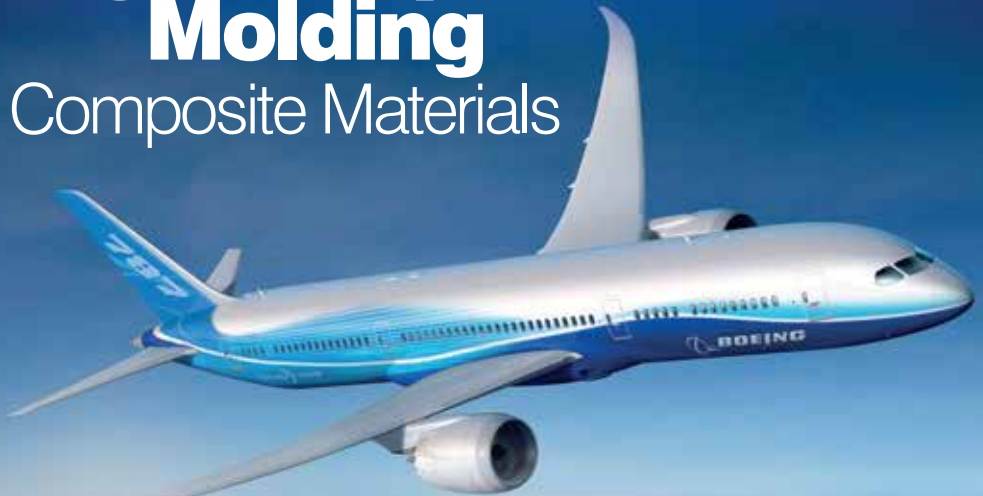


NEW RUBBERCRAFT
'Non-Permeable'

Elastomeric Tooling for

**High Temperature
Molding**

of Composite Materials



Improve surface quality
Avoid surface porosity

The Rubbercraft technical team has developed an innovative new 'tri-layer' flexible tooling technology which improves part quality by reducing leaks, avoiding surface porosity and increases productivity.

This new 'non-permeable' elastomeric tooling system is ideal for bladders or reusable vacuum bags to form complex structural aircraft parts.

How Does it Work?

Rubbercraft's new 'non-permeable' tri-layer elastomeric tooling works by having a fully integrated central breather layer which counters gas permeation onto the surface of a molded FRP composite part during production, even at high pressures and temperatures. The integrated breather layer not only allows the

removal of trapped air between the part and the tool, but also acts as a gas barrier from the outside.

This integrated breather layer counters the inherent permeability of elastomers, such as Viton™ or silicone, on the high pressure side, while removing unwanted air or volatiles on the part side.

Key Advantages

- Higher quality part by eliminating surface porosity due to gas permeation.
- Reduced profile, improved fit and superior surface finish on part inner surface.
- Extra layer of security against leaks due to punctures or manufacturing defects.

- Easier and more accurate leakage check by simply applying a vacuum to the breather layer, with no need to use a specialized test station.
- Can be used as an elastomeric reusable vacuum bag for aerospace part infusion applications where it is not possible to use an internal breather.

Extensive Research & Development

This innovative new elastomeric tooling technology has been developed in-house by Rubbercraft's technical experts: Mathias Hecht, Finley Miller and Robert Harshberger.

Extensive research and development work, which included comparative permeation testing at different temperatures, was carried out to prove the capabilities and benefits of this tri-layer technology to improve elastomeric tooling performance when there is a pressure differential with a gas, such as air or nitrogen on one side and the resin system that is in contact with vacuum, on the other side.

Silicone and Viton™ elastomers were evaluated, both being

flexible tooling materials widely used for re-usable vacuum bags, cauls, and bladders. For a comparative tooling performance evaluation that simulated an aircraft part production, an aircraft approved toughened epoxy prepreg with ply lay-up configurations similar to those in many OEM commercial aircraft programs were used.

Conclusive Permeation Test Results

The permeation test results detailed in the table below, clearly show that Rubbercraft's the new tri-layer elastomeric tooling design, with its central breather layer, provides a highly effective non-permeable barrier at autoclave temperatures and pressures.

Elastomer Permeability at Different Temperatures [Standard differential air pressure of 690 kPa]

| Permeation Rates [ml/cm ² min] | 20°C | 180°C |
|---|----------|-------|
| Silicone 3555, 1.9mm slab | 0.015 | 0.070 |
| Viton™ 3180, 1.9mm slab | 0.0005 * | 0.008 |
| Rubbercraft tri-layer | 0.000 | 0.000 |

*Measurement accuracy was 0.0005 ml/cm² min.

SAMPE Seattle 2017 Conference Paper

Full details of the tests and findings can be found in our research paper presented at the SAMPE Seattle 2017 conference. This technical white paper is available online.

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find out more?**

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