



TRUE TEMP

A Cast-to-Shape Composite Tooling Material Fact Sheet

Description

TRUE TEMP is a high-temperature, low-cost tooling material for structural, resin-matrix composite manufacturing. This new material has performance characteristics that other currently available products can't come close to matching. In particular, it maintains high strength above 200°C (400°F) (high thermal stability) and can be easily machined from thick section billets or cast-to-shape to yield three-dimensional tooling. The composite parts can be fabricated using standard industry practices such as hand lay-up, filament winding, resin transfer molding (RTM), and vacuum assist RTM. And, because TRUE TEMP is compatible with many standard mold releases and gel coat materials, a single TRUE TEMP mold can be used repeatedly.

Principal Applications

The principal application for TRUE TEMP is as an advanced material for tooling used in forming three-dimensional composite structures. The two ways TRUE TEMP can be used to achieve this are machining a billet and casting to shape.

Properties

Coefficient of thermal expansion (CTE), 77-257°C	2.7 x 10⁻⁵ °C⁻¹
with low CTE filler	1.6 x 10 ⁻⁵ °C ⁻¹
Compression strength, 25°C (77°F)	>7000 psi
Compression strength, 200°C (392°F)	>4000 psi
Modulus	300,000 psi
Density range	0.3-0.8 g/cm ³
Size limitations	greater than 24" x 24" x 8"
Cure	204.4°C (400°F)
Maximum use temperature	>204.4°C (400°F)
Approximate material cost	\$80/ft ³

Compelling features

- **High-temperature stability**
- **Processing over 200°C (392°F)**
- **Inexpensive**
- **Lightweight**
- **Thick section size**
- **Machinable**
- **Castable**
- **High strength**
- **Easy processing**
- **Repairable**
- **Range of densities**
- **Uses commercially available ingredients**
- **Accepts gel coat**
- **No epoxide inhibition**



TEPIC tool with gel coat
2 part bolted mold



seam



4 double sided room temp parts

2 carbon prepreg @ 40 psi
and 121°C (250°F) parts



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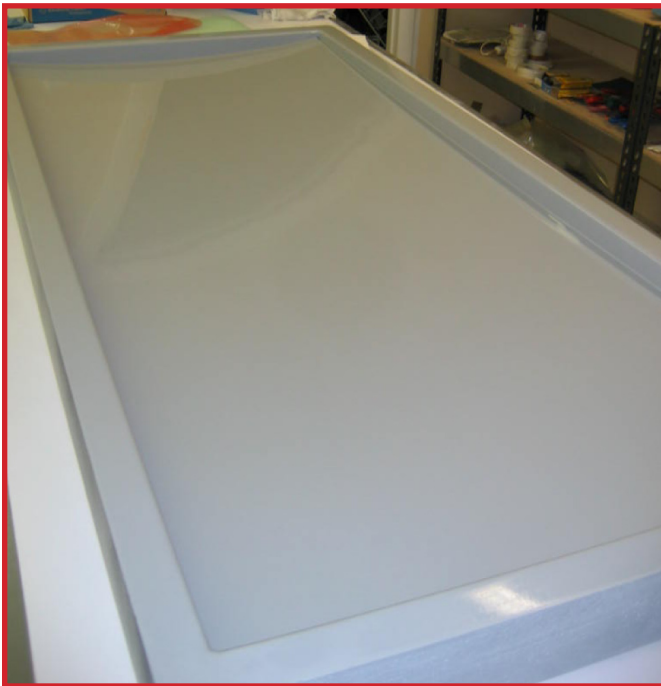
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New, advanced composite materials that cure at high temperatures are becoming more prevalent in industry as their advantages are realized. Because of their high temperature cure, only expensive metal tooling can be used to form these composites. TRUE TEMP's thermal stability and strength at temperature allows industry to process these advanced composites at a significant savings in tooling material costs alone. The exceptional thermal stability of TRUE TEMP is likely to spur the development of new composite materials that require even higher processing temperatures. A common difficulty in manufacturing is encountered when a replacement composite part is needed, but tooling no longer exists, only the old, perhaps broken part remains. The part may even be made of a different material that the user wants to replace with composite. The easiest solution is to use the existing part to form the new tool by pouring a casting liquid around it and letting it set up. This new tool would then have the right shape to form the new composite part. While there are castable tooling materials available, none can be used to process composites over 149°C (300°F). The casting characteristics of TRUE TEMP permit the fabrication of tooling directly from an existing structure. The dimensional and feature fidelity of the resulting mold is sufficient to permit the use of the mold without further machining. Beyond its superior high-temperature performance, TRUE TEMP is cost competitive with existing polymer-based tooling boards that can only operate at lower temperatures. The capability of producing TRUE TEMP in thick sections further enhances its use over the competition.



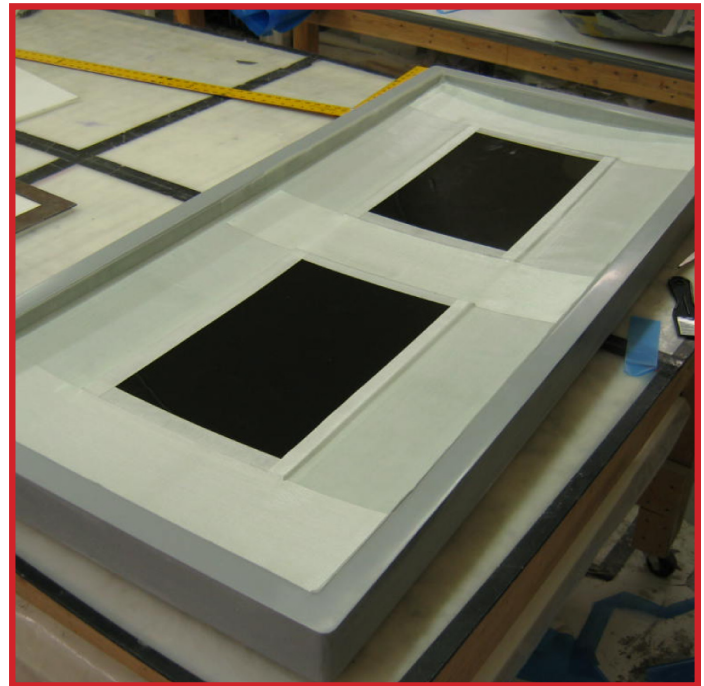
TEPIC billet

Large pours (26" x 12" x 10") have been demonstrated



Large Lid

6' x 3' tool lid High temperature gel coat



Large Lid

*2 prepeg parts at 135°C (275°F) vacbag
also 204.4°C (400°F) for 12 hours with surface coat used to
make four prepeg parts*

**For more information contact
Sandia National Laboratories
Laura E. Santos at (925) 294-1214
lesanto@sandia.gov**