



Polyurethane Q&A

By [Northstar Polymers](#)

What is Polyurethane?

A: Polyurethane is a versatile, elastomeric polymer used across many industries for products such as insulation foam, cushioning, parts molding, adhesives, coatings, and composites. Known for its adaptability, polyurethane is ideal for various molded parts, including automotive components, skate wheels, industrial products, medical supplies, and consumer goods. Its durability and flexibility make it a preferred choice for applications that require resilience, comfort, and structural integrity.

[Northstar Polymers](#) offers a wide range of [polyurethane raw materials](#).

What Types of Polyurethane Foams Are Available?

A: Polyurethane foams come in both soft and rigid varieties, with options for different densities and strengths. Softer foams are commonly used for seat cushions, bumpers, earplugs, and other comfort products. Harder foams provide insulation, gap filling, garage floor repair, prosthetic cores, and more. Microcellular foams are high-density closed flexible foams used in shoe soles, bumpers, bushings, archery targets, and gaskets.

[Northstar Polymers](#) supplies raw materials for a variety of polyurethane [flexible foam](#) and [rigid foam](#) formulations.

What Are the Types of Solid Polyurethanes?

A: Solid polyurethane compounds range from very soft to very hard. Harder polyurethanes are used in applications like climbing holds for bouldering, and other load-bearing uses. Rubbery polyurethanes are common in gaskets, seals, skate wheels, rollers, sprockets, abrasion-resistant industrial parts, and mold-making for concrete products. Very soft polyurethanes, called “gel elastomers,” are used for applications requiring softness and flexibility, like shoe insoles and keyboard wrist rests. Solid polyurethane products can be either thermoplastic (TPU) or thermoset.

Northstar Polymers offers [thermoset polyurethane formulations](#) and [precursors](#) for various applications.

What Other Products Are Made with Polyurethanes?

A: Polyurethane chemistry is widely applied in adhesives, sealants, and coatings. These products often use isocyanate prepolymers, which react with moisture in the air to create a solid polymer, making it ideal for applications that need quick setting in ambient conditions. Polyurethane prepolymers are commonly used in these products, while polyurethane varnishes are often based on alkyd resins, which cure through oxygen exposure rather than moisture.

Northstar Polymers provides isocyanate-terminated [polyurethane prepolymers](#) for use in adhesives, sealants, and coatings.

How Can I Manufacture Polyurethane Parts?

A: Polyurethane casting resins can be used to create molded products such as skate wheels and climbing holds. These resins are typically supplied as a two-component system, Part-A (isocyanate) and Part-B (polyol). Mixing these components at a specific ratio creates a blended material that can be poured into a mold to form the desired shape.

Northstar Polymers offers various [polyurethane formulations](#) suitable for creating polyurethane parts.

Are There Different Types of Polyurethane Casting Resin Compounds?

A: Yes, polyurethane casting resins can be categorized by strength and process requirements. “High-Performance” formulations produce strong parts but often require advanced molding equipment. “Room-Temperature-Curable” formulations are easier to process but may have lower strength. Additionally, resins can be classified by polarity: polar types repel oils, non-polar types repel water, and apolar types are neutral.

Northstar Polymers provides a selection of [“High-Performance”](#) and [“Room-Temperature-Curable”](#) casting resins with varying polarities.

What Is Polyurethane Gel Elastomer?

A: Polyurethane gel elastomers are extremely soft, resilient compounds used for products like wrist rests, surgical bed cushions, and motorcycle seats. These elastomers are also used in pressure-sensitive adhesives for temporary adhesion products, as well as novelty and specialty items.

Northstar Polymers supplies a range of [polyurethane gel elastomer formulations](#).

What Equipment Do I Need to Cast Polyurethane Resins?

A: Required equipment varies by formulation. High-performance resins typically require an inline meter-mixing dispenser, heated molds, and industrial ovens. For room-temperature-curable resins, simpler tools like a scale, cup, stir stick, and mold may suffice. Manual mixing may require a vacuum chamber to remove bubbles before pouring.

What Types of Molds Are Used for Polyurethane Parts?

A: Room-temperature-curable polyurethane parts can use simple molds like cookie sheets, while high-performance resins may require durable aluminum molds to prevent distortion. Silicone rubber is a common mold material, known for its ease of release and heat tolerance.

Do I Need a Mold Release Agent?

A: Most polyurethane molding processes require a mold release agent to prevent sticking. For non-foam solid elastomers, silicone-based agents are effective. However, silicone-based agents can cause adhesion issues in environments with welding or adhesive bonding due to potential contamination.

How Should Polyurethane Resin Components Be Stored?

A: Polyurethane components are moisture-sensitive. Once opened, they should be stored in a nitrogen- or argon-purged container. They also require temperature-controlled storage, typically between 72°F and 86°F, to prevent degradation.

How Can I Add Color to Polyurethane Products?

A: Colors are usually added via pigment dispersions compatible with polyurethane. A small concentration (0.1%–2.0%) of dispersion typically suffices for an opaque color, with stronger colors like black and blue needing lower amounts than lighter shades such as white and yellow.

What Is the Temperature Range for Polyurethane Products?

A: Polyurethane products are generally stable up to 180°F, and higher temperatures cause softening and degradation over time. Many soft polyurethanes remain flexible at temperatures as low as -40°F, but rigidity can increase as temperatures drop.

Are Polyurethanes Chemical Resistant?

A: Polyurethane's chemical resistance varies by formulation. Common room-temperature-curable polyurethanes may weaken with exposure to ketones, alcohols, or hydrocarbons. For better chemical resistance, formulations with polycarbonate or polycaprolactone polyols are recommended.

What Is the Cost of Polyurethane Resins?

A: As of November 2024, MDI-based room-temperature-curable polyurethane resin costs about \$2.80 to \$3.80 per pound in bulk. Smaller packages may cost two to three times more. Specialty formulations are generally more expensive.

For more information, please visit our website <https://northstarpolymers.com>