

Machinable Media

Freeman Machinable Wax



Formulated & manufactured by Freeman, this unique medium is an extremely hard synthetic wax that machines faster than polyurethane and epoxy tooling boards or metals without sacrificing quality of finish, surface detail, or dimensional accuracy.

Machinable Wax is:

Non-Abrasive – unlike metal and tooling boards that can cause significant wear on cutting tools.

User-Friendly – machining produces chips instead of dust, for a cleaner work environment.

Self-Lubricating – enables all machining operations to be performed without the need for coolants or cutting fluids.

Able To Be Glued – to produce large or irregularly-shaped pieces for machining with the use of 3M #90 Hi-Strength Spray Adhesive (pg. 67).

Available in a Wide Variety of Sizes – eliminating the waste associated with using large tooling boards for smaller projects.

Recyclable – our recommended procedure allows it to be remelted and reused repeatedly without significant change to its original properties.

Self-Releasing/Self-Sealing – liquid tooling plastics, including epoxy, urethane, and silicone rubber may be poured into Machinable Wax without requiring the use of sealers or release agents.

Machinable Wax is used for:

- Education as a Training Aid Material
- CNC Systems Set-up and Demonstrations
- Proofing CNC Machining Programs
- Producing Accurate Molds and Prototypes

Machinable Wax Specifications

Hardness (Shore D)	50-55
Specific Gravity	0.92
Flash Point	575° F
Softening Point	226° F
Volumetric Shrinkage @ Room Temp.	7%
Coefficient of Thermal Expansion (in./in. °F)	9.5 x 10 ⁻⁵
Color	blue

Machinable Wax Machining Guidelines

	Spindle Speed	Feed Rate
Roughing	3,000 rpm	100 inches per minute
Finishing	8,000 - 10,000 rpm	40 - 100 inches per minute

*Data obtained using a 1/2" ball end mill

How to Calculate Machinable Wax Weight

$$\frac{\text{Length} \times \text{Width} \times \text{Thickness (inches)}}{28.8} = \text{Weight (Lbs)}$$

Original Sizes

Catalog Number	Description	Thickness	Width	Length
108003	Wax Block	1 1/2"	2"	3"
108011	Wax Block	1 1/2"	3"	7"
108021	Wax Block	3"	3"	7"
108031	Wax Block	3"	4 1/2"	7"
108051	Wax Block	3"	5"	10"

Standard Block Sizes

Width x Length	Thickness							
	2"	3"	4"	5"	6"	7"	8"	
6" x 6"	108250	108300	108350	108400	108450	108500	108552	
6" x 12"	108252	108071	108352	108402	108452	108502	108554	
6" x 18"	108254	108304	108354	108404	108454	108504	108556	
6" x 24"	108256	108306	108356	108406	108456	108506	108558	
6" x 30"	108258	108308	108358	108408	108458	108508	108560	
6" x 36"	108260	108310	108360	108410	108460	108510	108562	
6" x 42"	108262	108312	108362	108412	108462	108512	108564	
6" x 48"	108264	108314	108364	108414	108464	108514	108566	
12" x 12"	108266	108316	108366	108416	108466	108516	108568	
12" x 18"	108268	108318	108368	108418	108468	108518	108570	
12" x 24"	108270	108320	108370	108420	108470	108520	108572	
12" x 30"	108272	108322	108372	108422	108472	108522	108574	
12" x 36"	108274	108324	108374	108424	108474	108524	108576	
12" x 42"	108276	108326	108376	108426	108476	108526	108578	
12" x 48"	108278	108328	108378	108428	108478	108528	108580	
18" x 18"	108280	108330	108380	108430	108480	108530	108582	
18" x 24"	108282	108332	108382	108432	108482	108532	108584	
18" x 30"	108284	108334	108384	108434	108484	108534	108586	
18" x 36"	108286	108336	108386	108436	108486	108536	108588	
18" x 42"	108288	108338	108388	108438	108488	108538	108590	
18" x 48"	108290	108340	108390	108440	108490	108540	108592	
24" x 24"	108222	108342	108392	108442	108492	108542	108594	
24" x 30"	108292	108344	108394	108444	108494	108544	108596	
24" x 36"	108294	108346	108396	108446	108496	108546	108598	
24" x 42"	108296	108348	108398	108448	108498	108548	108600	
24" x 48"	108298	108243	108244	108245	108246	108550	108248	

Standard Cylinder Sizes

Catalog Number	Description	Diameter (Nominal)	Length
108114	Wax Cylinder	1"	12"
108115	Wax Cylinder	1 1/2"	12"
108125	Wax Cylinder	2"	12"
108135	Wax Cylinder	3"	12"
108145	Wax Cylinder	4"	14"
108155	Wax Cylinder	5"	16"
108165	Wax Cylinder	6"	18"
108175	Wax Cylinder	7"	18"
108195	Wax Cylinder	9"	18"

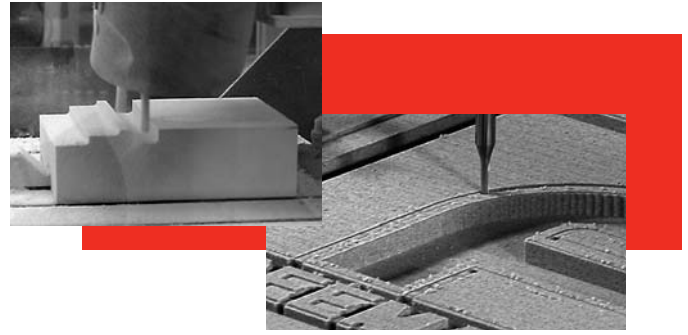
Non-Standard Sizes and Bulk Machinable Wax

In addition to the above blocks and cylinders, machinable wax is also available in custom sized blocks.

Catalog Number	Description
108099	Non-Standard Size Block
108199	Non-Standard Size Cylinder
108001	Bulk Wax 1-5 lb. pieces

RenShape® Polyurethane & Epoxy Tooling Boards

Huntsman Advanced Materials' RenShape polyurethane and epoxy tooling board line is the broadest and most diverse offering in the industry. From the original modeling board, RenShape 450, this line has grown to meet the needs of nearly every demanding styling, modeling, and tooling application. All of these boards are manufactured in the United States to the highest quality standards in the industry, which is why RenShape remains the leading line of modeling and tooling boards and why Freeman is proud to be its number one distributor.



RenShape Applications Guide

RenShape No.	5020	5025	5030	5045	440	5440	450	5460	460	5003	470	472	473	550	5166	5169	5008	2000
NC Tape Proofing	X	X	X	X	X	X	X	X	X	X								
Visual Models	X	X	X	X	X	X	X	X	X	X								
Styling Prototypes	X	X	X	X	X	X	X	X	X	X								
Architectural Models	X	X	X	X	X	X	X	X	X	X								
Tooling Aids & Fixtures								X	X		X	X	X		X	X		
Temporary Models	X	X	X	X	X	X	X	X	X	X								
Master Models	X	X	X	X	X	X	X	X	X	X				X	X			X
Automotive Dies	X	X	X	X	X	X	X	X	X	X								X
Intermediate-Temperature Aerospace Masters & Lay-up Tools														X				X
Prototype Foundry Patterns	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		
Foundry Patterns & Core Boxes																X		
Prototype Vacuum-Form Molds			X	X	X	X	X	X	X	X	X	X	X	X			X	
Metallforming Tools															X			
Prototype Injection Molds																		X

RenShape Specifications

	Hardness Shore D	Density (g/cc)	Density (lbs/ft. ³)	Tensile Strength (psi)	Compressive Strength (psi)	Compressive Modulus Elasticity (psi)	Flexural Strength (psi)	Flexural Modulus (psi)	Glass Transition Temp (°F)	Coefficient Thermal Expansion (in/in/°F)	Color
Low Density Polyurethane Foam Boards											
RenShape 5020	27	0.16	10	370	260	–	330	–	–	–	Lt. Gray
RenShape 5025	27	0.25	15	800	800	–	–	–	–	47.0 x 10 ⁻⁶	Lt. Green
RenShape 5030	33	0.30	20	–	1,000	–	1,000	40,000	–	–	Peach
RenShape 5045	43	0.48	30	–	–	–	–	–	–	–	Lt. Peach
Medium Density Modeling & Styling Boards											
RenShape 440	54	0.55	34	1,300	1,400	105,000	2,300	106,000	203	34.4 x 10 ⁻⁶	Red. Brown
RenShape 5440	55	0.56	35	–	–	–	–	–	–	–	Lt. Brown
RenShape 450	65	0.66	41	2,300	2,800	135,000	4,000	144,000	205	36.0 x 10 ⁻⁶	Lt. Brown
RenShape 5460	65	0.69	43	–	–	–	–	–	–	–	Lt. Brown
RenShape 460	64	0.77	48	1,800	2,200	181,000	3,700	185,000	219	29.9 x 10 ⁻⁶	Lt. Brown
RenShape 5003**	62	0.54	34	2,900	3,700	185,000	3,400	188,000	182	32.0 x 10 ⁻⁶	Tan
Tooling & High-Temperature Work Boards											
RenShape 470	90	1.67	104	4,700	9,500	866,000	8,700	983,000	232	22.7 x 10 ⁻⁶	Lt. Gray
RenShape 472	81	0.88	55	7,000	10,900	460,000	9,540	416,000	248	25.8 x 10 ⁻⁶	Lt. Gray
RenShape 473	73	0.80	50	2,500	3,500	210,000	4,000	200,000	212	30.0 x 10 ⁻⁶	Lt. Gray
RenShape 550	82	0.85	53	7,000	10,500	415,000	8,800	414,000	289	27.5 x 10 ⁻⁶	Cream
RenShape 5166	90	1.66	103	4,875	9,500	840,000	8,000	965,000	228	22.0 x 10 ⁻⁶	Cream
RenShape 5169	85	1.20	75	9,000	8,800	366,000	14,000	380,000	206	40.8 x 10 ⁻⁶	Red
RenShape 5008**	68	0.67	42	3,500	8,200	350,000	4,600	350,000	287	18.0 x 10 ⁻⁶	Lt. Blue
RenShape 2000**	91	1.80	112	9,000	36,500	900,000	12,000	1,200,000	496	21.0 x 10 ⁻⁶	Gray
ASTM	D-2240	D-792	D-792	D-638	D-695	D-695	D-790	D-790	D-4065	D-3386	

**Epoxy boards



RenShape® Polyurethane & Epoxy Tooling Boards [CONTD.]

RenShape Low Density Polyurethane Foam Boards

RenShape polyurethane foam boards are an economical choice for models, prototypes, and CNC proofing. These products feature a closed cell structure that may be machined or hand carved to an excellent surface finish. Available in sizes up to 8" thick and 4' x 8' overall, these rigid foam boards are ideal for large styling projects.

RenShape 5020 Polyurethane Foam Board

- 10 Pound Density
- Light Gray Color
- Lightest Weight, Most Economical

RenShape 5020 is our lowest density polyurethane foam styling board. This product is the most economical board in the RenShape line but still produces a good machined surface finish. RenShape 5020 also makes an excellent substructure for RenPaste Seamless Modeling Paste applications.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075175	RenShape 5020	2"	24"	96"	32
075176	RenShape 5020	4"	24"	96"	64
075177	RenShape 5020	6"	24"	96"	96
075178	RenShape 5020	8"	24"	96"	128
075182	RenShape 5020	4"	48"	96"	128
075183	RenShape 5020	6"	48"	96"	192

RenShape 5025 Polyurethane Foam Board

- 15 Pound Density
- Light Green Color
- Excellent Balance of Cost and Performance

RenShape 5025 is a medium density polyurethane foam styling board. It offers a better surface finish than RenShape 5020.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075119	RenShape 5025	4"	24"	16"	10.67
075123	RenShape 5025	2"	24"	96"	32
075124	RenShape 5025	4"	24"	96"	64
075125	RenShape 5025	6"	24"	96"	96
075122	RenShape 5025	8"	24"	96"	128
075135	RenShape 5025	2"	48"	96"	64
075126	RenShape 5025	4"	48"	96"	128
075121	RenShape 5025	6"	48"	96"	192

RenShape 5030 Polyurethane Foam Board

- 20 Pound Density
- Peach Color
- Excellent Surface Finish

RenShape 5030 is a higher density polyurethane foam styling board. It features excellent edge definition and a superior surface finish compared to either RenShape 5020 or RenShape 5025.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075264	RenShape 5030	2"	24"	96"	32
075265	RenShape 5030	4"	24"	96"	64
075266	RenShape 5030	6"	24"	96"	96
075267	RenShape 5030	8"	24"	96"	128
075256	RenShape 5030	2"	48"	96"	64
075261	RenShape 5030	4"	48"	96"	128

RenShape 5045 Polyurethane Foam Board

- 30 Pound Density
- Light Peach Color
- Best Surface Finish of the RenShape Foam Boards

RenShape 5045 is our highest density polyurethane foam board. It features the best edge definition and surface finish available in a foam styling board.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.	Boards Per Carton
075521	RenShape 5045	2"	24"	96"	32	1
075522	RenShape 5045	4"	24"	96"	64	1
075523	RenShape 5045	6"	24"	96"	96	1
075525	RenShape 5045	2"	48"	96"	64	1

RenShape Medium Density Modeling and Styling Boards

The most popular products of the RenShape line, these boards feature a perfect balance of machinability, surface finish, stability, and durability. They are designed and formulated to meet the wide scope of styling, modeling, prototyping and fabricating applications found throughout industry today.

RenShape 440 Polyurethane Styling Board

- 34 Pound Density
- Light Reddish-brown Color
- Ideal for Many Model and Pattern Applications

RenShape 440 is a medium-low density polyurethane modeling and styling board. Used for master models, CNC styling models, prototypes, and visual models. RenShape 440 machines easily at fast cutting speeds, finishes to a good surface with excellent edge definition and produces very little tool wear.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.	Boards Per Carton
075236	RenShape 440	2"	16"	60"	13.33	1
075235	RenShape 440	2"	16"	60"	40	3
075240	RenShape 440	4"	16"	60"	26.67	1
075146	RenShape 440	1"	20"	60"	8.33	1
075147	RenShape 440	2"	20"	60"	16.67	1
075148	RenShape 440	3"	20"	60"	25	1
075149	RenShape 440	4"	20"	60"	33.33	1
075151	RenShape 440	6"	20"	60"	50	1

RenShape® Polyurethane & Epoxy Tooling Boards [CONTD.]

RenShape 5440 Polyurethane Foam Board

- 35 Pound Density
- Light Brown Color
- Ideal For Many Modeling and Styling Applications

RenShape 5440 is higher density version of 440, offering an improved surface finish without sacrificing ease of machining. Like RenShape 440, it minimizes tool wear and can also be worked by hand.

These boards are manufactured in metric sizes (500mm x 1500mm). The English equivalent sizes are provided below.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.	Boards Per Carton
075501	RenShape 5440	0.98"	19.7"	59.1"	7.92	1
075502	RenShape 5440	1.97"	19.7"	59.1"	15.85	1
075503	RenShape 5440	2.96"	19.7"	59.1"	23.77	1
075504	RenShape 5440	3.94"	19.7"	59.1"	31.69	1

RenShape 450 Polyurethane Modeling Board

- 41 Pound Density
- Light Brown Color
- Superior Machinability and Stability

RenShape 450 is the original medium density polyurethane modeling and styling board. An ideal material for models and prototypes, master patterns, and tooling aids. This material will produce very stable, dimensionally accurate tools with well-defined edges and surface detail. RenShape 450 can be machined using standard woodworking tools and will not result in objectionable dust particles when planed, milled, sawed or drilled. It resists warping and can be easily painted and finished for appearance and prototype models.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.	Boards Per Carton
075139	RenShape 450	2"	15"	20"	4.17	1
075202	RenShape 450	2"	16"	60"	13.33	1
075200	RenShape 450	2"	16"	60"	40	3
075205	RenShape 450	4"	16"	60"	26.67	1
075140	RenShape 450	1"	20"	60"	8.33	1
075141	RenShape 450	2"	20"	60"	16.67	1
075142	RenShape 450	3"	20"	60"	25	1
075143	RenShape 450	4"	20"	60"	33.33	1
075203	RenShape 450	1"	24"	60"	10	1
075206	RenShape 450	2"	24"	60"	20	1
075211	RenShape 450	3"	24"	60"	30	1

RenShape 5460 Polyurethane Modeling Board

- 43 Pound Density
- Light Brown Color
- High Quality Surface Finish

RenShape 5460 is lower density version of 460, offering excellent surface finish and ease of machining while minimizing the dust prevalent in many other modeling boards in this range.

These boards are manufactured in metric sizes (500mm x 1500mm). The English equivalent sizes are provided below.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.	Boards Per Carton
075511	RenShape 5460	0.98"	19.7"	59.1"	7.92	1
075512	RenShape 5460	1.97"	19.7"	59.1"	15.85	1
075513	RenShape 5460	2.96"	19.7"	59.1"	23.77	1
075514	RenShape 5460	3.94"	19.7"	59.1"	31.69	1

RenShape 460 Polyurethane Modeling Board

- 48 Pound Density
- Light Brown Color
- Excellent Surface Finish

RenShape 460 is a medium-high density polyurethane modeling and styling board. It was developed to meet the growing demand for higher-quality, more dimensionally accurate, machined master patterns and prototypes. With a smoother surface finish than RenShape 450, this board is an ideal material for prototype vacuum-forming tools, styling prototypes, master models, tooling aids, and automotive die models. Carbide cutters are recommended, but not necessary.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.	Boards Per Carton
075213	RenShape 460	2"	16"	60"	13.33	1
075212	RenShape 460	2"	16"	60"	40	3
075214	RenShape 460	4"	16"	60"	26.67	1
075229	RenShape 460	1"	20"	60"	8.33	1
075219	RenShape 460	2"	20"	60"	16.67	1
075221	RenShape 460	3"	20"	60"	25	1
075222	RenShape 460	4"	20"	60"	33.33	1
075169	RenShape 460	1"	24"	60"	10	1
075170	RenShape 460	2"	24"	60"	20	1
075171	RenShape 460	3"	24"	60"	30	1
075172	RenShape 460	4"	24"	60"	40	1

RenShape 5003 Epoxy Modeling Board

- 34 Pound Density
- Tan Color
- Prepreg Compatibility

RenShape 5003 is a medium-low density syntactic epoxy modeling and styling board. RenShape 5003 features excellent machinability, superior edge definition, dimensional stability, and excellent surface finish. Also, this epoxy board will not inhibit the curing of prepregs.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.	Boards Per Carton
075280	RenShape 5003	2"	24"	60"	20	2
075281	RenShape 5003	4"	24"	60"	40	1
075282	RenShape 5003	6"	24"	60"	60	1



RenShape® Polyurethane & Epoxy Tooling Boards [CONTD.]

RenShape Tooling and High-Temperature Work Boards

RenShape Tooling and High-Temperature Work Boards are designed and formulated to meet the wide scope of challenging applications including foundry, metal-forming, vacuum-forming and temperature resistant tooling.

They all share a number of performance characteristics including ease of machining, excellent dimensional stability, and good edge definition.

RenShape 470 High-Density Polyurethane Fixture Board

- 104 Pound Density
- Light Gray Color
- Extremely Tough and Dense

RenShape 470 is a high-density polyurethane board designed for machining of production fixtures capable of withstanding extended use and handling. It is very dimensionally stable and features excellent wear resistance.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075209	RenShape 470	2"	20"	60"	16.67

RenShape 472 Medium-Density Polyurethane Fixture Board

- 55 Pound Density
- Light Gray Color
- Excellent for Foundry Patterns and Thermoform Tools

RenShape 472 is a polyurethane board designed for machining of production fixtures capable of withstanding extended use and handling. Combines light weight with toughness and abrasion resistance to withstand demanding production environments.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075242	RenShape 472	1"	20"	60"	8.33
075243	RenShape 472	2"	20"	60"	16.67
075245	RenShape 472	3"	20"	60"	25
075244	RenShape 472	4"	20"	60"	33.33
075238	RenShape 472	5"	24"	30"	25
075239	RenShape 472	6"	24"	30"	30

RenShape 473 Lighter Density Polyurethane Fixture Board

- 50 Pound Density
- Light Gray Color
- Excellent Combination of Durability and Surface Finish with Less Weight

RenShape 473 is a polyurethane fixture board that offers a lighter density than traditional fixture boards. May be used for check fixtures, model bases, patterns and thermoform tools where requirements are less demanding.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075153	RenShape 473	2"	16"	60"	13.33
075155	RenShape 473	4"	16"	60"	26.67
075156	RenShape 473	6"	16"	60"	40

RenShape 550 Intermediate Temperature Polyurethane Board

- 53 Pound Density
- Cream Color
- High Temperature Resistance and Compressive Strength

RenShape 550 is a polyurethane board that is designed for forming dimensionally accurate aerospace models and curing tools requiring elevated temperature resistances up to 200°F. Carbide cutting tools required.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075207	RenShape 550	2"	15.9"	56.9"	12.56

RenShape 5166 Metal-Forming Board

- 103 Pound Density
- Cream Color
- Metal Forming Applications

RenShape 5166 is a polyurethane board that is designed for use in forming metal parts for prototype and low volume production. Carbide cutting tools required.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075237	RenShape 5166	2"	20"	60"	16.67
075199	RenShape 5166	4"	20"	30"	16.67

RenShape 5169 Foundry Pattern and Tooling Board

- 75 Pound Density
- Red Color
- Foundry Patterns and Tools

RenShape 5169 is a polyurethane board that is designed for machining extremely durable and wear resistant foundry patterns, core boxes and other tools that require high wear and impact resistance. Its superior edge definition, dimensional stability and polishing characteristics also make it an excellent material for thermoforming tools designed to produce clear plastic parts.

Catalog Number	Description	Diameter	Thickness	Width	Length	Bd. Ft.
075246	RenShape 5169		1"	20"	60"	8.3
075232	RenShape 5169		2"	20"	60"	16.7
075233	RenShape 5169		3"	20"	60"	25
075234	RenShape 5169		4"	20"	60"	33.3
075127	RenShape 5169		5/8"	24"	30"	3.1
075131	RenShape 5169		3/4"	24"	30"	3.1
075128	RenShape 5169		1"	24"	60"	10
075129	RenShape 5169		1 1/4"	24"	60"	12.5
075130	RenShape 5169		1 1/2"	24"	60"	15
075164	RenShape 5169		2"	24"	60"	20
075165	RenShape 5169		3"	24"	60"	30
075166	RenShape 5169		4"	24"	60"	40
075247	RenShape 5169		5"	24"	30"	25
075248	RenShape 5169		6"	24"	30"	30
075160	RenShape 5169	28"	2"	Round		
075161	RenShape 5169	28"	3"	Round		
075162	RenShape 5169	28"	4"	Round		

RenShape® Polyurethane & Epoxy Tooling Boards [CONT'D.]

RenShape 5008 Intermediate Temperature Epoxy Modeling Board

- 42 Pound Density
- Light Blue Color
- Superior Dimensional Stability and Prepreg Compatibility

RenShape 5008 is an epoxy modeling board designed for tooling use up to 250°F (121°C) and is well-suited for building master models, layout tools for low and medium temperature curing prepregs, and other heat-resistant tooling. This medium density epoxy material features a very low coefficient of thermal expansion to produce outstanding accuracy and dimensional stability.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075289	RenShape 5008	2"	24"	60"	20
075290	RenShape 5008	4"	24"	60"	40
075291	RenShape 5008	6"	24"	60"	60

RenShape 2000 High-Temperature Epoxy Injection Mold Board

- 112 Pound Density
- Gray Color
- Prototype Injection Molds

RenShape 2000 is specifically designed for the fast machining of injection molds, resin transfer molds, vacuum form molds, and other tooling that requires very high temperature and chemical resistances. Molds created from RenShape 2000 may be polished to a metallic finish and are capable of producing hundreds of accurate thermoplastic parts.

Catalog Number	Description	Thickness	Width	Length	Bd. Ft.
075269	RenShape 2000	2"	24"	30"	10
075271	RenShape 2000	4"	24"	30"	20

RenShape Machining Specifications

	Roughing Speed (RPM)	Roughing Feed (IPM)	Finishing Speed (RPM)	Finishing Feed (IPM)
Low Density Polyurethane Foam Boards				
RenShape 5020	2,500	200	15,000	200
RenShape 5025	2,500	200	15,000	200
RenShape 5030	2,500	200	15,000	200
RenShape 5045	2,500	200	15,000	200
Medium Density Modeling & Styling Boards				
RenShape 440	2,000	100	15,000	200
RenShape 5440	2,000	100	15,000	200
RenShape 450	2,000	100	15,000	200
RenShape 5460	2,000	100	15,000	200
RenShape 460	1,600	40	10,000	100
RenShape 5003	1,600	40	10,000	100
Tooling & High-Temp Work Boards				
RenShape 470	1,600	40	10,000	100
RenShape 472	1,600	40	10,000	100
RenShape 473	1,600	40	10,000	100
RenShape 550	1,600	40	10,000	100
RenShape 5166	1,600	40	10,000	100
RenShape 5169	1,600	70-140	10,000	100-200
RenShape 5008	1,600	40	10,000	100
RenShape 2000	6-10,000	240+	15,000	300+

Cutters Used:

Roughing – 1" Ball End mill, 4-Flute, Carbide
 Finishing – 5/8" Ball End Mill, 2-Flute, Carbide

Depth:

Roughing – varied from 1/4" to 2 1/2" deep with a 40% stepover
 Finishing – 1/8" deep leaving 0.002 scallop height

These machining parameters are represented as starting points. Cutter type and material, spindle speed, feed rate, machine power and rigidity all affect machining results. User must determine best parameters for specific applications.

RenShape Matched Accessories

RenShape Matched Adhesives

Product	Matched Adhesive
RenShape 5020	Repro UltraLight, Ren Weld 103
RenShape 5025	Repro UltraLight, Ren Weld 103
RenShape 5030	Repro UltraLight, Ren Weld 103
RenShape 5045	Repro UltraLight, Ren Weld 103
RenShape 440	Repro Light, Ren Weld 103, RenLam 1700-1
RenShape 5440	Repro Light, Ren Weld 103, RenLam 1700-1
RenShape 450	Repro Light, Ren Weld 103, RenLam 1700-1
RenShape 5460	Repro Light, Ren Weld 103, RenLam 1700-1
RenShape 460	Repro Light, Ren Weld 103, RenLam 1700-1
RenShape 5003	Freeman 690, Ren Weld 103, RenLam 1700-1
RenShape 470	Freeman 690, Ren Weld 100, RenLam 1700-1
RenShape 472	Freeman 690, Ren Weld 103, RenLam 1700-1
RenShape 473	Freeman 690, Ren Weld 103, RenLam 1700-1
RenShape 550	RenLam 4005/Ren 1500
RenShape 5166	Ren Weld 100
RenShape 5169	Ren Weld 5169, Rapid Patch
RenShape 5008	Ren Weld 5008
RenShape 2000	RenLam 4026/Ren 1501

RenShape Matched Repair Pastes

Product	Matched Repair Paste
RenShape 5020	Freeman Quick-Fil
RenShape 5025	Freeman Quick-Fil
RenShape 5030	Freeman Quick-Fil
RenShape 5045	Freeman Quick-Fil
RenShape 440	Freeman Quick-Fil
RenShape 5440	Freeman Quick-Fil
RenShape 450	Freeman Quick-Fil, Ren TDT-177-113
RenShape 5460	Freeman Quick-Fil
RenShape 460	Freeman Quick-Fil
RenShape 5003	Freeman Quick-Fil
RenShape 470	Freeman Tuf-Fil Aluminum
RenShape 472	Freeman Tuf-Fil Aluminum
RenShape 473	Freeman Tuf-Fil Aluminum
RenShape 550	Freeman Hi-Temp Tuf-Fil, Ren TDT-177-119
RenShape 5166	RenCast 6470/DT 082
RenShape 5169	Ren Patch 5169, Rapid Patch
RenShape 5008	Ren Patch 5008
RenShape 2000	RenLam 4026/Ren 1501



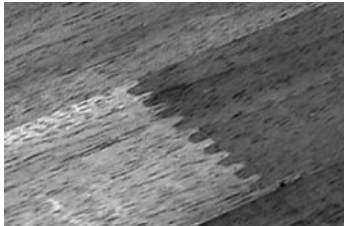
Perfect Plank® Specialty Lumber

For nearly 50 years, skilled craftsmen have made Perfect Plank their overwhelming choice when it comes to high quality pattern lumber. Perfect Plank is manufactured to provide a dry, thick, stress-free pattern plank that is uniform in texture, low in moisture and virtually defect-free.

Perfect Plank is designed to free the user from the time-consuming tasks of planing, jointing, sizing, and gluing to assemble larger blocks for pattern construction. Perfect Plank maximizes the skills, and best utilizes the production time of the pattern maker, mold maker, and model maker because each board is ready for use right off the shelf in a wide variety of sizes.

Virtually Defect-Free

All Perfect Plank is made from carefully inspected pieces of lumber with very few of the defects that cost the user time and money. This lumber is precisely dried and stress-relieved, then finger-jointed into narrow, vertical-grained strips.



Accurate Construction

The strips are then accurately machined prior to being glued face-to-face to form the standard width plank. The accuracy of Perfect Plank is especially evident in the glue lines of each piece. Thin lines of water-resistant glue are cured with state-of-the-art electronic gluing equipment to make Perfect Plank easy to carve and machine without causing unnecessary wear of woodworking tools and cutter blades.



Superior Stability

The vertical grain construction of Perfect Plank produces a pattern lumber that has much greater dimensional stability than ordinary, straight grain pattern lumber. Vertical grain Perfect Plank will resist twisting and cupping and will produce patterns, molds, and models that are far superior to those made from ordinary rough sawn lumber.



Properly Stored

All Perfect Plank is stored in climate controlled warehouses, which ensures consistent moisture content regardless of the location or time of year you require your next delivery.



Perfect Plank is:

Virtually Defect-Free	The Pine species is equivalent to Select grades of pattern lumber while the mahogany species is equivalent to FAS grades.
Grain	Tight, straight, vertical grain as opposed to the wide, diagonal and/or straight grain commonly found in other products.
Moisture Content	Kiln-dried to a low and uniform moisture content throughout (controlled to 8% - 10%)
Surfacing	Each board is surfaced four sides
End Gluing	Individual wood strips joined by precision finger-jointing with non-abrasive adhesives.
Edge Gluing	Strips are edge-glued with uniformly thin glue lines of water-resistant glue.
Immediately Usable	Simply select the thickness needed, cut off the required length, and begin to build your pattern. With Perfect Plank, every cubic inch is usable.

Ordering Information:

This material is now ordered by the full board. Board feet per board is still listed as a reference. When ordering please indicate how many boards needed.

Custom Ordering:

Custom orders are available in thicknesses from 1" to 6", widths 12" to 48", and lengths up to 16'.

Maple Perfect Plank is also available by special order. Lead times are based on availability.

Please contact customer service for all custom orders.

Perfect Plank® Specialty Lumber [CONT'D.]

Perfect Plank Pine

This popular laminated plank is uniformly dry, virtually free from defects, and planed on all four sides for immediate use. An excellent alternative to the select Sugar Pine grades which are becoming increasingly difficult to source.

Catalog Number	Description	Nom.* Thickness	Nom.* Width	Length	Board Feet/Piece
074005	4/4 Perfect Plank Pine	1"	18"	96"	12
074007	5/4 Perfect Plank Pine	1¼"	18"	96"	15
074010	6/4 Perfect Plank Pine	1½"	18"	96"	18
074012	7/4 Perfect Plank Pine	1¾"	18"	96"	21
074014	8/4 Perfect Plank Pine	2"	18"	96"	24
074015	9/4 Perfect Plank Pine	2¼"	18"	96"	27
074020	10/4 Perfect Plank Pine	2½"	18"	96"	30
074025	12/4 Perfect Plank Pine	3"	18"	96"	36
074028	13/4 Perfect Plank Pine	3¼"	18"	96"	39
074030	14/4 Perfect Plank Pine	3½"	18"	96"	42
074035	16/4 Perfect Plank Pine	4"	18"	96"	48
074040	17/4 Perfect Plank Pine	4¼"	18"	96"	51
074048	20/4 Perfect Plank Pine	5"	18"	96"	60
074050	21/4 Perfect Plank Pine	5¼"	18"	96"	63
074052	22/4 Perfect Plank Pine	5½"	18"	96"	66
074054	23/4 Perfect Plank Pine	5¾"	18"	96"	69
074055	24/4 Perfect Plank Pine	6"	18"	96"	72
074058	25/4 Perfect Plank Pine	6¼"	18"	96"	75

*Actual thicknesses are approximately 1/8" less and actual widths are 17" +/- 1/4".

Perfect Plank Jelutong

Due to its extremely fine texture and consistent grain structure, this species of Perfect Plank is the best product choice for hand carving or CNC machining. Constructed from Jelutong, this laminated wood product is uniformly dry, virtually free from defects, and planed on all four sides for immediate use.

Catalog Number	Description	Nom.* Thickness	Nom.* Width	Length	Board Feet/Piece
074310	6/4 Perfect Plank Jelutong	1½"	18"	96"	18
074314	8/4 Perfect Plank Jelutong	2"	18"	96"	24
074315	9/4 Perfect Plank Jelutong	2¼"	18"	96"	27
074320	10/4 Perfect Plank Jelutong	2½"	18"	96"	30
074325	12/4 Perfect Plank Jelutong	3"	18"	96"	36
074326	13/4 Perfect Plank Jelutong	3¼"	18"	96"	39
074335	16/4 Perfect Plank Jelutong	4"	18"	96"	48
074340	17/4 Perfect Plank Jelutong	4¼"	18"	96"	51
074349	20/4 Perfect Plank Jelutong	5"	18"	96"	60
074350	21/4 Perfect Plank Jelutong	5¼"	18"	96"	63
074354	23/4 Perfect Plank Jelutong	5¾"	18"	96"	69
074355	24/4 Perfect Plank Jelutong	6"	18"	96"	72

*Actual thicknesses are approximately 1/8" less and actual widths are 17" +/- 1/4".

Perfect Plank Mahogany

Constructed from genuine Mahogany, this laminated wood product is the best choice for high-tolerance patterns, models, and fixtures. It is uniformly dry, virtually free from defects, and planed on all four sides for immediate use.

Catalog Number	Description	Nom.* Thickness	Nom.* Width	Length	Board Feet/Piece
074378	4/4 Perfect Plank Mahogany	1"	18"	96"	12
074379	5/4 Perfect Plank Mahogany	1¼"	18"	96"	15
074380	6/4 Perfect Plank Mahogany	1½"	18"	96"	18
074382	8/4 Perfect Plank Mahogany	2"	18"	96"	24
074384	9/4 Perfect Plank Mahogany	2¼"	18"	96"	27
074386	10/4 Perfect Plank Mahogany	2½"	18"	96"	30
074388	12/4 Perfect Plank Mahogany	3"	18"	96"	36
074390	13/4 Perfect Plank Mahogany	3¼"	18"	96"	39
074391	14/4 Perfect Plank Mahogany	3½"	18"	96"	42
074393	16/4 Perfect Plank Mahogany	4"	18"	96"	48
074392	17/4 Perfect Plank Mahogany	4¼"	18"	96"	51
074395	20/4 Perfect Plank Mahogany	5"	18"	96"	60
074394	21/4 Perfect Plank Mahogany	5¼"	18"	96"	63
074389	22/4 Perfect Plank Mahogany	5½"	18"	96"	66
074397	23/4 Perfect Plank Mahogany	5¾"	18"	96"	69
074396	24/4 Perfect Plank Mahogany	6"	18"	96"	72

*Actual thicknesses are approximately 1/8" less and actual widths are 17" +/- 1/4".

SEE ALSO:

Product	Page No.
TUF-Carv (for Pine and Jelutong)	58
TUF-Fil (for Mahogany)	58
White Cold Glue	69
Wood Screws	92
Abrasives	102-107
Pattern Coatings—Primers, Paints & Sealers	110-111

Rough Sawn Pattern Lumber – Soft Woods

Freeman offers a complete selection of soft woods graded specifically for pattern and model construction. All of our lumber adheres to accepted grading rules. We take great pride in the quality of our lumber and all of our lumber products are stored inside climate controlled warehouses to maintain specified moisture content and overall quality.

Many of our various grades of lumber are available surfaced two sides (S2S) for a small additional charge. Listed in the Ordering Information Tables are sizes/grades we have in stock as S2S.

Ordering Information:

Please make us aware if you have specific requirements for boards with random widths and/or lengths.

How to Calculate Board Feet

$$\frac{\text{Length} \times \text{Width} \times \text{Thickness (inches)}}{144} = \text{Board Feet}$$

Pattern Sugar Pine

All Sugar Pine pattern lumber stocked by Freeman is kiln-dried and selected to meet the exacting specifications and requirements of pattern and model makers. By maintaining an average moisture content of 10% to 12%, selecting from specific domestic mills, and storing in climate controlled warehouses, we ensure that our customers receive boards that are stable and consistent in quality.

No. 2 Common

A very popular standard grade for the patternmaker. The entire board can be used in a wide range of applications where tight, sound knots do not affect performance and cost is a major factor. Tight knots are generally limited to 3¾", but most are significantly smaller and well-spaced. Spike knots are permitted, but we purchase our lumber with the objective of minimizing this defect.

Catalog Number	Description	Thickness	Width	Length
071225	4/4 No. 2 Common Pine	1"	12"	8'-16'
071230	5/4 No. 2 Common Pine	1¼"	12"	8'-16'
071235	6/4 No. 2 Common Pine	1½"	12"	8'-16'
071240	8/4 No. 2 Common Pine	2"	12"	8'-16'
071241	10/4 No. 2 Common Pine	2½"	12"	8'-16'
071242	12/4 No. 2 Common Pine	3"	12"	8'-16'

No. 3 Common

The most economical choice for the patternmaker. This grade is typically used for medium to large applications where cost of the lumber is of primary importance and surface rework is allowed. The most notable surface imperfections are random knots on both surfaces. Tight knots may be up to 4½" in diameter while loose knots may be up to 2½" in diameter.

Catalog Number	Description	Thickness	Width	Length
071260S	4/4 No. 3 Common Pine (S2S)	1"	12"	8'-16'
071275	8/4 No. 3 Common Pine	2"	12"	8'-16'

S2S = Surfaced two sides

Eastern White Pine

Its straight grain and comparatively uniform texture makes Eastern White Pine similar to Sugar Pine, although it is not as easily carvable as Sugar Pine. All of our Eastern White Pine is kiln-dried and ranks high in stability. Eastern White Pine offers an economical alternative to Sugar Pine. It is available in #2 Common, #3 Common and is stored inside climate controlled warehouses to maintain specified moisture content and overall quality.

No. 2 Common

Catalog Number	Description	Thickness	Width	Length
071254	6/4 No. 2 Common Eastern White Pine	1½"	12"	6'-16'
071251	8/4 No. 2 Common Eastern White Pine	2"	12"	6'-16'
071246	10/4 No. 2 Common Eastern White Pine	2½"	12"	6'-16'
071245	12/4 No. 2 Common Eastern White Pine	3"	12"	6'-16'

No. 3 Common

Catalog Number	Description	Thickness	Width	Length
071247	6/4 No. 3 Common Eastern White Pine	1½"	12"	6'-16'
071248	8/4 No. 3 Common Eastern White Pine	2"	12"	6'-16'

Jelutong

Because of its low-density, fine texture, and exceptional workability, Jelutong is ideal for pattern shop applications as well as fine detail work and intricate carving. Jelutong is a white wood with approximately the same weight properties as sugar pine and accepts pattern coatings very well. To minimize splitting and checking, all boards are carefully kiln-dried to under 12% moisture content and stored inside climate controlled warehouses to maintain specified moisture content and overall quality.

Catalog Number	Description	Thickness	Width	Length
073007	5/4 Jelutong	1¼"	12"	8'-18'
073010	6/4 Jelutong	1½"	12"	8'-18'
073015	8/4 Jelutong	2"	12"	8'-18'

Rough Sawn Pattern Lumber – Hardwoods

Freeman offers a complete selection of hardwoods graded specifically for pattern and model construction. All of our lumber adheres to accepted grading rules. We take great pride in the quality of our lumber and all of our lumber products are stored inside climate controlled warehouses to maintain specified moisture content and overall quality.

Ordering Information:

Please make us aware if you have specific requirements for boards with random widths and/or lengths.

How to Calculate Board Feet

$$\frac{\text{Length} \times \text{Width} \times \text{Thickness (inches)}}{144} = \text{Board Feet}$$

Mahogany

Genuine Mahogany is the most popular and best known of the hardwoods used for pattern and model work. It is extremely stable, withstands abrasion, and wears well. It has straight and close grain and carves easily. All Mahogany Pattern Lumber stocked by Freeman is kiln-dried and stored inside our climate controlled warehouses to maintain specified moisture content and overall quality. Freeman has been providing the trade with straight-grained Pattern Mahogany for over 50 years.

FAS Pattern Mahogany

Highest grade of Mahogany available (virtually defect-free). This is selected for its straight grain and used for producing high quality, accurate patterns and models. We also offer FAS Mahogany in 6' to 7' lengths which provides a lower cost option for those jobs that do not require the longer length.

Catalog Number	Description	Thickness	Width	Length
072005	4/4 FAS Mahogany	1"	6"+	8'-16'
075010	5/4 FAS Mahogany	1 1/4"	6"+	8'-16'
072015	6/4 FAS Mahogany	1 1/2"	6"+	8'-16'
072020	8/4 FAS Mahogany	2"	6"+	8'-16'
072025	10/4 FAS Mahogany	2 1/2"	6"+	8'-16'
072030	12/4 FAS Mahogany	3"	6"+	8'-16'
072035	16/4 FAS Mahogany	4"	6"+	8'-16'
072120	4/4 FAS Mahogany	1"	6"+	6'-7'
072125	5/4 FAS Mahogany	1 1/4"	6"+	6'-7'
072130	6/4 FAS Mahogany	1 1/2"	6"+	6'-7'
072135	8/4 FAS Mahogany	2"	6"+	6'-7'

Freeman Pattern Mahogany

Similar to our FAS Pattern Mahogany, but at a lower cost, this grade is selected for straight grain but allows for a small number of pin worm holes and other minor defects. Though widths are somewhat narrower than our FAS grade, our stock is typically 6" and wider.

Catalog Number	Description	Thickness	Width	Length
072150	4/4 Freeman Pattern Mahogany	1"	6"+	8'-16'
072155	5/4 Freeman Pattern Mahogany	1 1/4"	6"+	8'-16'
072160	6/4 Freeman Pattern Mahogany	1 1/2"	6"+	8'-16'
072165	8/4 Freeman Pattern Mahogany	2"	6"+	8'-16'

Poplar

Poplar is a domestically-grown, economical hardwood species that offers good workability and hardness characteristics. This pattern lumber is relatively clear and free of most defects. Stocked in "Face & Better", this species offers the patternmaker affordable performance compared to Sugar Pine and Mahogany.

Catalog Number	Description	Thickness	Width	Length
075046	4/4 Poplar – Face & Better	1"	6"+	8'-16'
075047	5/4 Poplar – Face & Better	1 1/4"	6"+	8'-16'
075048	6/4 Poplar – Face & Better	1 1/2"	6"+	8'-16'
075050	8/4 Poplar – Face & Better	2"	6"+	8'-16'
075051	10/4 Poplar – Face & Better	2 1/2"	6"+	8'-16'
075052	12/4 Poplar – Face & Better	3"	6"+	8'-16'
075053	16/4 Poplar – Face & Better	4"	6"+	8'-16'

Lyptus

Lyptus is a Brazilian grown hardwood that provides an economical alternative to Mahogany. This wood is plantation grown to protect Brazilian forests and is stable, hard, durable, wear resistant, and readily machinable. Although Lyptus is about 45% heavier than Mahogany, the boards are much straighter, flatter, and smoother in their rough sawn state.

Catalog Number	Description	Thickness	Width	Length
072205	4/4 Lyptus – FAS	1"	7-8"	8'-16'
072215	6/4 Lyptus – FAS	1 1/2"	7-8"	8'-16'
072220	8/4 Lyptus – FAS	2"	7-8"	8'-16'

Hard Maple

A hard, strong, white-colored wood with excellent wear-resistant characteristics. Kiln dried for stability and consistent quality.

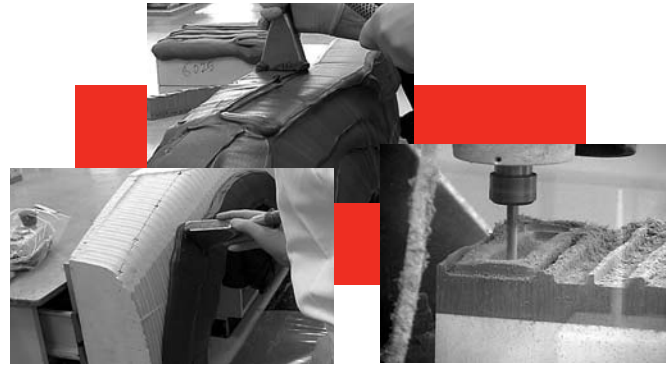
Catalog Number	Description	Thickness	Width	Length
075015	4/4 Hard Maple – FAS	1"	6"+	8'-16'
075025	6/4 Hard Maple – FAS	1 1/2"	6"+	8'-16'
075030	8/4 Hard Maple – FAS	2"	6"+	8'-16'

SEE ALSO:

Product	Page No.
TUF-Carv (for Pine and Jelutong)	58
TUF-Fil (for Hardwood)	58
White Cold Glue	69
Wood Screws	92
Abrasives	102-107
Pattern Coatings–Primers, Paints & Sealers	110-111

Ren® Seamless Modeling Pastes and Clay

Huntsman Advanced Materials' line of seamless modeling pastes and syntactic clay was created to meet the unique needs of those doing very large tooling, especially those in the aerospace, marine, and automotive industries. RenPaste seamless modeling pastes are machined dispensed, 2-part epoxy pastes that are applied to an undersized substructure (usually made of foam boards) enabling the toolmaker to achieve a high quality surface finish without the heavy weight, glue lines, and high costs associated with adhering multiple tooling boards together.



Ren Seamless Modeling Paste Specifications Chart

	RenPaste 4503	RenPaste 4569	RenPaste 4618-1	Ren RP 4040	ASTM
Color	Brown	Dark Grey	Light Grey	Off White	
Mix Ratio – Resin to Hardener (by wt.)	100:90	100:100	100:50	N/A	
Mix Ratio – Resin to Hardener (by vol.)	100:100	100:100	–	N/A	
Gel Time (min)	60-90	2.5-3 hrs.	15	N/A	D-2471
Density (g/cm³)	0.8	1.5	0.9	1.6	D-1963
Hardness (Shore D)	60	80	76	88	D-2240
Compressive Strength (psi)	2,100	9,000	9,280	20,500	D-695
Flexural Strength (psi)	2,200	7,500	5,220	8,140	D-790
Deflection Temp. (264 psi) (°F)	118	–	122	–	D-648
Tg DMA Onset (°F)	137	180	–	–	D-4065
Tg DMA Peak (°F)	159	216	–	324	D-4065
Coefficient of Thermal Expansion (in./in./°F)	32 x 10 ⁻⁶	28 x 10 ⁻⁶	30 x 10 ⁻⁶	10 x 10 ⁻⁶	D-3386

RenPaste® 4503 Seamless Modeling Paste

- 60-90 Minute Pot Life
- 60 D Shore Hardness
- Excellent Machinability and Surface Finish
- Automotive Design and Styling Models

RenPaste 4503 is a low density, two component epoxy paste that may be machine dispensed in a uniform layer over an undersized, lightweight, and low cost substructure. After permitting the material to solidify for a minimum of 1 day, the RenPaste 4503 may be easily machined to produce a model of excellent surface finish and good durability, with no evidence of any seam lines. This method is a cost effective alternative to the traditional method of gluing tooling boards together when large contoured tooling is done on a frequent basis.

Catalog Number	Description	Availability	Net Wt. (Lb.)
056147	RenPaste 4503 Resin Only	55 Gallon	275
056148	Ren 4503 Hardener Only	55 Gallon	242

RenPaste® 4569 Seamless Modeling Paste

- 2.5-3 Hrs. Pot Life
- 80 D Shore Hardness
- High Strength, Durability, and Heat Resistance
- Aircraft Models and Tooling

RenPaste 4569 is a high density, heat resistant, two component epoxy paste that may be dispensed in a uniform layer over an undersized substructure. Following a 2 day cure and a postcure at 175°F for 8 hours, the RenPaste 4569 may be easily machined to produce a model of excellent surface quality, excellent durability, and heat resistance to 180°F with no evidence of any seam lines. This method is a cost effective alternative to the traditional method of gluing tooling boards together when large contoured tooling is done on a frequent basis.

Catalog Number	Description	Availability	Net Wt. (Lb.)
056188	RenPaste 4569 Resin Only	55 Gallon	440
056189	Ren 4569 Hardener Only	55 Gallon	440

RenPaste® 4618-1 Seamless Modeling Paste

- 15 Minute Pot Life
- 76 D Shore Hardness
- Low Shrinkage, Mixes and Dispenses Easily, Excellent Machinability with Less Dust Generation
- Large Marine and Aerospace Models

RenPaste 4618-1 is a medium density epoxy seamless modeling paste that is specifically designed for building large, accurate models and plugs for the marine and aerospace industries. The paste is easy to dispense onto an undersized core in layers of 0.4 to 1.5 inches thick using meter/mix equipment. After curing for 24 to 48 hours at room temperature, RenPaste 4618-1 epoxy seamless modeling paste can be CNC machined to a fine finish.

Catalog Number	Description	Availability*	Net Wt. (Lb.)
056190	RenPaste 4618-1 Resin Only	55 Gallon	330
056191	Ren 4618-1 Hardener Only	55 Gallon	330

*Two drums of resin are required for correct mix ratio with one drum of hardener. Each drum sold separately

Ren RP 4040 Machinable Syntactic Clay

Ren RP 4040 is a high temperature resistant, low CTE, machinable, one component epoxy designed for directly machining curing tools for prepreg parts. Supplied in a patty form, these patties may be hand applied to a heat resistant substructure (such as Aluminum Honeycomb), heat cured, and finally machined to the desired tool shape. The resulting tool can be used at 300°F continuously and intermittently up to 350°F under full autoclave conditions.

Catalog Number	Description	Availability	Net Wt. (Lb.)
056152	Ren RP 4040	1.4" x 6" x 8.5" Patty	3.7

Richlite® Fibre-Laminate Sheets

Richlite Fibre-Laminate Sheets offer excellent machinability and dimensional stability. They are abrasion, moisture and chemical resistant. This remarkably strong material resists warping and maintains a uniform flatness and thickness throughout.

Physical Properties

Specific Gravity	1.24
Water Absorption (% @ 1"/25 hrs.)	1.45
Impact Strength (ft. lbs./in.)	1.17
Tensile Strength (lbs./sq. in.)	19,000
Flexural Strength (lbs./sq. in.)	22,000
Compressive Strength (lbs./sp. in.)	30,650
Abrasion-Resistance (Taber CS-17-% loss/1,000 revolutions)	0.0107
Hardness (Shore D)	86
Coefficient of Thermal Expansion (in./in. °F)	1.1 x 10 ⁻⁶
Density (lbs./cu. ft.)	77.4
UL Classified	Class A
Color	Oak

User Tips:

Sawing – Carbide-tipped saw blades are recommended for both circular and table saw cutting applications. The proper feed rate, combined with a sharp blade will result in coarse sawdust. All sawing should be performed dry.

Milling, Routing & Machining – Carbide cutters are recommended. The proper feed rate, combined with a sharp cutter will result in coarse sawdust. All machining should be performed dry.

Drilling & Tapping – The use of high speed steel drills and taps are recommended for short production runs and shallow holes. For longer production runs and deeper holes, use carbide-tipped drills and taps. When tapping Richlite Fibre-Laminate Sheets use a slightly smaller pilot drill than specified for the size tap required. This will assure optimum thread strength. Whenever possible, the piece to be machined should be backed up by another piece of scrap material to prevent chipping around the holes. Lift the drill frequently to allow chips to be removed and to prevent the build-up of excess heat. Holes drilled parallel to the lamination should be clamped or secured in a vise. All drilling and tapping should be performed dry.

Sanding & Buffing – Sanding should be performed by using a belt or disc sander, or by hand. Sand using the same procedures and techniques as used with wood. Dry sanding is recommended.

Bonding Richlite Fibre-Laminate Sheet – Lightly sand the mating surfaces to be glued. Use epoxy adhesives such as RenLam 1700-1 or Freeman 690.

Catalog Number	Description	Thickness	Width	Length
076001	Richlite Fibre-Laminate Sheet	1/2"	16"	96"
076036	Richlite Fibre-Laminate Sheet	5/8"	16"	96"
076038	Richlite Fibre-Laminate Sheet	3/4"	16"	96"
076002	Richlite Fibre-Laminate Sheet	1"	16"	96"
076041	Richlite Fibre-Laminate Sheet	1 1/4"	16"	96"
076045	Richlite Fibre-Laminate Sheet	1 1/2"	16"	96"
076003	Richlite Fibre-Laminate Sheet	2"	16"	96"
076004	Richlite Fibre-Laminate Sheet	3"	16"	96"
076043	Richlite Fibre-Laminate Sheet	1/2"	24"	48"
076035	Richlite Fibre-Laminate Sheet	5/8"	24"	48"
076029	Richlite Fibre-Laminate Sheet	3/4"	24"	48"
076039	Richlite Fibre-Laminate Sheet	1"	24"	48"
076040	Richlite Fibre-Laminate Sheet	1 1/4"	24"	48"
076044	Richlite Fibre-Laminate Sheet	1 1/2"	24"	48"
076009	Richlite Fibre-Laminate Sheet	2"	24"	48"
076047	Richlite Fibre-Laminate Sheet	3"	24"	48"
076048	Richlite Fibre-Laminate Sheet	1/2"	24"	96"
076049	Richlite Fibre-Laminate Sheet	5/8"	24"	96"
076050	Richlite Fibre-Laminate Sheet	3/4"	24"	96"
076051	Richlite Fibre-Laminate Sheet	1"	24"	96"
076052	Richlite Fibre-Laminate Sheet	1 1/4"	24"	96"
076053	Richlite Fibre-Laminate Sheet	1 1/2"	24"	96"
076054	Richlite Fibre-Laminate Sheet	2"	24"	96"
076042	Richlite Fibre-Laminate Sheet	1/2"	48"	48"
076034	Richlite Fibre-Laminate Sheet	5/8"	48"	48"
076037	Richlite Fibre-Laminate Sheet	3/4"	48"	48"
076025	Richlite Fibre-Laminate Sheet	1"	48"	48"
076026	Richlite Fibre-Laminate Sheet	1 1/4"	48"	48"
076033	Richlite Fibre-Laminate Sheet	1 1/2"	48"	48"
076027	Richlite Fibre-Laminate Sheet	2"	48"	48"
076005	Richlite Fibre-Laminate Sheet	1/4"	48"	96"
076022	Richlite Fibre-Laminate Sheet	1/2"	48"	96"
076023	Richlite Fibre-Laminate Sheet	5/8"	48"	96"
076024	Richlite Fibre-Laminate Sheet	3/4"	48"	96"
076007	Richlite Fibre-Laminate Sheet	1"	48"	96"
076031	Richlite Fibre-Laminate Sheet	1 1/4"	48"	96"
076032	Richlite Fibre-Laminate Sheet	1 1/2"	48"	96"
076008	Richlite Fibre-Laminate Sheet	2"	48"	96"
076046	Richlite Fibre-Laminate Sheet	3"	48"	96"

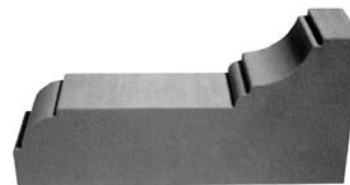
**Some sizes are special order and subject to extended lead times. Please contact customer service for complete information.

MDF – Medium Density Fiberboard

Medium Density Fiberboard (MDF) is a low cost machinable media for producing master patterns, models, and prototypes. This product features a uniform density for smooth machining and low tool wear. MDF will accept a wide range of sealers, primers, and coatings to produce a hard, durable tool surface.

Physical Properties

Color	Beige
Density	39 Lbs./Ft. ³
Internal Bond	90 Lbs./Inch ²
Moisture Content	5-8%
Hardness (Shore D)	45-55



Catalog Number	Description	Thickness	Width	Length	Board Feet/Piece
076225	Medium Density Fiberboard	2"	24"	96"	32
076230	Medium Density Fiberboard	4"	24"	96"	64

Other sizes available upon special request.