The main advantages of resin transfer moulding are:
- Highly integrated and complex design which results in a lower number of pieces and reduced assembly cost;
- Multi-material solutions may be produced by incorporation of metallic parts (inserts);
- Low-investment production facilities;
- Uncomplicated material handling (reinforcing fibres & resin systems).

As the air transport industry is under increasing pressure to cut costs, the costly material logistics for prepregs and the high investment cost of autoclaves favour substituting the simpler RTM technology – with almost equal product quality.

RTM processes are closed processes, i.e. during injection, the mould cavity is open only to the vacuum vent and the inlet where liquid resin mix is flowing in. For this reason, it is difficult to follow the mould filling process or to control it in any way. At best, sensors can deliver a signal at the instant the filling front reaches them. Suitable process control is decisive in ensuring process repeatability and the quality of the finished component. If either the injection points or...
The areas of different permeability in the fibre reinforcement can be modified during the simulation. Additional gates may be added at any point in time to implement concepts such as cascade injection. The injection pressure can be altered and the effect of race tracking observed, considering different injection strategies. Such features make it possible to obtain the highest possible reliability for a RTM process.

Fig. 3 shows a case study for a whitewater paddle, where the influence of race tracking is visualised.

The input parameters from simulation are then transferred to the manufacturing process. In the case of the whitewater paddle, a two-point cascade injection strategy using gates at the top of the shaft and at the root of the blade is implemented. Thanks to the preliminary process design with myRTM, the paddle is produced without any dry spots in a very efficient and reliable injection process (Figure 4).

Further details, including a user tutorial and download of the myRTM software, are available on the website www.myrtm.ch