



Low Profile Tooling Systems

**RESINS and
GELCOATS for
SMOOTHER, MORE
DURABLE MOLDS**



| **aliancys**



aliancesys

CREATE BETTER TOOLS

AOC Aliancys' low profile resins and tooling gelcoats help manufacturers create smooth, lower cost molds that last longer. These resins and gelcoats sharpen the competitive edge by providing a smoother tooling surface and saving mold-makers money and time.

The AOC Aliancys tooling systems are for open molding, resin transfer molding and infusion operations that can benefit from improved quality and higher profits.



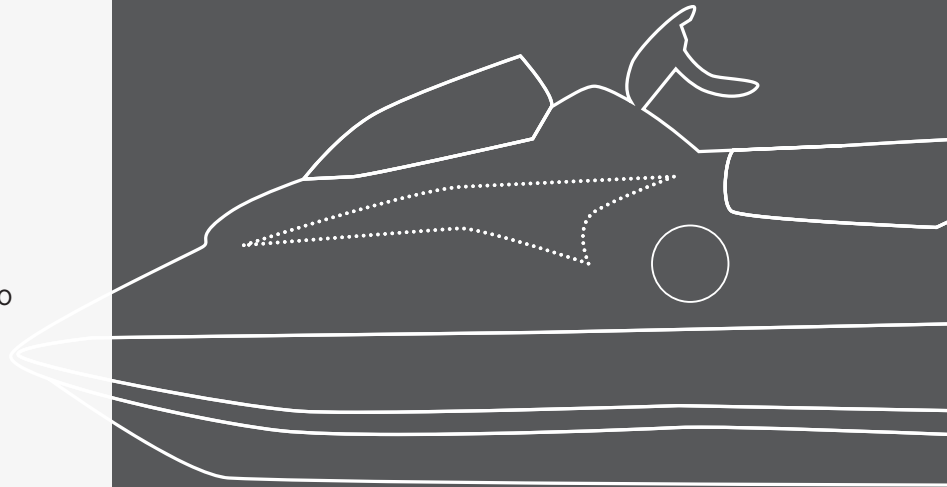
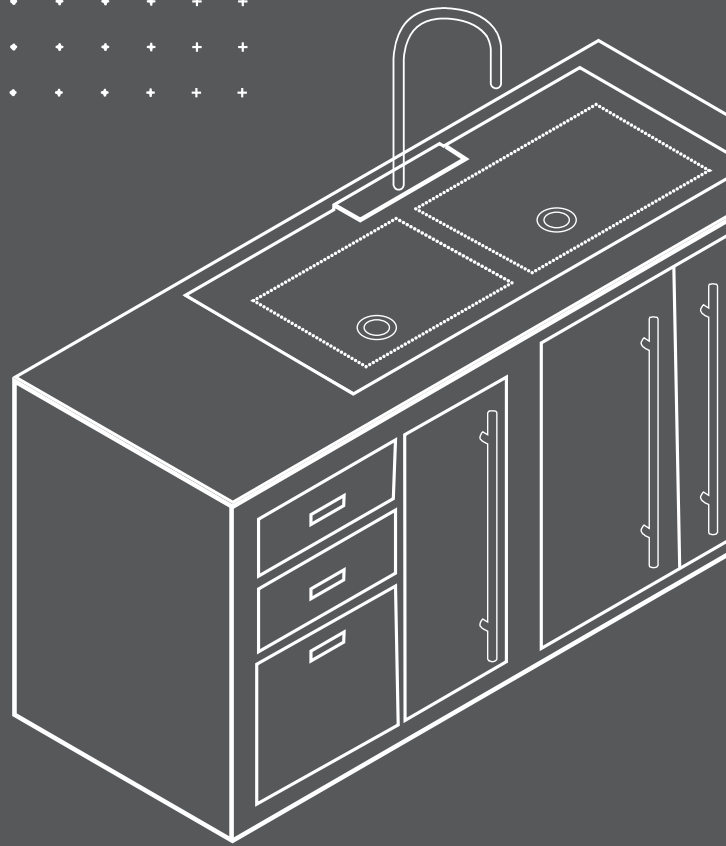
Tooling Gelcoat

AOC Aliancys' tooling gelcoat creates molds with the highest level of gloss, toughness and longevity. The chemistry is specially designed to work with AOC Aliancys' tooling resins.

Tooling Resins

Researchers drew upon expertise in automotive Class A resins to engineer special additive technology that gives MoldTru resins a near-zero shrink feature. Ultra-low shrinkage combines with excellent fiber and filler wetting to ensure that the mold surface is a precise replica of the master model's surface.

AOC Aliancys has tooling resins specifically formulated for both open molding and closed molding processes.



The information contained in this guide is based on laboratory data and field experience. AOC Aliancys believes this information to be reliable, but does not guarantee its applicability to the user's process or assume any liability for occurrences arising out of its use. The user, by accepting the products described herein, agrees to be responsible for thoroughly testing each such product before committing to production. Recommendations should not be taken as inducements to infringe any patent or violate any law, safety code or insurance regulations.

VIBRIN G910 VINYL ESTER TOOLING GELCOAT



This revolutionary gelcoat creates the toughest molds with mirror-like finishes. The vinyl ester chemistry makes the gelcoat extremely resistant to impact and abrasion. And Vibrin G910's extreme toughness makes molds last longer.

BENEFITS

- Very high gloss
- Excellent dimensional stability
- Porosity resistant
- High heat distortion temperature
- Hard, resilient and impact resistant
- Excellent cure and Barcol development
- Application and user-friendly
- MACT Compliant

Typical Liquid Properties		
Test	Unit of Measure	Nominal
Viscosity @ 77 °F / 25 °C, RVF Brookfield Spindle #4 @ 20 rpm	Centipoise	3,200 - 4,200
Thix Index		5.5 - 7.5
Gel Time @ 77 °F / 25 °C (1.8% of a 9% active oxygen MEKP)	Minutes	15.0 - 20.0
Film Cure	Minutes	60 - 90
HAP Content	%	42 - 48
Tg	C°	137 - 141

Available in the following colors:

Black: G910LA73096
Orange: G910LA32016
Green: G910LA41087
Clear: G910LA00000



*Recommend use with MoldTru® LPT-68000/68001 resin for a class A profile

Typical Cast Mechanical Properties			
Test	Units of Measure	Nominal	Test Method
Tensile Strength	Psi	10,000	ASTM D 638
Tensile Modulus	KPsi	510	ASTM D 638
Tensile Elongation	%	2.6	ASTM D 638
Flexural Strength	Psi	16,500	ASTM D 790
Flexural Modulus	KPsi	550	ASTM D 790

*Typical properties are not to be construed as specifications.

MOLDTRU LPT-68000 TOOLING RESIN

MoldTru LPT-68000 allows manufacturers to build up to five or six layers of laminate at once, saving both time and money. With traditional tooling resins, a maximum of only two layers of laminate can be added each day and then needs to be cured overnight. Because of MoldTru LPT-68000's low exotherm, it can properly cure up to six layers of laminate in one day, without exhibiting surface distortion.



The high reactivity of the innovative polymer improves the Barcol Hardness results on laminates, regardless of whether filler was used or not when making the tool. And because MoldTru LPT-68000 has a low peak exotherm, the tool's surface finish is protected from potential distortion.

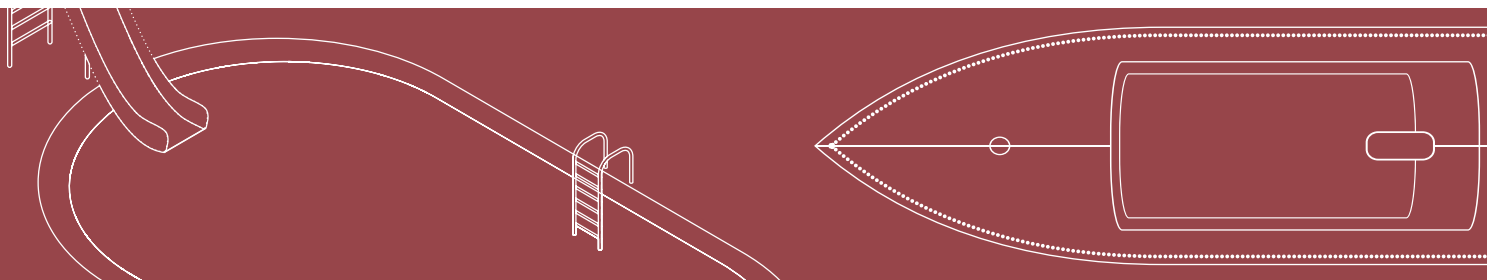
TIME SAVINGS WITH MOLDTRU LPT-68000

Producing thicker tooling in a single step means the completed part will be ready for use in up to 50% less time.

OVERVIEW OF PROCESS

Operation	MoldTru LPT-68000 Resin	Conventional Resin
Prepare the master model	Similar process for both	
Apply gelcoat		
Laminate skin coat		
Laminate 5 to 6 layers of 1.5oz chopped mat and wait for the cure	5-6 layers at the same time	2 layers at a time and wait for the complete cure before continuing to the next layer - typically overnight
Laminate 5 to 6 layers of 1.5oz chopped mat and wait for the cure	5-6 layers at the same time	2 layers at a time and wait for the complete cure before continuing to the next layer
Prepare the steel frame, locate over the laminate, and fix it over the laminate	Similar process for both	
Demolding, polish and prepare release treatment	Similar process for both	
Mold is ready for use	9-10 days from the master model preparation	15-17 days after the master model preparation

Additional details regarding making a mold with MoldTru LPT-68000 are on page 7.



MOLDTRU LPT-68000 LIQUID AND PHYSICAL PROPERTIES

Typical Liquid Resin Properties		
	Unit	Spec
Viscosity LV#3 60rpm 25°C	cps	400-600
Thix Index (Static)		2.0-3.5
Volatiles Content	%	36-38
Density Cup @25°C	lb / gal	8.7-8.9

Gel Time Properties		
Gel Time 1.25% MEKP-9	minutes	30.0-34.0
Gel to Peak	minutes	12.0-16.0
Peak Exotherm	°F / °C	330 / 165

Barcol Evolution on Laminates		
MoldTru LPT-68000	1.5% MEKP-9	
100 Gram Mass	Neat	40% ATH filler
Gel Time	29.2	21.3
Peak Exotherm	337.1°F	255.1°F
Interval	8	11.8
2 ply Laminate		
Exotherm	92.8°F	90.3°F
HB @ 70 minutes	-	15
HB @ 100 minutes	5	30
HB @ 150 minutes	10	45
4 ply Laminate		
Exotherm	118.2°F	110.6°F
HB @ 80 minutes	-	20
HB @ 100 minutes	10	30
HB @ 150 minutes	16	30-35
6 ply Laminate		
Exotherm	156.9°F	122.7°F
HB @ 70 minutes	30	40
HB @ 100 minutes	40	46
HB @ 150 minutes	42	46

Typical Cast Mechanical Properties			
Test	Units of Measure	Nominal	Test Method
Tensile Strength	psi / Mpa	8,720 / 60	D-638
Tensile Modulus	Mpsi / Gpa	430 / 3.0	D-638
Elongation	(%)	3	D-638
Flexural Strength	psi / Mpa	15,460 / 107	D-790
Flexural Modulus	psi / Gpa	480 / 3.3	D-790
Heat Distortion	°F / °C	241 / 116	D-648
Barcol Hardness	934-1	42	D-2583
Izod Impact	(Ft.lbs / in)	3.49	D-4812

Typical Mechanical Properties on 4 Layers 1.5 oz Chopped Strand Mat				
Test	Units	ASTM	Neat	40% ATH Filler
Flexural Strength	Psi / Mpa	D-790	30,970 / 214	24,480 / 169
Flexural Modulus	Kpsi / Gpa	D-790	1,140 / 7.9	1,150 / 7.9
Tensile Strength	Psi / Mpa	D-638	20,340 / 140	14,930 / 103
Tensile Modulus	Kpsi / Gpa	D-638	1,300 / 9.0	1,260 / 8.7
Elongation	(%)	D-638	2.1	1.9
Izod Impact	(%)	D-4812 / D-256	13.05 / 8.78	7.69 / 4.74
Non-Combustible	(% Glass)	D-2584	36.82	25.31



MOLDTRU LPT-68001 INFUSIBLE RESIN

MoldTru LPT-68001 was developed primarily to build molds using the vacuum molding process at room temperature, without post-cure operations. It offers faster infusion, low shrinkage, high HDT, low viscosity and minimal print through, making it a superior material for a variety of tooling applications.



LIQUID AND PHYSICAL PROPERTIES

Typical Liquid Resin Properties ¹		
Test	Units of Measure	Nominal
Viscosity Brookfield LV		
Spindle #3 @ 60 RPM	cps	110-140
Styrene Volatiles	%	36-38
Density, Wt / Gal cup @ 25°C	lb / gal	8.7-8.9

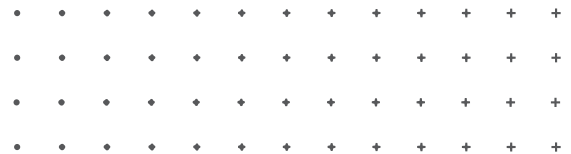
Typical Gel Time Properties		
Test	Units of Measure	Nominal
Gel Time, 1.75% MEKP-9	minutes	18-22
Gel to Peak	minutes	7.0-10.0
Peak Exotherm	°F / °C	385 / 196

Typical Cast Mechanical Properties ^{2*}			
Test	Units of Measure	Nominal	Test Method
Tensile Strength	psi / MPa	8,720 / 60	ASTM D 638
Tensile Modulus	psi / GPa	430 / 3.0	ASTM D 638
Tensile Elongation	%	3	ASTM D 638
Flexural Strength	psi / MPa	15460 / 107	ASTM D 790
Flexural Modulus	psi / GPa	480 / 3.3	ASTM D 790
Heat Distortion Temp.	°F / °C @264 psi	241 / 116	ASTM D 648
Barcol Hardness	934-1	42	ASTM D 2583
Izod Impact	Ft. Lbs / in	3.49	ASTM D 4812

**Typical properties are not to be construed as specifications.*

GUIDELINES FOR BUILDING MOLDS WITH MOLDTRU LPT-68001

Contact AOC Aliancys Technical Service for details and support in building a mold with MoldTru LPT-68001. Phone +1 866.319.8827



FOOTNOTES:

- The gel times shown are typical but may be affected by catalyst, promoter and inhibitor concentrations and resin, mold and shop temperature. Variations in gelling characteristics can be expected between different lots of catalysts and at extremely high humidities. Pigment and fillers can retard or accelerate gelation. It is recommended that the fabricator check the gelling characteristics of a small quantity of resin under actual operating conditions prior to use.
- Based on tests at 23°C and 50% relative humidity. All tests performed on unreinforced cured resin castings. 1/4" castings were prepared using 2.8% MEKP-9, post cured for 5 hours at 212°F/100°C using AOC Aliancys test method X-12Ab.

GUIDELINES FOR BUILDING TOOLS WITH **MOLDTRU LPT-68000**

The following guidelines apply to MoldTru LPT-68000 only. Consult with your AOC Aliancys Technical Support Team for recommendations on which tool building materials best meet your application's performance requirements.

When the master mold is ready, apply a full release agent system to prepare the surface for gel coat application. Once the gel coat system is applied, use a high temperature laminate skin coat system to protect the surface of the mold. The high temperature barrier system is the combined construction of 2 gel coat layers and laminate skin coat layer. The ideal combined thickness of the temperature barrier system (gel coats plus laminate skin coat) is 0.079 inch (2 mm).

GELCOAT

Apply AOC Aliancys' **Vibrin® G910 gelcoat**.

- Apply the first layer of gelcoat 18-21 mils (0.46 millimeter) thick. This can be done in two passes of 9-10 mils or three passes of 6-7 mils each. Allow each pass to breathe for 30-60 seconds before applying the next pass.
- Allow the first layer of gelcoat to cure such that when the second gelcoat layer is applied it will not "alligator." The gelcoat film should be cured well enough so that it does not transfer when touched.
- Before applying the second gelcoat layer, inspect for evenness of cure. If wet spots or uncured gelcoat is present after the film has cured, either allow more time for the film to cure or consider removing the film and respraying the gelcoat.
- Once the first gelcoat layer is cured apply the second coat on top of it using the same method as the first layer.
- In lieu of a second gelcoat layer, 18-22 mils of barrier coat may be applied.

SKIN COAT

Once the gelcoat is cured, continue with the high temperature barrier system using an AOC Aliancys Hydropel® vinyl ester resin (ex. Hydropel H100, Vipel F085). Some cases require MoldTru LPT-68000 as a skin coat for high cosmetics.

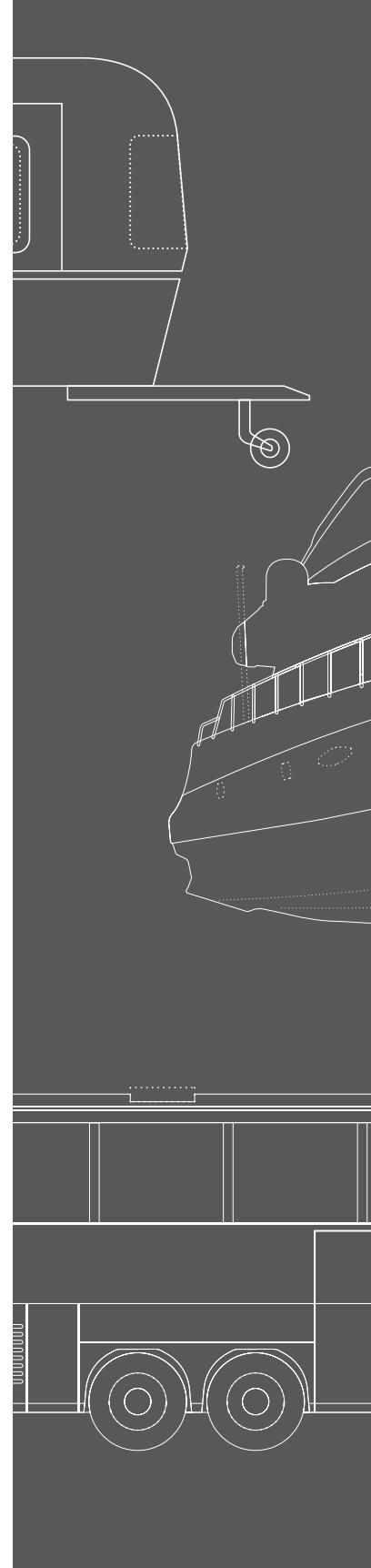
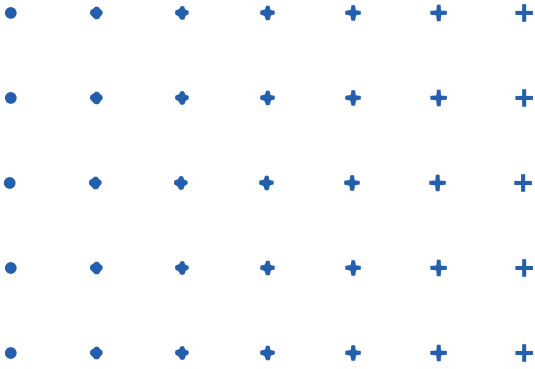
- Consult with your AOC Aliancys resin vendor for recommendations regarding the optimum curing system (i.e. promotion system, catalyst type and amount).
- Apply a surface veil in the first layer (30 grams / square meter). It is vital to use a surface veil that conforms easily, which is especially important for tight radius areas. Surface veils made from Continuous Strand Mat (CSM) are not recommended.
- Once the first layer cures, carefully inspect for blisters and other imperfections. Pay particular attention to areas containing small curves and tight radii. Using a lamp during inspection is recommended.

- Remove defective areas with dry, medium-grit sand paper and repair with resin or putty.
- After inspection and repair, continue by applying one layer of 1.5 ounce (450 grams per square meter) Chopped Strand Mat. Use an AOC Aliancys Hydropel® vinyl ester resin (ex. Hydropel H100, Vipel F085) as used with the surface veil.
- Before continuing to the bulk laminate construction phase, check laminate cure. The skin coat laminate should have a minimum Barcol of 25HB.

BULK LAMINATE CONSTRUCTION

- If the resin is to be filled, AOC Aliancys recommends only aluminum trihydrate (ATH, 10-19 microns) as it provides additional thixotropy properties to the mix and imparts the best profile characteristics. Other fillers, such as calcium carbonate, will not provide good profile characteristics and often increase viscosity too much.
- When using ATH, AOC Aliancys recommends 40 parts for every 100 parts resin.

- 1 Apply a very thin, non-reinforced layer of resin to "wet" the part.
 - 2 Immediately begin lamination using 1.5 ounce chopped strand mat (or chopped roving equivalent).
 - 3 Immediately roll-out part to remove excess air.
 - 4 Repeat steps two and three until desired thickness is obtained. Five to six layers can be applied sequentially without stopping.
- After lamination is complete, wait for cure. During the cure cycle, the laminate should change color from a light brown at the beginning to white at the end.
 - Add cores such as balsa or foam as necessary. Laminate these materials using the same preparation methods described in steps 1-4.



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