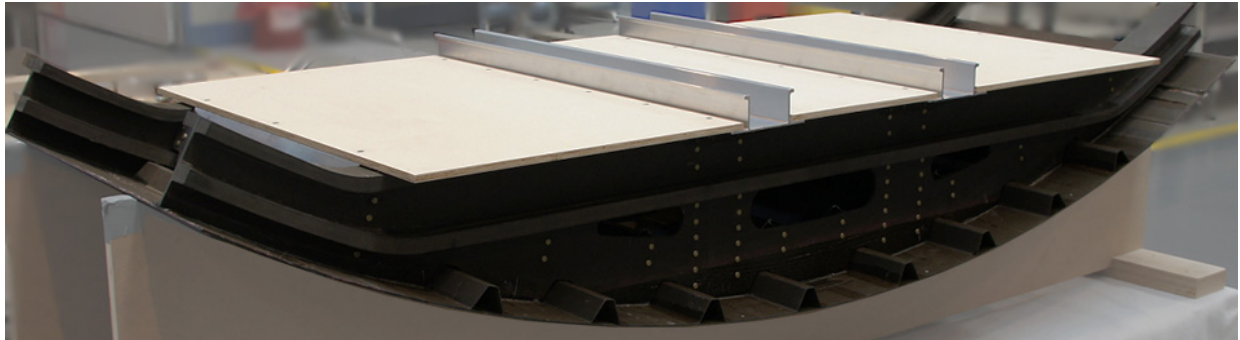




## Integrated Cargo Unit



To use the potential of CFRP structures, components with a high degree of integration are a reasonable approach. The so-called Integrated Cargo Unit (ICU) integrates the function of frames and cargo-crossbeams in the lower fuselage area. The CTC develops the manufacturing and tooling concept of the complex structure.

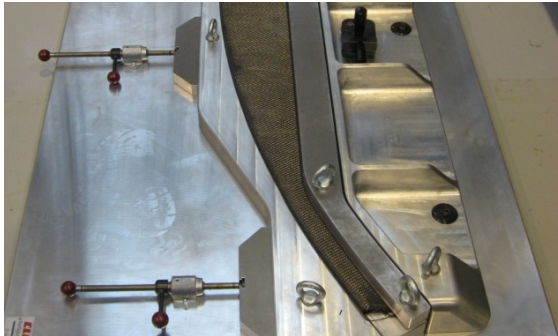
The complex frame structure is manufactured using MVI-technique (Modified Vacuum Infusion): textile preforms in „big C“, „small C“ and „L“ shape are assembled to a complex preform, which is fixed with binder material.

The sub-preforms can be produced industrially – only few plies require a manual lay-up. The preform then is placed into the infusion & curing tool. An integrated flow aid secures the impregnation with resin.

The choice of textile materials to realize the structure is due to the high complexity of the part. Only the good drapability of NCF materials (non crimp fabric) ensures the manufacturability of the structure.

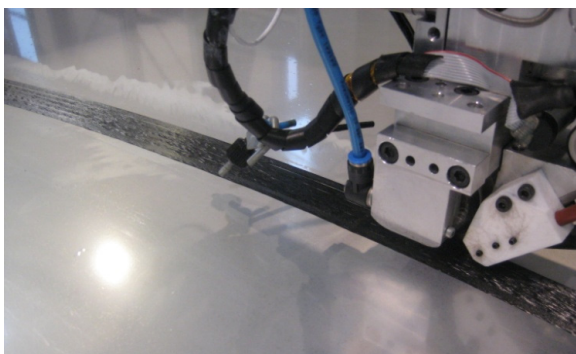


Figure 1 shows a complex ply draping of the structure.



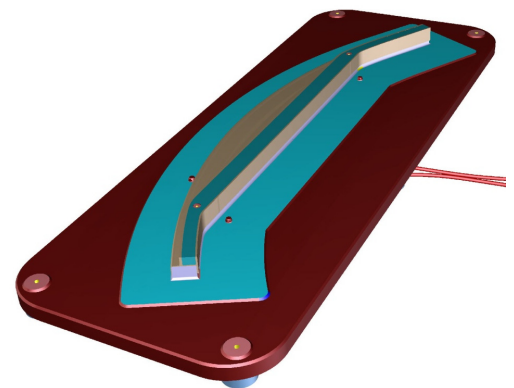
**Figure 1: Draped ply**

Reinforcements following the curvature of the part provide structure-mechanic benefits. Polar Plies follow the direction of stress along the curvature. As NCF materials can only be draped into a radius with limitations, dry fibre placement technology is used. In dry fibre placement, single rovings can be placed on a pre-defined path.



**Figure 2: Dry fibre placement**

To avoid tolerance issues during infusion and curing, preform and curing tools feature a specific geometry. Effects resulting from deviations in coefficient of thermal expansion between part and tool can be avoided.



**Figure 3: Curing Tool**

In summary, it can be stated that the ambitious structure can be realized in a good quality managing the technical challenges. With the work performed to realize this concept, a good baseline for producing complex, textile parts has been created.

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