

Nylon Plastic

Engineering & Manufacturing Capabilities Guide

Your comprehensive reference for plastic part design, material selection, and manufacturing process decision-making.

30+
CNC & Molding Cells

ISO 9001
Certified Quality

15-25
Day Lead Time

Global
Shipping

1. About Nylon Plastic

Nylon Plastic is a full-service plastic parts manufacturer specializing in CNC machining, injection molding, and additive manufacturing. We serve engineers, procurement managers, and product developers across North America, Europe, and Asia with a single-source solution for plastic components — from prototype to production.

Our 30+ production cells operate under an ISO 9001:2015 certified quality management system, with full material traceability and inspection reporting on every order. Whether you need 5 machined PEEK prototypes or 50,000 injection-molded nylon housings, we have the equipment and expertise to deliver.

Core Capabilities

- **CNC Machining:** 3-, 4-, and 5-axis CNC for engineering plastics — PEEK, PTFE, nylon, acetal, polycarbonate, acrylic. Tolerances to ± 0.05 mm.
- **Injection Molding:** 50 to 450 ton presses. In-house mold design and tooling management. Materials include PA6, PA66, glass-filled nylon, PP, ABS, PC, PBT, TPE.
- **3D Printing / Additive:** SLA, SLS, MJF, and FDM for rapid prototyping and low-volume production.
- **Secondary Operations:** Ultrasonic welding, heat staking, surface finishing (SPI/VDI), assembly, and packaging.
- **Quality Control:** CMM, optical comparator, tensile testing, and full dimensional inspection reports.

2. Manufacturing Process Selection Guide

Selecting between CNC machining and injection molding is one of the most consequential decisions in plastic part development. The table below summarizes the key trade-offs.

Factor	CNC Machining	Injection Molding	Best Choice
Tooling Cost	\$0 (no mold)	\$5,000 - \$80,000+	CNC for <500 pcs
Per-Part Cost (100 pcs)	\$15 - \$50	\$20 - \$60	CNC
Per-Part Cost (10K pcs)	\$15 - \$50	\$0.50 - \$5	Molding
Lead Time	3-10 days	2-8 weeks (+mold)	CNC for urgent
Tolerance	±0.05 mm	±0.10 mm (typical)	CNC
Material Options	Any rigid plastic	Most thermoplastics	CNC (wider range)
Surface Finish	Machined (SPI-C)	SPI-A to D grades	Molding (cosmetic)
Design Complexity	Undercuts need fixturing	Complex geometry OK	Molding
Minimum Order	1 piece	1,000+ (economical)	CNC

Rule of thumb: If your annual volume exceeds 1,000 parts and you can amortize tooling across 2+ years, injection molding wins on unit cost. For everything else, CNC or hybrid.

When to Choose 3D Printing

Additive manufacturing bridges the gap — ideal for prototyping before committing to tooling, and for complex geometries (internal channels, lattice structures) that cannot be machined or molded. Our SLA, SLS, and MJF services offer lead times of 3-7 days with materials ranging from engineering-grade nylon (PA12) to high-temperature resins.

3. Engineering Plastic Material Reference

Material selection directly impacts part performance, manufacturability, and cost. Below is a quick-reference comparison of the most commonly specified engineering plastics.

Material	Tensile (MPa)	Max Temp (°C)	Best For
PA6 (Nylon 6)	70-85	100	General-purpose structural parts
PA66 (Nylon 66)	75-90	120	Higher stiffness & heat resistance
PA66-GF30 (30% Glass)	150-180	140	High-strength structural
PEEK	90-100	250	Aerospace, medical, high-temp
POM (Acetal/Delrin)	60-70	90	Gears, bearings, precision parts
PC (Polycarbonate)	60-70	125	Transparent, impact-resistant
PMMA (Acrylic)	50-70	80	Optical, transparent display,
ABS	30-50	80	Consumer housings, prototypes
PP (Polypropylene)	25-40	100	Chemical tanks, living hinges
PTFE (Teflon)	20-30	260	Chemical resistance, low friction

Values are typical ranges. Actual performance depends on specific grade, fillers, and processing conditions. Contact our engineering team for data sheets on specific grades.

4. Plastic Part Design Guidelines

Good plastic part design starts with understanding process constraints. These guidelines help avoid the most common manufacturing issues.

Uniform Wall Thickness

Maintain consistent wall thickness throughout your part. Variations cause uneven cooling, warpage, and sink marks. Recommended: 1.5-4 mm for injection molding. If thickness must vary, use gradual transitions (3:1 ratio maximum).

Draft Angles

Apply 1-3° draft on all vertical surfaces for injection-molded parts. Without draft, parts stick in the mold and require excessive ejection force that damages both part and tool. Textured surfaces need additional 1° per 0.025 mm texture depth.

Radii and Fillets

Avoid sharp internal corners — they create stress concentrations that lead to premature failure. Apply a minimum radius of 0.5x wall thickness at internal corners. External corners: 1.5x wall thickness.

Undercut Awareness

Undercuts require side-actions or lifters in injection molds, adding \$2,000-8,000+ to tooling. Redesign to eliminate undercuts where possible, or use pass-through coring. For CNC, undercuts require multi-setup fixturing or 5-axis machining.

Gate Location

Gate placement affects fill pattern, weld line position, and cosmetic appearance. Place gates at the thickest section to ensure complete packing. Avoid gating near high-stress areas. Discuss gate options with our tooling engineers before finalizing.

Tolerance Expectations

Injection molding: ± 0.10 mm commercial, ± 0.05 mm fine. CNC: ± 0.05 mm standard, ± 0.01 mm achievable. Do not over-specify — each tightening of 0.01 mm can double cost. Apply tight tolerances only to functional features (bearing bores, seal surfaces).

5. Quality Assurance & Certifications

Every order ships with a Certificate of Conformance and dimensional inspection report as standard. Our ISO 9001:2015 system ensures repeatable quality across all production runs.

- **Incoming Material Inspection:** Every resin batch is verified against supplier certifications before release to production.
- **First Article Inspection (FAI):** Full dimensional report per AS9102 on first-off parts from every production run.
- **In-Process Control:** Statistical process control (SPC) for critical dimensions on runs over 500 pieces.
- **Final Inspection:** 100% visual inspection plus AQL sampling per ISO 2859-1. CMM reports included.
- **Material Certification:** Traceability from resin lot number to finished part — full chain of custody.
- **Surface Finish Verification:** SPI/VDI standard finishes verified with comparator plates or profilometer.

6. Start Your Project

Ready to discuss your plastic part requirements? Our engineering team will review your design, recommend the optimal manufacturing process, and provide a firm quotation — typically within 24 hours.

**Send your drawings or 3D models to our engineering team
at <https://nylonplastic.com/contact/>**

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