

Selecting the appropriate material is a crucial step when bringing a plastic injection molded part to market. Product designers should consider their product's application requirements and these things during the material selection process: mechanical characteristics, material properties, molding properties, cost.

Proto Plastics Inc. has the expertise and personnel to work with product designers to adjust part geometry to ensure the moldability of the part. Injection molders like Proto Plastics need to have a good understanding of process-related issues such as the ability to fill the mold, tendency to flash, ease of part ejection, and the potential for warp, sink or void creation. Plastic injection molding material manufacturers work with product designers and injection molders to influence part geometry as well since they are very knowledgeable when it comes to material properties and how they may impact the application requirements and part moldability. This collaboration between the customer, injection molder, & material supplier increases the probability of a successful part design and project.

The following is a general guide for understanding which thermoplastic materials may be suitable for your application and product:

Plastic Material Type	Main Properties/Characteristics	Application Examples	Cost
Acetal (POM)	Tough, rigid, chemical resistance, high temp strength, natural lubrication, fatigue resistance	Bearings, cams, gears, handles, plumbing components, rollers, rotors, slide guides, valves, switches, bushings	Low/Medium
Acrylic (PMMA)	Rigid, brittle, scratch resistant, transparent, optical clarity	Weatherable, Color stability, Display stands, knobs, lenses, light housings, panels, reflectors, signs, shelves, trays, windows	Low/Medium
Acrylonitrile Butadiene Styrene (ABS)	Good durability & impact resistance, electroplating capability, flame retardancy, high pressure resistance	Automotive (consoles, panels, trim, vents), consumer appliances, office equipment, gauges, housings, wall switch & wheel covers, inhalers, toys	Low/Medium
HDPE (High Density Polyethylene)	Impact & chemical resistance, tough/stiff, waxy appearance	Chair seats, toys, utensils, milk bottle caps, housings, covers, and containers	Low
Polyamide or Nylon 6 (PA6)	Impact resistance, High temp. strength, rigidity, abrasion & fatigue resistance, self-lubrication, low friction, high melting point	Metal replacements, living hinge, bearings, bushings, gears, rollers, wheels, handles, connectors, plugs, fans, coils	Medium

Plastic Material Type	Main Properties/Characteristics	Application Examples	Cost
Polyamide or Nylon 6/6, glass-filled (PA 6/6)	Excellent strength, wear, abrasion, impact, chemical, and heat resistance. Low friction & self-lubrication	Handles, levers, small housings, zip ties, brake fluid housing, industrial valves	Medium
Polycarbonate (PC)	Impact Resistance, tough, clarity (even at high temps), temp. resistance	Lens, goggles, surgical forceps, bottles, containers, safety helmets & shields, reflectors, windows, good for ultrasonic welding	Med./High
PC/ABS	Great combination of mechanical and thermal properties. Good impact strength, rigidity, thermal, biocompatibility, and color stability.	Automotive interior, healthcare, food trays, taillight housing, headlight rings	Medium
Polyetherimide (PEI)	Superior heat & flame resistance, mechanical strength, hydrolysis resistant, highly resistant to acidic solutions, available in transparent	Electrical components (connectors, boards, switches), covers, shields, surgical tools, microwave cookware, temperature sensors, jet engine components	High
Polyphenylene Oxide (PPO)	High heat resistance, stiff, electrical performance, hydrolytic stability	Wire & cable coatings, automotive panels, plumbing components, terminal housing, pump housing	Medium/High
Polyphenylene Sulfide (PPS)	Strength, good chemical & heat resistance, dielectric & insulating	Bearings, covers, fuel system & hydraulic components, guides, switches, pumps, cams, sockets, flow meters, and shields	High
Polypropylene (PP)	Lightweight, impact resistance, flexible, naturally waxy. Good tensile strength and inertness towards acids, alkalis, and solvents.	Hinged parts, automotive (bumpers, covers, trim), household goods (bottles, caps), crates, handles, battery cases	Low

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Polystyrene - High Impact (HIPS)	Decent impact strength & toughness, gloss, naturally translucent	Home appliances, food containers/packaging, toys, medical test tubes	Low
Polyvinyl Chloride (PVC)	Tough, flexible, transparent or opaque	Weatherable, solvent resistance, electrical insulation, housewares, medical tubing, shoe soles, toys, construction, sewerage pipes, appliances, seals, gaskets	Low
Thermoplastic Elastomer (TPE/R)	Impact resistance, tough, flexible, longevity	Over molding, living hinges, bushings, electrical components, seals, washers, wheels, grips, toys	Med./High