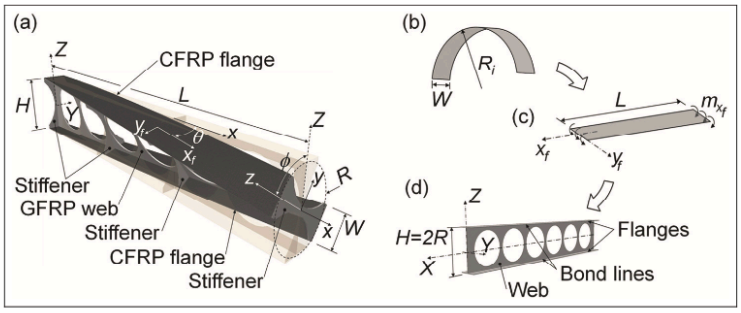

Figure 1. (a) Illustration of the bi-stable I-beam in the straight (light grey) and twisted configuration (dark grey). Details of the beam manufacture: (b) cylindrical flanges were manufactured, (c) flattened and (d) bonded to the web in a straight configuration. CFRP: carbon fibre reinforced plastic; GFRP: glass fibre reinforced plastic.

From: Lachenal X, Daynes S and Weaver P M 2014 A non-linear stiffness composite twisting I-beam J. Intell. Mater. Syst. Struct. 25 744–754

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Research at University of Bristol:

The research undertaken focuses on adaptive structures, with a strong interest for aerospace applications, example of which are morphing surfaces for load control (morphing flaps, twisting wing tip) and deployable structures (deployable boom for spacecraft, nature inspired lattice structure). Particularly, zero stiffness structures are of interest for their minimum actuation cost while removing the need for joints and mechanisms.

Selected Publications:

Lachenal, X., Weaver, P.M., and Daynes, S., 2012, "Multistable composite twisting structure for morphing applications," Proceedings of the Royal Society A: Mathematical, Physical and Engineering Science, 468 (2141), 1230 - 1251.
Lachenal X, Daynes S and Weaver P M 2013 Review of morphing concepts and materials for wind turbine blade applications, Wind Energy 16 283–307
Lachenal, X, Daynes, S, Weaver, PM. A zero torsional stiffness twist morphing blade as a wind turbine load alleviation device. Smart Mater Struct 2013; 22: 065016: 1–13.
Pirrera A, Lachenal X, Daynes S, Weaver P M and Chenchiah I V 2013 Multi-stable cylindrical lattices J. Mech. Phys. Solids 61 2087–2107
Lachenal X, Daynes S and Weaver P M 2014 A non-linear stiffness composite twisting I-beam J. Intell. Mater. Syst. Struct. 25 744–754
Lachenal, X., Weaver, P.M., and Daynes, S., 2014, "Influence of transverse curvature on the stability of pre-stressed helical structures," International Journal of Solids and Structures, 51 (13), 2479–2490.
Xavier Lachenal, Paul M. Weaver and Alberto Pirrera, "Concept for a deployable wing", Proceedings of the ASME 2014 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS2014), Paper No. 7428, Newport, Rhode Island, USA, September 8-10, 2014
S. Daynes, X. Lachenal, P.M. Weaver, "Concept for morphing airfoil with zero torsional stiffness", Thin-Walled Struct., 94 (2015), pp. 129-134