



*Aerospace North America, Inc.*



# **FAA Workshop on Key Characteristics for Composite Material Control**

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## **Liquid Resin Molding Processing Specification**

- 1 General Comments**
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## **Liquid Resin Molding Processing Specification**

### (1) General Comments

- The specification provides valid guidelines, in a logical sequential manner, for the various areas relating to the fabrication of composite parts via liquid molding techniques.
- Increased emphasis on “Safety” for fabrication process
- Need for a Preform Teardown to be conducted
- Issue of “Standardization” in the process details?



## Liquid Resin Molding Processing Specification

### (2) Introduction Section

- Figure 1.1      Should read “Resin Preparation” (mixing / degas / heating / thawing, etc.)
- Pg. 6, 2<sup>nd</sup> Par.    Add: bullet “In Process Quality Assurance” (SPC, Operator checks of Key Characteristics)
- Pg. 8, 3<sup>rd</sup> Par.    Add: bullet “Preform bulk, spring up / fluff / relaxation of material”
- Pg. 8, 5<sup>th</sup> Par.    Add: 2 bullets –    Pot Life of Resin  
Material Handling and Safety Issues (gloves, ventilation, eye protection, etc.)



## Liquid Resin Molding Processing Specification

### (3) Process Specification Guidelines

- Pg 10, 2.2 / Par. 3 Add: “Company suggestion plans as well as incentive Technician Team objectives and goal setting have also proved very successful.
- Pg 11, 2.3 / Par 6 Add: Out-time needs to be tracked and recorded for each required material.
- Pg 12, 2.3 / Par 1 Add: Solid Binders (tackifier) materials may also react at RT.
- Pg 16, 2.6 / Par 1 Add: requirement for a Heat survey with the preform within the mold to verify tool / part temperature relationship and determine proper set points for the injection and cure is recommended.



## Liquid Resin Molding Processing Specification

### (3) Process Specification Guidelines (cont.)

- Pg. 17, 2.7.1 / Par 3      Add: When multiple debulks are required the preform time / temperature history needs to be tracked.
- Pg. 18, 2.7.2 / Par 1      When the container is opened the operator should visually inspect the resin (color, FOD, etc.)
- Pg. 18, 2.7.2 / Par 3      It is recommend that a ratio check be conducted before and after each injection.



## Liquid Resin Molding Processing Specification

### (3) Process Specification Guidelines (cont.)

- Pg. 19, 2.7.3 / Par 3      Add: The specific infusion parameters should be recorded (Injection Data Sheet) for future traceability and problem investigation purposes.
- Pg. 21, 2.8.3 / Par 2      Panel thickness should be conducted at multiple points across the panel.



## Liquid Resin Molding Processing Specification

### (4) Producibility Qualification Tests

- Pg 23, 3.1                      Add: Preform Teardown requirement where debulk steps, material bulk factor, ply locations and any distortions or scale up issues are checked and corrected.
  
- Pg. 23, 3.1 / Par 4            Add: The Discriminator panel does not necessarily need to be a panel. Angle bend designs or other simple representative shapes may better illustrate scale up effects expected to be seen on the full scale part.





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### (4) Producibility Qualification Tests

- Pg 26, 3.2.2 / Par. 1      Substitute “Thermal Analysis” (DSC, TMA, DMA) for DSC.



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### **(5) Glossary**

- Pg. 27      Add: Binder (Tackifier): A material applied to dry fabric to enhance the compaction and forming of required shapes. The material can be reactive or un-reactive.
- Pg 34      Add: Preform Teardown: Recommended approach to review individual plies and shaped preforms for orientations, distortions, and other issues which may effect the fabricated part.



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### **(5) Glossary (cont.)**

- Pg. 35      Add:      Thermal Cycle Certification (TCC) –  
Preform / mold temperature correlation  
determined to set the injection and cure  
time / temperature equipment set points  
necessary to meet the given part  
requirements.



## **Liquid Resin Molding Processing Specification**

### (6) Appendices

- Appendix 1 Fine as an example Process Specification for RTM
- Appendix 2 Fine as an example Process Specification for VARTM