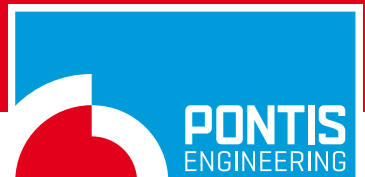


Pontis Preforming Technology

*A new standard for manufacturing
composite structures*

- » FULL TURN-KEY MANUFACTURING SOLUTION
- » REDUCE IN-MOULD CYCLE TIMES UP TO 50%
- » REDUCE COST AND OUTPUT SIGNIFICANTLY
- » APPLICABLE TO ANY LARGE COMPOSITE STRUCTURE

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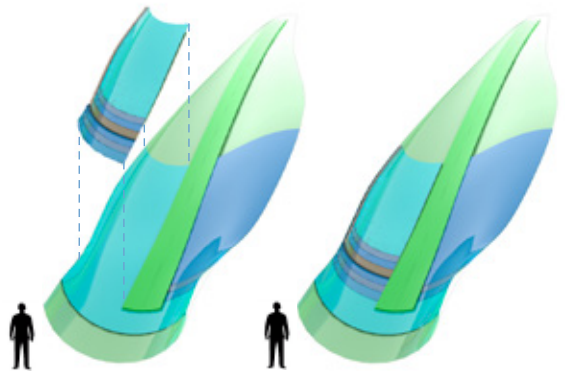
In manufacturing large composite structures still much is to be gained in optimizing capacity of large, expensive main moulds that are bottlenecks in the production process. Often manual lay up operations are used to lay plies and core into the mould, which is time and labour-intensive.

Pontis Engineering has designed a turn-key manufacturing solution which ensures maximum output of these bottleneck moulds. This solution turns conventional operations of manual layup of large composite materials into an assembly process with increased quality and quality control. The solution infuses Lean Manufacturing principles into the large composite industry.



PREFORMING

Pontis invented a unique moulding and tooling solution based on a process called “preforming”. The concept is as simple as it is effective: capacity of large main moulds is increased by moving the majority of the production process to smaller, low cost submoulds. Stacked layers of composites are applied on separate tools. These so called “preforms” come in handy modules which can easily be loaded into the main mould. Then the individual modules are smoothly joined, resulting in a composite structure of the highest quality and durability.



REDUCING IN-MOULD CYCLE TIMES

With Pontis’ preforming solution manufacturers of composite structures are enabled to reduce in-mould cycle times, reduce costs and increase output significantly. Test results on rotor blades showed a 50% reduction of in-mould cycle time against 10% of the cost of other automated solutions. The preform increases product quality immensely over existing processes.

FULL TURN-KEY SOLUTION

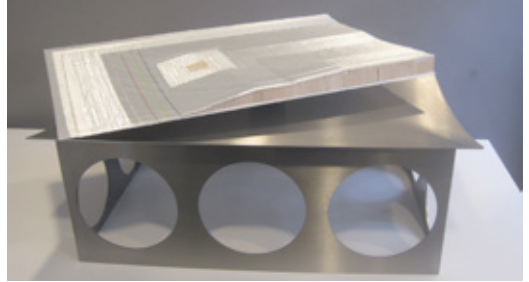
Pontis offers a full turn-key solution, including all necessary advice, training and hardware. Therefore, in addition to the increased bottleneck capacity the entire production process will be optimized according to Lean principles.

THE LARGER THE STRUCTURE, THE GREATER THE ADVANTAGES

The technique is not limited to wind energy solutions and is readily applicable to any large composite structure used in for example the aviation industry, marine applications and civil engineering.

TRANSFORMING MANUFACTURING

Pontis' preforming solution provides the game changing improvement that will transform the composite industry of large composite structures, including wind turbine blades, to assembly line fashion. To date, no manufacturer has achieved a low cost assembly solution like Pontis developed.



PREFORMING FACTS

MATERIALS:

The preforming technology is developed for Infusion. The following materials have been tested:

- » Dry glass fabrics [E- glass, High-modulus glass™]
- » Most used fibre directions [UD, BIAx, TRIAX] can be used
- » Any core materials [Balsa, PVC foam, SAN, PS, PET]
- » Dry carbon fibre materials are possible [under development]
- » Prepregs are under development.

Cutting waste is similar to traditional infusion processes. Optimized cutting by glass cutters is recommended. Pontis assists in choosing the optimized process here.

RESINS:

- » Tested with the main infusion epoxy resins.
- » Other resins under development

GEOMETRY:

Pontis Preforming technology is suitable for any layup in large composite structures. There is no limitation in fibre direction in the fabrics. Limitations are mainly encountered by the handling of the packages. Preforms of 20m² have been made. The size of the preform is defined by the layup of the rotor blade.

THICKNESSES:

Layup thickness of over 2" [50 mm] have been achieved and we see hardly limitations to this.

AUTOMATION:

Pontis Preforming technology is developed as an intermediate solution to reduce in-mould cycle times. The preforms are handled with dedicated tooling to layup in the production moulds. It provides an excellent platform for further automation. Pontis is currently in the process of selecting an automation partner to develop the system even further.



ALWAYS NEARBY

As we strive to be close to our partners, Pontis has expanded its global presence by establishing local operations in Europe, China and the US. In these subsidiaries, we work with specialists who have thorough knowledge and understanding of the local market and culture.

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