

# TORRESWING

*A glimpse on the future*

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# 01 The idea

A tedious job. That is the main conclusion after more than 30 years of giving support to our customers in the development of automated assembly systems. Assembly means large amounts of labor, it means unexpected issues coming from a large number of very complex parts from different suppliers that consume time and effort to be fixed, it means tedium.

After all those years working -and suffering-together with our customers, at MTorres we decided it was time to do something about it. Composites processing at our core, we knew there should be a way to simplify complex assemblies. Especially in the aeronautic sector, where really large skins, frames and stringers need to come out in a single part, a solution that can simplify the tasks to be done and reduce dramatically labor required can be what the industry has been looking for.

So we started brainstorming: how could we reduce the amount of assembly tasks? By integrating more components in one single part, forget about the skin/frame/stringers division. Composites are the enabler for such a proposal, smartly dealing with co-curing and co-bonding processes. However, it always came to an end at the same point: if we require a mold to prepare the final structure (a wing, a fuselage,...), how do we take it out once the

structure is finished?

And a simple question too was the inception of the proposal: why do we need to take the mold out of the structure? That's how the first concept of the Torreswing project came into light, from the hand of Mr. Manuel Torres, founder of MTorres. A proposal for a mold made in composites that after the complete production process remains inside the final product, as a structural component. A process that will achieve a fully-integrated component without the need for riveting stations. An idea that could reduce manufacturing costs up to a 40%.

The solution was aimed, initially, at wings, and so it was named after them (Torreswing) although it soon showed equivalent potential for other structures such as fuselages. As soon as we identified the potential, we started to run. A real scale demonstrator of the process was the best way to validate and share with the industry our proposal and our findings.

And so it started. In a critical timeframe of less than six months, the Composite Materials team was able to go from a preliminary sketch of the concept to the production of a first real-scale demonstrator in the shape of a reference fuselage.

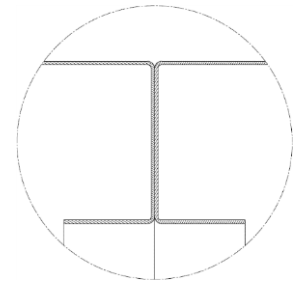
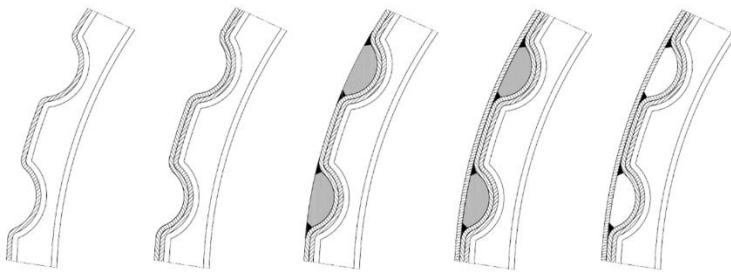
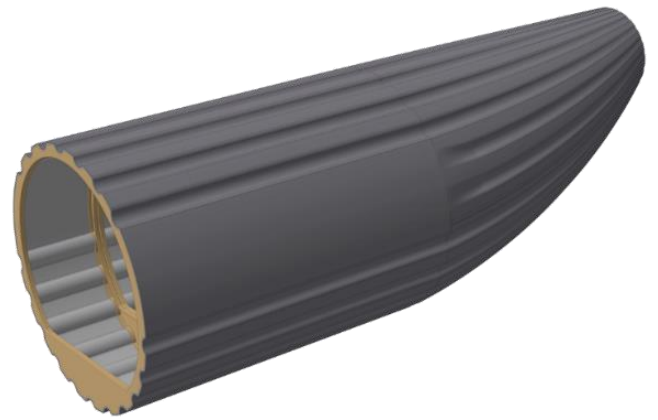
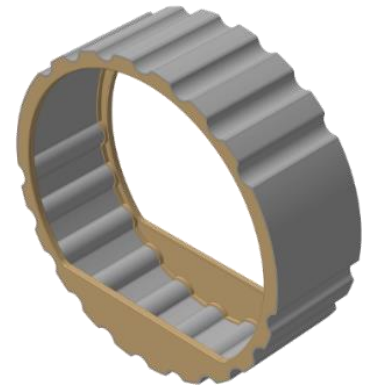


## The concept 02

The Torreswing concept is easy to explain, but not so easy to implement. Composites' ability to integrate multiple parts in one single final component is well-known. A large number of R&D projects have aimed to integrate structural components in skins and have validated the idea. However, dealing with a fully-integrated, large-scale, closed structure requires more than that.

MTorres proposal starts with the idea mentioned before: let's make a composite mold that can stand the process and that will later remain inside it as a structural component. It all starts with the manufacturing of ring-shaped base components with specific geometries. These rings can be placed together in order to create the geometry of the final component, obtaining some kind of "canals" all over the geometry.

These canals allow for the generation of stringers, after a specific layering sequence and core introductions as showed in the following figure. For the generations of frames, the ring geometries generate them automatically once they are placed together.



With these solutions, the final structure can integrate frames and omega-shaped stringers without the need of a single rivet.

## 03 The prototype

The manufacturing process prototype was focused on the demonstration of the integrability of components in a large-scale part. It required the development of the manufacturing process for the initial rings, the

initial assembly of those rings to generate the mold, the fiber placement over the mold and the final infusion and co-curing of the components generated.

Check out the complete project development video at:  
[Torreswing Manufacturing process video](#)





Developing the complete process, including the required tooling and the design of all manufacturing stages, in a record time of less than six months, the MTorres team was able to

develop the first fully integrated monocoque structure.

## The results 04

Results speak for themselves, and Torreswing has become a clear exposition of MTorres creativity, technical capabilities and project development. The project was awarded the JEC 2019 Innovation Award in the Aerospace Process category, and it was the base for the developments of integration through composites with dry fiber and infusion processes such as the IIAMS project under the EU Cleansky program.



Want to go into full technical-detail? Check out the SAMPE article covering the development:  
[Torreswing SAMPE article](#)

More information at:

