

Material Information



PMMA (Acrylic)

Introduction

PMMA, or Polymethyl Methacrylate, is a transparent, rigid engineering thermoplastic commonly known as acrylic. It offers excellent optical clarity, good UV resistance, scratch resistance, and good machinability, making it a popular choice for CNC-machined parts where transparency, appearance, and dimensional accuracy are important.

Advantages

Excellent optical clarity, good UV resistance, good surface hardness, low weight, and good machinability. PMMA can also be polished to achieve a clear, smooth surface, making it particularly suitable for transparent components and applications where visual appearance is important.

Disadvantages

PMMA is more brittle and has lower impact strength than polycarbonate, making it less suitable for applications involving severe impact or repeated mechanical shock. It also has lower heat resistance than many high-performance engineering plastics and can soften or deform when exposed to elevated temperatures.

Tolerance

3DSPRO can manufacture and inspect to tight tolerances, including sub +/- 0.001" tolerances, per your drawing specifications and GD&T callouts.

Recommendation

The combination of optical clarity, UV resistance, machinability, surface hardness, and lightweight construction makes PMMA suitable for CNC-machined transparent parts, optical components, display products, covers, and prototypes. It is particularly appropriate for applications where visual transparency and appearance are more important than high impact strength or high-temperature performance.

Material Specifications (For reference only.)	
Tensile strength	65 to 75MPa
Elongation at Break	2% to 10%
Hardness	80 to 90 HD

Heat deflection temperature at 0.45MPa	105°C to 110°C
Melting point	85°C to 110°C

Attention

PMMA can be sensitive to machining-generated heat and residual stress, which may affect surface quality or contribute to stress cracking under certain conditions. Appropriate cutting parameters, sharp tooling, and effective chip evacuation should be used during CNC machining. For applications requiring high optical clarity, additional polishing may be needed after machining to reduce tool marks and improve transparency.

Applications

3DSPRO finds people using PMMA to make functional parts and prototypes in the following industries and applications.

Optical components:

Lenses, light pipes, optical covers, light guides, and other transparent components requiring good light transmission.

Lighting equipment:

Light shades, diffusers, lamp covers, reflectors, and other components used for light transmission and visual effects.

Electronics and equipment:

Transparent housings, protective covers, display windows, instrument panels, and other components requiring visibility and lightweight construction.

Consumer and display products:

Signs, display fixtures, product prototypes, decorative panels, covers, and other CNC-machined parts where transparency, surface appearance, and UV resistance are important.