces a very significant stiffening of the swollen structure, thus making it possible to produce a three-dimensional structure from pieces of fabric that are initially flat and easy to roll or fold for easy transport or storage.

COMPETITIVE ADVANTAGES

- Complex reversible three-dimensional shape from initially flat pieces of fabric
- Storage and transport of the structure before inflation
- Structural rigidity of the structure after inflation
- Thermal and acoustic insulation of these structures
- Adaptable to prototyping methods
- Easy manufacturing process in a flat 2D state



PRINCIPAL MARKETS

- Sport/Rehabilitation
- Woodworking
- Architecture
- Biomedical device
- Aircraft furniture industry



FIELDS OF APPLICATION

- Adjustable support and movement assistance
- Biocompatible elastomer
- Manufacture of art furniture
- adaptable structures for industry



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