

Polybutylene Terephthalate (PBT) is a high performance semi crystalline resin, one of the toughest and most versatile of all engineering thermoplastics. [1] PBT is a strong, lightweight material that has superior electrical properties that makes it one of the top contenders in the plastic industry.

PBT is generally processed at temperatures ranging from 230° to 270° C. PBT is often preferred over Polyethylene Terephthalate (PET) because it crystallizes faster, which makes it more cost effective in injection molding applications. PBT can be joined together by a number of different ways; ultrasonic, hot plate, friction, and by hot gas welding. PBT also can be joined by two-component adhesives. [2]

With a somewhat low strength and stiffness level, PBT can be made significantly stronger by adding 10-30% nylon which will incorporate glass reinforcement. When PBT is alloyed with 15-25% low density polyethylene, processing and mechanical properties can be enhanced as well as the reduction of moisture consumption. PBT also has outstanding wear and creep resistance over steady and elevated temperatures. Along with wear longevity and resistance to creep, PBT is also UV stable. Only when exposed to UV light for an extended period of time discoloration and brittleness can occur. A benzotriazole-type UV stabilizer is generally used because it offers low initial color and good color stability. [3]

Excellent electrical properties allow PBT to be widely used in the injection molding industry. PBT has exceptional insulation resistance as well as a high dielectric strength. Its strong dimensional stability, especially in water, and resistance to hydrocarbon oils, gives it even more versatility. Outstanding arc resistance and a low dissipation level over a wide range of humidity and temperatures are additional properties that PBT has to offer.

Although PBT is one of the best resins to use for injection molding, it has other limitations. PBT is sensitive to hot water, strong bases, oxidizing acids and ketones. PBT with no glass reinforcement is notch sensitive and PBT with too much glass reinforcement becomes too brittle for use. Thus, finding the appropriate amount of glass reinforcement is highly dependent on the application. When PBT is cooled at different temperatures part warping and shrinkage, up to 2.3%, can occur. An optimum cooling temperature of 250-275° F for 2-4 hours will produce the best results. [1]

PBT is used in everyday applications including; switches and relays to motor housings and key caps for computer key boards. It is also used in vacuum cleaner parts and toaster side panels. PBT is a big part of everyday appliances and will only grow to be bigger as the demand for these appliances increases.

[1] Campo, E. Alfredo, *The Complete Part Design Handbook*, Hanser, 2006.

[2] Osswald, et al, *International Plastics Handbook*, Hanser, 2006.

[3] Pospisil , Jan, and Peter P. Klemchuck. *Oxidation Inhibition in Organic Materials*. 2nd ed. CRC Press, 1990.