

MBrace: a lighter and more comfortable brace

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What if a medical brace could be lighter, more attractive and more comfortable, so that patients would be more willing to wear it?

Braces are essential in the treatment of scoliosis, but their discomfort often leads many young patients to stop wearing them. The MBrace project set out to change that. Thanks to collaboration between doctors, designers, Sirris and other specialised partners, a new brace has been developed: lighter, more aesthetic and adaptable. This innovative device follows the development of the spine while improving patient adherence to treatment.

Rethinking the brace from the patient’s perspective

For children and adolescents with scoliosis, wearing a brace every day remains a major challenge. Existing models are often heavy and rigid, causing pain and discomfort. Their unattractive appearance reinforces reluctance to use them. Yet, the effectiveness of the treatment depends on one crucial factor: the brace must be worn consistently.

With MBrace, patient needs were included from the start. Medical partners emphasised what patients expect: a brace that corrects while still allowing them to move, get dressed and live their daily lives without discomfort. Designers translated these expectations into more fluid shapes and a less “medical” appearance, combining aesthetics with ergonomics.

Materials as a lever for innovation

At the core of the project, Sirris played a key role in turning design concepts into concrete technical solutions. The team focused on developing and optimising both materials and manufacturing processes.

In the first phase, Sirris worked on **validating protocols for the thermal consolidation of thermoplastic (TP) sheets**, adjusting thicknesses to ensure proper fibre impregnation and optimal structural strength. This helped define reliable parameters (temperature, pressure, duration). In parallel, tests with thermosetting elastomers (TSE) were conducted but proved unsuitable, leading to their abandonment.

Initially, a combined approach (consolidation and forming at the same time) was considered, but was soon replaced by a **sequential two-step process**:

1. Flat thermal consolidation of preforms (via compression moulding and vacuum bagging)
2. Secondary forming on 3D-printed moulds

This methodology improved reproducibility and material quality, while maintaining flexibility in controlling process parameters.

Later, Sirris integrated **Tailored Fibre Placement (TFP)** preforms supplied by IPF, making it possible to work with geometries closer to the final brace, including complex variations in thickness and curvature.

The MBrace

Fibre Reinforced Rib Structure
Filava® and Thermoplast

Pressure distribution zones
3D-printed Cover (ABS)

Testing and lessons learned

Like any research project, MBrace advanced through testing, errors and adjustments. Several forming methods were trialled on 3D-printed anatomical busts:

- Hot-air gun forming
- Preheating followed by rapid manual forming
- Preheating followed by vacuum-assisted forming

The last method proved the most promising, offering both precise positioning of TFP preforms and better adaptation to anatomical curves.

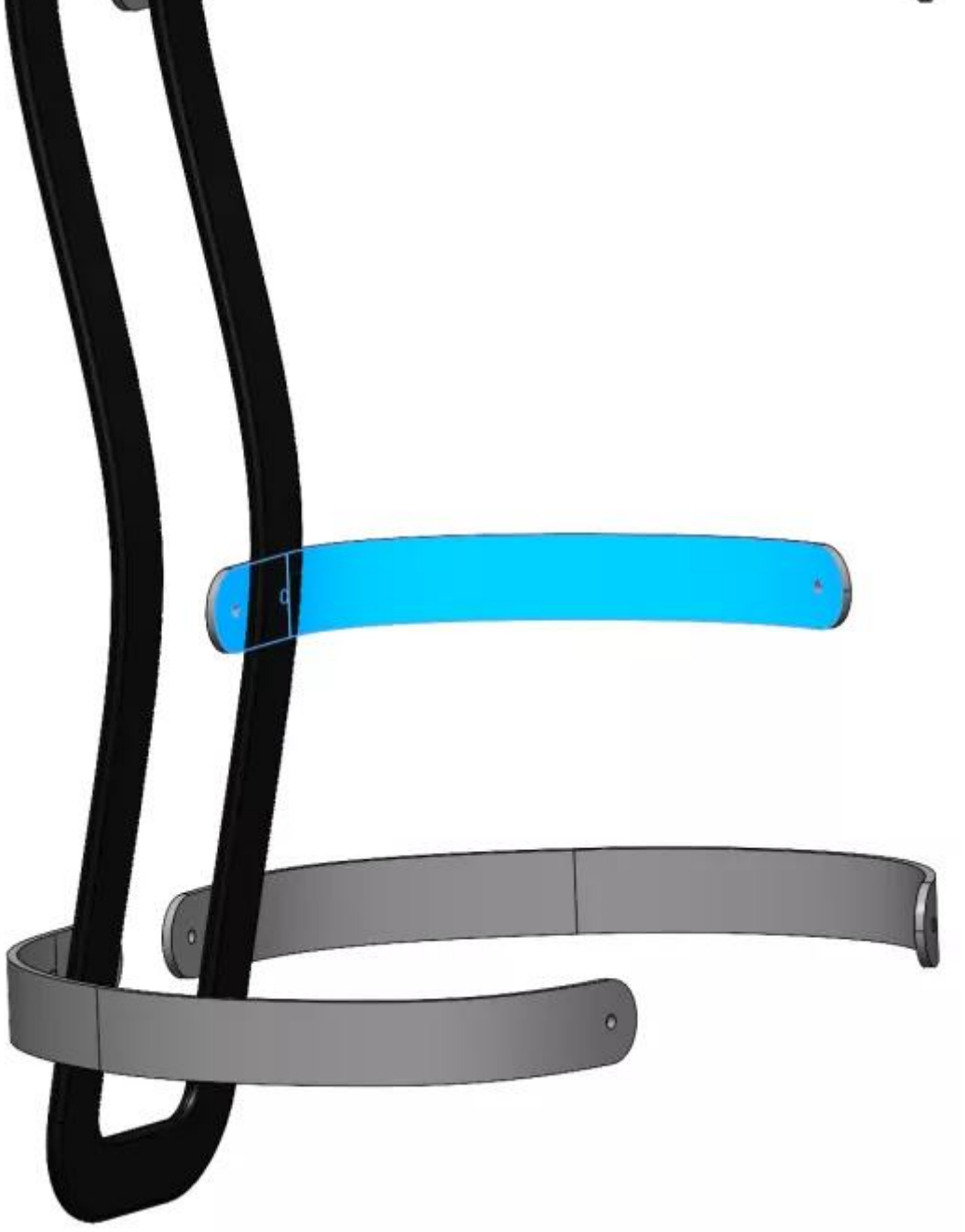
To further improve comfort, Sirris asked IPF to replace the embroidery backing material: glass fibre was swapped for **PLA**, which was more compatible with the reinforcement matrix. This adjustment improved the touch and patient tolerance of the structure.

The strategic choice of the EXO-SPIN design

In the project's third year, the consortium adopted the **EXO-SPIN** design, based on a rigid dorsal structure combined with adaptive lateral modules. Sirris then focused on producing customised composite dorsal structures.

FILAVA™/PLA preforms were implemented, with a forming insert systematically integrated during vacuum-bag consolidation. This significantly improved geometric stability before forming. Demonstrators were produced and tested on busts adapted to the EXO-SPIN design, following a precise protocol (preheating, controlled positioning, vacuum forming).

The result: **robust third-generation demonstrators that are lightweight, well adapted to dorsal shapes, and free from delamination or visible defects**. Positioning tests on mannequins confirmed their comfort: continuous inner surfaces, controlled flexibility and effective postural support.

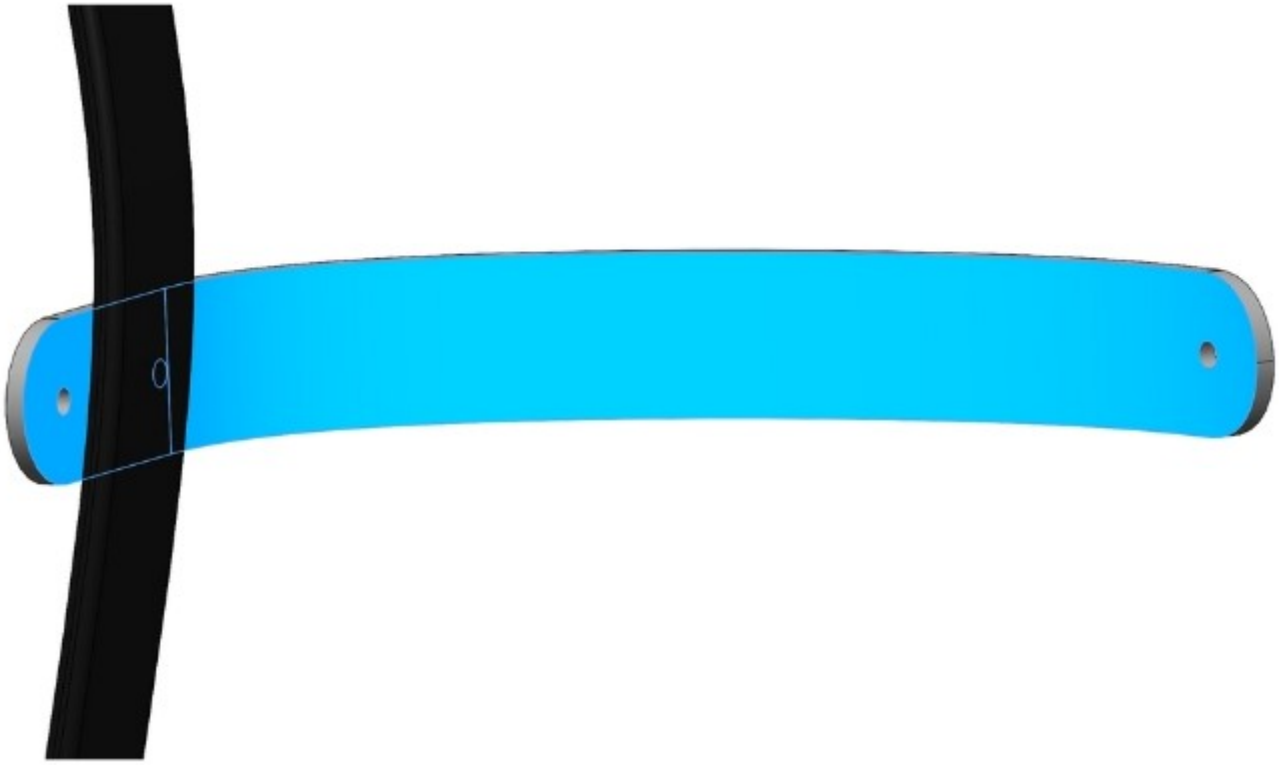


From research to industry

The MBrace project has achieved its goal: proving technical feasibility and validating a stable, reproducible manufacturing protocol.

- For doctors, MBrace means better therapeutic adherence
- For patients, a less restrictive, more comfortable brace
- For industry, proof that a medical design can be translated into a reliable, industrially viable process

The third-generation results confirm the **industrial potential** of this solution and pave the way for its application to other customised composite medical devices.



Towards more humane and effective care

More than just a brace, MBrace demonstrates how medicine, design and technology can come together to transform a conventional device into an intelligent, patient-centred solution. Thanks to the advanced materials and processes developed by Sirris and its partners, comfort and performance now go hand in hand.

Official MBrace project video

This video is part of the MBrace project. The content of this video is used with reference to the MBrace project, an M-ERA.NET success story.

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The project was carried out in collaboration with all project partners and with the support of:

- SAB Aufbaubank (Germany)
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Want to learn more?

Would you like to learn more about MBrace or discuss a similar project?
Contact Didier Garray didier.garray@sirris.be to find out how Sirris can support your product innovations.

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