

### DEVICES AND METHODS FOR MANUFACTURING CORRUGATED COMPOSITE PANELS

#### IITM Technology Available for Licensing

##### Problem Statement

- Composite materials are difficult to manufacture and require special techniques for manufacturing.
- Currently researchers made several geometries from composite materials, but **corrugated composite has yet not been made** due to difficulty in manufacturing.
- Conventional method of assembling a corrugated truss structure by building up individual shapes formed over mandrels or shaped press are either laborious or require expensive dies to form the corrugations.
- There is a need for a better way to manufacture **corrugated fabric composites** that overcome above challenges.

##### Intellectual Property

- IITM IDF Ref.2477
- IN 202341050413 Patent Application

##### TRL (Technology Readiness Level)

TRL 4 Technology Validated in Lab

##### Technology Category/ Market

Category- Advance Materials and Manufacturing  
Industry Classification:

- NIC (2008)-30305** Manufacture of parts and accessories of the aircraft and spacecraft of this class (major assemblies such as fuselages, wings, doors etc); **16212-** Manufacture of particle board and fibreboard including densified wood;
- NAICS (2022)- 33641-** Aerospace Product and Parts Manufacturing; **322211-** Corrugated and Solid Fiber Box Manufacturing;
- Applications-** Panels and structures used in automobiles or aero structures and furnite

Market drivers:

The Aerospace Composites Market is projected to grow from USD 27.79 billion in 2024 to USD 43.47 billion by 2029 with a CAGR of 9.36%

##### Research Lab

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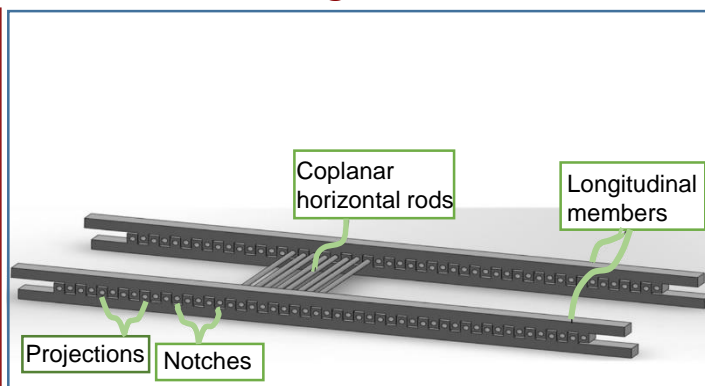


Figure: perspective view of a device having two ladder-like structures for manufacturing composite panels.

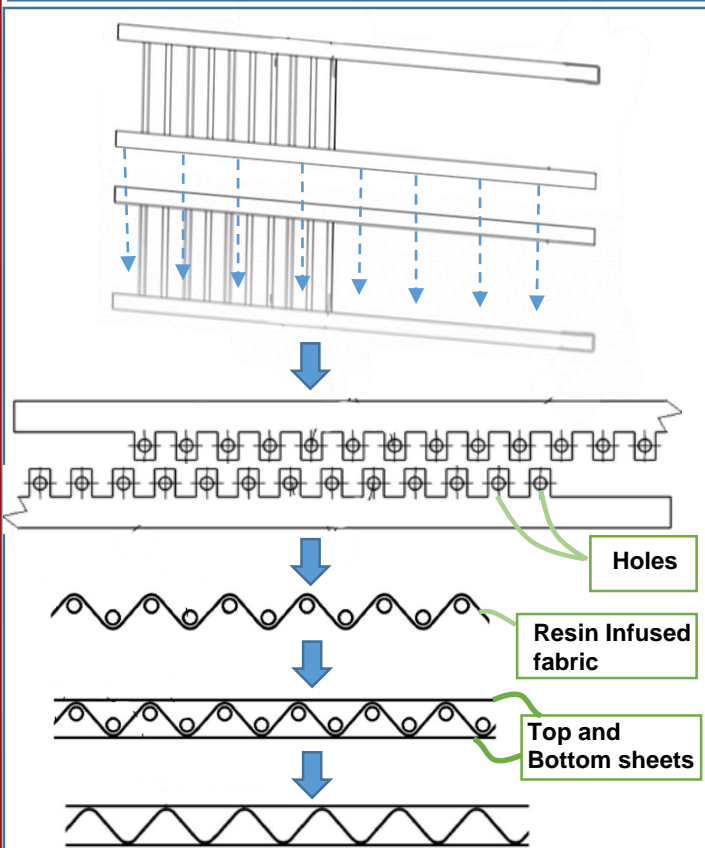


Figure: Process flow of the method of manufacturing of corrugated structures.

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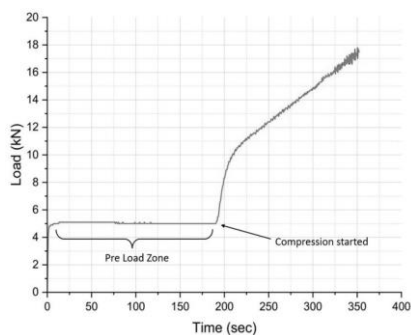
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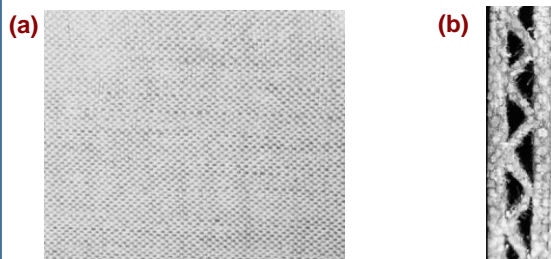
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**Figure:** Compression test results of composite panel



**Figure:** Photograph of (a) surface appearance and (b) cross-section of corrugated composite panel formed using the device and method

### Technology

Provide a mould with two ladder-like frames

Place a sheet of fabric infiltrated by a liquid resin between the top and bottom frames

Form a corrugated structure of the fabric by interleaving the top and bottom frames.

Place the top and bottom sheets of the fabric infiltrated with the resin on either sides of the corrugated structure to form a composite panel.

Place the mould with the composite fabric structure in a vacuum bag and apply vacuum for uniform distribution of the liquid resin and pressure to bond for 24 hours.

Remove the mould with composite structure from the vacuum bag.

Separate the frames with rods from the opposite panel structure

Cure the structure to obtain the corrugated composite panel with a top sheet, a bottom sheet and a corrugated portion there between

### Key Features / Value Proposition

- Corrugation in a composite material is successfully achieved by this invention. Whereas, conventional corrugation methods are incapable of fabricating corrugated sheets using composite materials.
- The process uses a simple ladder-like apparatus that can be easily manufactured, assembled and disassembled. Whereas, conventional corrugation processes are laborious and require expensive dies for fabrication of corrugated materials.
- The corrugated structure obtained has high structural rigidity and light weight making it suitable for high performance applications such as aero structures and transport.
- Conventional manufacturing methods require sophisticated equipment such as mandrels to build individual shapes or shaped press for forming corrugations. Whereas, the invented process uses an apparatus having a simple profile and shape that is easy and affordable to manufacture.

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