

3 Days Composites & RTM training for Engineers & Technicians

Coexpair proposes a 3 days general introduction to RTM for aerospace. Its content covers the process, the design, the materials and the equipments. The fabrication of one part during the course gives the opportunity to illustrate the theory & provide hands-on learning. Language is either English or French. Notes are provided in English. The program is detailed here under. According to participants experience and interest the program is adapted.

Place:

The training take place at Coexpair s.a. 38 Route de Saussin, lot 11A, 5190 Spy
Find directions on www.coexpair.com

Course Content

	Day 1	Day 2	Day 3	
9h00	Welcome & introduction of Coexpair	Fiber reinforcement - 05	Design & Drawings rule for Composites - 12	
9h30	Introduction to resin transfer moulding Comparison with other production techniques Current & future application in aeronautics - 01			Injection equipments: theory & security - 06
10h00				
10h30		Advanced preforms - 08		
11h00				
11h30	Typical process schedule - 02	Injection equipments: plumbing, mould closing & degazing start - 07	Design - taking advantage of RTM - 13	
12h00			Resin degazing & mould closing - 14	
12h30	Lunch	Lunch	Lunch	
13h00				
13h30	NC ply cutting & heated debulk & mould preparation-03	Injection of the 1st part - 09	Injection of a 2nd part - 14	
14h00				
14h30		Typical shop layout & equipments (from stock to part production)	Lay-up & mechanical properties - 15	
15h00	Part finishing & Inspection - 16			
15h30			Resin systems for RTM - 04	
16h00	First part demoulding - 11			
16h30		Demoulding - 17		
17h00	Questions & Discussion	Questions & Discussion	Questions & Discussion	
17h30	End	End	End	

Subject by subject

01- General introduction to the composite processes used in the aerospace industry with a comparison to RTM. Presentation of some applications.

02 – Presentation of the different steps of the RTM process with illustration.

03 – Ply cutting with the NC cutting table and debulk under vacuum. Introduction of the «bulk factor ». Mould preparation with the use of release agent.

04 – The kind of resin used with their respective application (epoxy, BMI, etc...). Links between resin chemistry, mechanical properties and process.

05 – The kind of fiber used (glass, kevlar, carbon). Name, architecture, mechanical performances & application. Link between fiber surface & resin chemistry.

06 – The injection systems. Presentation of different kind of equipment (pressure controlled, flow controlled, pail unloader). Pro & Cons. Risks and safety procedures.

07 – Preparation of the first injection : mould closing, plumbing, checks to be done, start of resin degas.

08 – The kind of preforms used : fabrics, braids, 3D. Usage and performances.

09 – First part injection (spring-in effect illustration)



First part injection

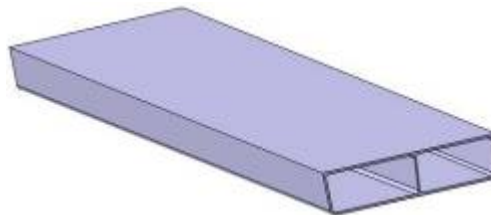
10 – Lay-out of a typical RTM shop, from the stock of raw materials to the parts delivery.

11 – First part demolding.

12 – Introduction to the drawing rules for composites parts. Difference between autoclave & RTM recommendation.

13 – How to take advantage of the RTM process at design level. Some recommendation & open discussion.

14 – Injection of a second part (multi-cell part with insert)



Second part injection

15 – Introduction to the laminate theory with an emphasis on comparison between metallic & composites mechanical performances. Presentation of an Excel spreadsheet to compute laminates evaluate margins of safety.

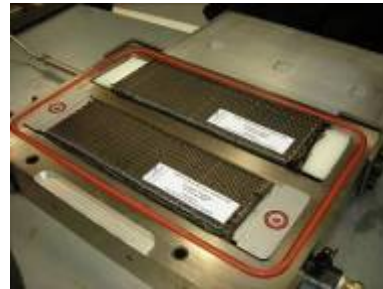
16 – Composite parts finishing: trimming (water jet, NC milling) & inspection technics.

17 – Demolding of the second part & open discussion.

Some Pictures From previous sessions



Some theory



Preforms: 2 concurrent teams



Demolding



Inspection & Discussion

Equipments Used for the Training



Zund NC cutter



Radius 5000cc & 2100cc
Injection systems



Radius Press

Price

Price is 1350€ / participant; this include the text book of the presentations, materials used for the fabrication of a parts, sandwiches and drinks. We need between 6 participants per session.