
PROTOBLOCK® Air Permeable Prototype Tooling

Technical Bulletin



CMT MATERIALS, Inc.
107 Frank Mossberg Drive
Attleboro, MA 02703
TEL (508) 226-3901 FAX - 3902
email: info@cmtmaterials.com
www.cmtmaterials.com

Innovative Tooling Materials for Thermoforming

General

PROTOBLOCK is a new composite material made of inorganic granules and epoxy resin engineered to form a micro-porous structure for use as prototype vacuum form or thermoform tooling. The material is air-permeable over the entire surface allowing for unique design considerations for prototype tools. PROTOBLOCK is a cost effective alternative to other permeable materials when considering short duration runs.

Thermoformers have seen some of the following advantages:

- ✓ High Definition and Accuracy
- ✓ Improved Surface Quality
- ✓ Trapped Air Elimination
- ✓ Faster Air Evacuation
- ✓ Reduced Machine Time
- ✓ Improved Mold Detail



PROTOBLOCK may also be used in vacuum clamping devices. Even clamping is attained without the need for drilling. Since there are no drill holes or channels, even sensitive parts show no deformation. Static jam while ejecting can be eliminated using compressed air, which creates a smooth and even air cushion.

Physical properties at 67°F (20 °C)

Property	Value (Eng)	Value (SI)
Color	White	White
Density	106.1 lb/ft ³	1.7 g/cm ³
Hardness Shore D	80	80
Flexural strength	3,192 psi	22 N/mm ²
Flexural Modulus	1,190 ksi	8,200 N/mm ²
Impact strength	1.52 ft-lb/in ²	3.2 kJ/m ²
Coefficient of thermal expansion 25 °C -125°C (77 - 257 °F)	14 -16 x 10 ⁻⁶ in/in/°F	25 - 30 x 10 ⁻⁶ mm/mm/°C
Thermal conductivity: at 100°C (212 °F)	0.86 BTU/ hr-ft-°F	1.6 W / m-°C
Martens Dimensional Stability	150 °F	65 °C
Total porosity (by volume)	20 %	20 %

Available Sizes

PROTOBLOCK is manufactured in blocks of 500 x 500 x 400 mm, (~20" x 20" x 16"), and cut into slabs of any required thickness. After the cutting process, the air permeability of the slab surface is reduced due to partial closure of the pores. It is essential to mill both surfaces of the slab by cutting off approx. 0.5 mm, (0.02"), providing complete air permeability.

Storage

Store dry, protect against jolts and impacts. Avoid contact with grease and fluids.

Machining

The machining properties of PROTOBLOCK are excellent and are comparable with rapid machinable aluminium. **PROTOBLOCK must be machined dry and should not be in contact with any cooling liquids.** In order to avoid any closure of pores, sharp tools made of HSS or carbide with edge angles as for aluminium must be used. It is recommended to use dust extraction. Avoid contact with grease and fluids

Cutting speed up to 3300 ft/min can be applied. The forward feed can be set up to 0.004 in/ tooth; in areas of thin walls the forward feed should be reduced.

Grinding/Polishing

Grinding and polishing of the machined surfaces can be made by hand or with a vibrating grinder. Use corundum paper with grains of 400 / 600 / 1200 in the ascending order. **PROTOBLOCK has to be polished dry and without any polishing paste!**

Air Flow Rates

The numbers are average values for calculating air consumption for overpressure or under pressure applications. Specification is in liters per minute per cm².

Pressure difference in bar (psi)	Plate thickness (mm)				
	10	15	20	25	30
0.2 (2.9)	0.42	0.35	0.31	0.26	0.23
0.3 (4.4)	0.53	0.44	0.38	0.34	0.30
0.4 (5.8)	0.65	0.55	0.48	0.42	0.37
0.5 (7.3)	0.77	0.65	0.57	0.51	0.46
0.6 (8.8)	0.89	0.75	0.67	0.59	0.54
0.7 (10.3)	1.01	0.87	0.77	0.67	0.62
0.8 (11.6)	1.15	0.99	0.87	0.79	0.71
0.9 (13.1)	1.29	1.12	0.98	0.88	0.80
1.0 (14.5)	1.42	1.22	1.08	0.96	0.90
2.0 (29.0)	2.53	2.20	1.97	1.79	1.65
3.0 (43.5)	3.45	3.02	2.72	2.48	2.28
4.0 (58.0)	4.25	3.73	3.37	3.08	2.85
5.0 (72.5)	4.92	4.34	3.93	3.60	3.34
6.0 (87.1)	5.48	4.84	4.39	4.04	3.75