

TOOLMASTER & TOOLFUSION COMPOSITE TOOLING

Tygavac has a comprehensive range of materials for the manufacture of composite tooling materials. These include surface resins, hand laminating resin, Toolfusion infusion resins, mould sealer resins, Prepregs and mould backup structures.



Product Reference	Description	Maximum Use °C
TMFP 3100 & 3200	Glass/Epoxy tooling prepreg	204°C
TMGP 4000, 4100 & 4200	Carbon/Epoxy tooling prepreg	204°C
LTC F5500 & F5600	Glass/Epoxy tooling prepreg with low temperature 60°C initial cure	180°C
LTC G1400 & G1600	Carbon/Epoxy tooling prepreg with low temperature 60°C initial cure	180°C
CEP F7500 & F7544	Glass/Cyanate Epoxy prepreg for high temperature service	232°C
CEP G3 & G12	Carbon/Cyanate Epoxy prepreg for high temperature service	232°C
Beta BG3, G6 & G12	Carbon/Benzoxazine high performance tooling prepreg	218°C
TMR 2001 A & B	Laminating resin for ambient cure high temperature tooling	204°C
TMH 7001B	Hardener for fast cure with TMR2001 & TMSF5001	--
TMSF 5001 A & B	Surface resin with graphite filler for use with TMR2001	204°C
TMSF 5005 A & B	Surface resin with silicone carbide filler for hard tool surfaces	204°C
TMSF 5100 A & B	Surface filled resin with reflow for use with TM & LTC prepregs	204°C
Infusioncoat A & B	Surface filled resin, non-sagging for use with Toolfusion resins	191°C
Toolfusion 1A & 1B	Infusion resin with room temperature initial cure	191°C
Toolfusion 3A & 3B	Infusion resin for high temperature service tooling with low initial cure	218°C
Carbon & Fibreglass	Woven fabrics for tool building	--
Masterbar 300	Structural tubes in high temperature Glass / Epoxy	204°C
Masterbar 400	Structural tubes in high temperature Carbon / Epoxy	204°C
Masterflex S	Spiral tube for forming hat section reinforcing on backside of tool skins	--
TB G48 & TB F48	High temperature tooling boards for mould supports structures & bond jigs	232°C
Airfill 2	Repair filler for high temperature mould repairs	232°C
Masterseal TK27	Epoxy sealer for master model and mould sealing	--

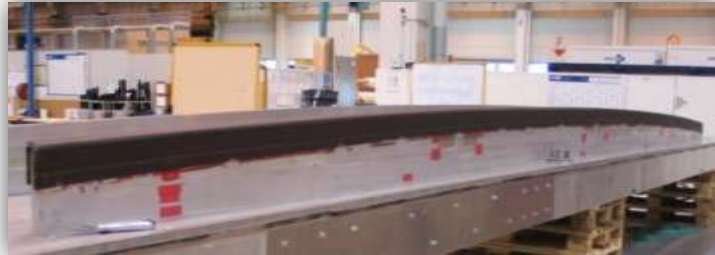


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TOOLING PREPREG SELECTOR



Tygavac can supply advanced composite tooling prepregs and composite tooling training

CEP Prepreg

CEP G3, CEP G12, CEP F7500, CEP F7544

Service temperature	Initial cure temperature	Resin type	Outlife at 72°F (22°C)	Fabric styles
450°F (232°C)	180°C (alternative 120°C)	Cyanate Epoxy	20 days	Carbon 3K twill & 12K twill Fibreglass 7500 & 7544
Benefits	<ul style="list-style-type: none"> • Excellent high temperature properties (High Tg. 500°F) for long tool life & reduced tooling cost • Lower temperature cure than BMI reduces dimensional deviation due to thermal expansion • Excellent tack level for fast ply lay-up and ease of processing for reduced labor cost 			

Beta Prepreg

Beta G3, Beta G6, Beta G12

Service temperature	Initial cure temperature	Resin type	Outlife at 72°F (22°C)	Fabric styles
425°F (218°C)	355°F (180°C)	Benzoxazine	182+ days	Carbon 3K twill, 6k twill & 12K twill
Benefits	<ul style="list-style-type: none"> • Outstanding toughness and high Tg. (485°F) ensures long term tool life & reduced life cycle cost • Exceptionally low shrinkage for low residual stresses, low spring back & excellent post machining • Exceptionally long out-life for greatly increased work flexibility, good tack for ease of laminating 			

Toolmaster Prepreg

TMFP3100, TMFP3200, TMGP4000, TMGP4100, TMGP4200

Service temperature	Initial cure temperature	Resin type	Outlife at 72°F (22°C)	Fabric styles
400°F (204°C)	250°F (120°C)	Epoxy	40 days	Carbon 3K Plain, 6k twill & 12K twill Fibreglass 7500 & 7544
Benefits	<ul style="list-style-type: none"> • Toolmaster composite molds are lighter weight than metal tools for easier manual handling • Lower thermal mass than metal tools allows faster heat up, shorter cures & greater productivity • Toolmaster's low volatile content & excellent adhesion enables Airpad rubber caul reinforcement 			

LTC Prepreg

LTC-F5500, LTC-F5600, LTC-G1400, LTC-G1600

Service temperature	Initial cure temperature	Resin type	Outlife at 72°F (22°C)	Fabric styles
355°F (180°C)	140°F (60°C)	Epoxy	5-7 days	Carbon 3K twill & 12K twill Fibreglass 7500 & 7544
Benefits	<ul style="list-style-type: none"> • Low initial cure temperature allows use of lower temperature master model materials • Dimensional deviation due to thermal expansion is minimized for more accurate molds • Good tack level & cut piece supply for fast ply lay-up and reduced manufacturing labor cost 			

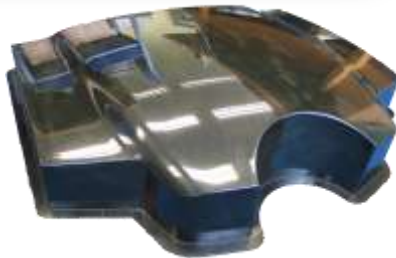


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RESIN SELECTOR GUIDE



Toolfusion® 3

Low viscosity high service temperature epoxy infusion resin

Service temperature	Initial cure temperature	Resin type	Pot Life 72°F(22°C)	Viscosity at 72°F (22°C)
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400°F (204°C)

120 °F (49 °C)

Epoxy

300 minutes

450 cps

Benefits

- Nano technology delivers outstanding toughness & high Tg. (425°F) for long tool life
- Low initial cure temperature for low thermal expansion and low cost master models
- Low viscosity allows infusion of thicker and more complex laminates with fewer resin feed lines
- Resin infusion process for high quality laminates at low cost, no freezer storage, no autoclave cure

Toolfusion® 1

Room temperature curing epoxy infusion resin

Service temperature	Initial cure temperature	Resin type	Pot Life 72°F(22°C)	Viscosity at 72°F (22°C)
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375 °F (191 °C)

72 °F (22 °C)

Epoxy

75 minutes

600 cps

Benefits

- Resin infusion process for high quality laminates at low cost, no freezer storage, no autoclave cure
- Room temperature curing avoids any thermal expansion and dimensional deviation
- Room temperature curing allows use of low temperature & low cost master model

TMR 2001

Room temperature curing high service temperature laminating resin

Service temperature	Initial cure temperature	Resin type	Pot Life 72°F(22°C)	Viscosity at 72°F (22°C)
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400°F (204°C)

72 °F (22 °C)

Epoxy

240 minutes

5,200 cps

Benefits

- Composite molds are lighter weight than metal tools for easier manual handling
- Room temperature curing allows use of low temperature & low cost master model materials
- Room temperature curing avoids any thermal expansion and dimensional deviation

Tool Surface Coat Resins

Surface fill resins for composite tool surfaces

Surface Coat Resin	Service temperature	Applications	Composition
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TMSF 5100

400°F (204°C)

Toolmaster & LTC

Mineral filled epoxy

TMSF 5001

400°F (204°C)

TMR 2001 & Toolfusion

Graphite filled epoxy

TMSF 5005

400°F (204°C)

TMR 2001 & Toolfusion

Silicon carbide filled epoxy

Infusioncoat®

375 °F (191 °C)

TMR 2001 & Toolfusion

Graphite filled epoxy

Benefits

- Surface coat resins will eliminate mold surface pitting, ensuring good part surface finish
- The protective surface layer will prevent fibre damage and extend tool life, reducing tooling costs
- Surface coat provides a tacky layer which aids first ply positioning during Toolfusion builds



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