

FibreFORM

State of the art 3D composite ply pick and place end effector

FibreFORM is a highly conformable system capable of picking composite plies from a flat surface and forming it onto a double curvature surface.

Suitable for prepreg and dry fibre materials, FibreFORM is perfect for manufacturing a wide range of component types including: aerospace parts such as fuselage sections, wing skins, control surfaces, engine nacelles; blades for wind, tidal and engine applications; automotive panels; rail rolling stock; and radomes.



PRECISE AND REPEATABLE

Positional repeatability of $\pm 0.5\text{mm}$ (subject to material type and geometry).



HIGH DEPOSITION RATE

10x the deposition rate when compared to traditional handling methods – up to 200kg/hour.



FLEXIBLE DEPLOYMENT

FibreFORM can be deployed using a gantry system or a robot arm.

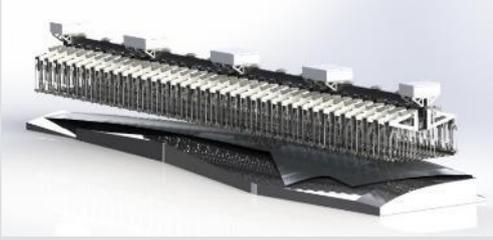
How does it work?

FibreFORM uses individually controlled suction cups configured in an array of splines to carefully pick up plies. The suction cups provide grip capability for a variety of surface types, both porous and non-porous. The specially designed hand and wrist mechanisms manipulate the splines, in such a way as to match the 3D surface of a tool, prior to the placement of the ply.



Modular and scalable design

Multiple modules can be arranged in parallel, enabling the construction of impressive large scale systems. Suitable for wing skins, wind turbine blades and more.



Technical Specification

Pickable Area Width (X)	1,500 – 2,000mm
Pickable Area Length (Y)	400 – 20,000mm+
Surface Complexity	Fifth order polynomial in X and Y directions
Minimum Segment Radius	200mm
X Gripper Density: (minimum 3)	Mod (Pickable Length / 160) + 1
Y Gripper Density: (maximum 10)	Mod (Pickable width / 160) + 1
Number of Grippers	X Gripper density x Y Gripper density
Gripper Technology	40mm vacuum <i>others available by request</i>
Positional Repeatability	< +/- 1 mm
Total Mass (per 3x10 module)	200kg including support frame
Operational Plane	Horizontal (<i>normal operation</i>) Vertical, Inverted (<i>application specific</i>)

Complex forms made simple

It is perfectly able to achieve concave, convex and omega profiles, as well as flat ply sheets.



Convex to concave along length.



3rd order curve changing orientation along length.



Simple curve with flat angle of 10° from horizontal face.



Complex double curvature form.

Vision Systems and Kitting

A 2D vision system can be integrated with FibreFORM for two purposes. Firstly, to support an automated kitting process where it can be used to identify the ply location. A ply vision library can be used to find the shapes and report its location.

And secondly, as a quality control method, before and after depositing the ply onto the mould surface.



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