

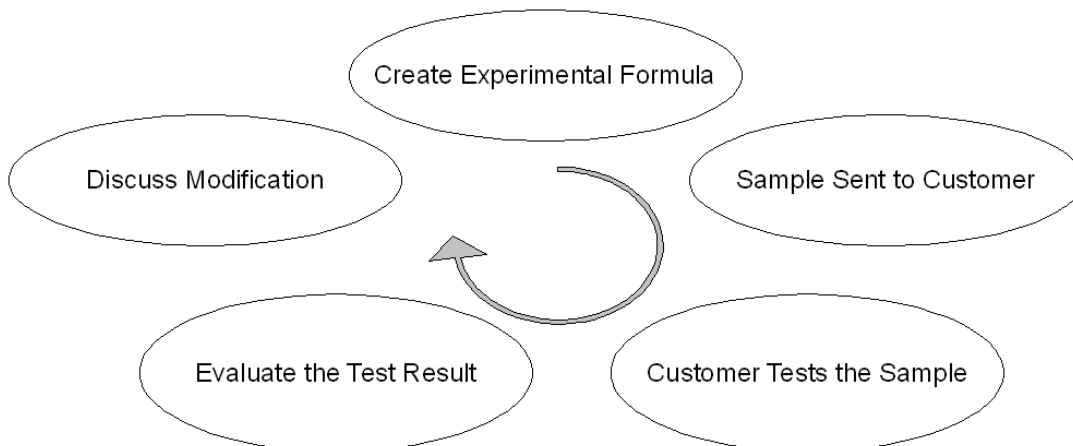


## Developing Specialty Materials

### Developing a Formulation for Your Specific Application with Northstar Polymers

A large part of our business comes from the results of our co-development works with our customers. We work with customers from a wide range of industries including medical, defense, consumer products, electronics, and constructions, to create the best-fit custom formulation for the specific application.

Our customers appreciate our fast iteration method that can reach the goal quickly and surely at a low cost. After the initial application idea is discussed and requirements are identified, we repeat the following process until we find an optimum formula:



The iterations of this development cycle take us closer to the goal one step at a time as we identify issues and discover new possibilities. Taking many small steps with our fast sample response time enables the customer to develop a new material smoothly without taking a large risk.

### Types of Products We Work With

We work with a variety of types of formulas in the polyurethane domain such as:

- Gel Elastomer Systems
- Specialty Foam Systems
- High Performance Elastomer Systems

- Room Temperature Curable Elastomer Systems
- Prepolymers and other polyurethane intermediates
- Thermoplastic Polyurethane (TPU)
- Two-Part 100% Solid Coating Systems

### Our Manufacturing Capabilities

When the developmental phase is over, Northstar Polymers can bring your material development project into pre-production phase and to the production phase. Small samples are provided from our Minneapolis lab promptly. Larger samples, and production quantity materials will be made at our manufacturing plant in Blooming Prairie, Minnesota. Our manufacturing facility is equipped for various production quantity requirements.

#### *Reactors:*

ID	Capacity (Gallons)	Lining	Heating Coils	Vacuum
1	50	Stainless Steel	External	Yes
2	500	Glass	External	Yes
3	1200	Stainless Steel	External	Yes
4	2000	Stainless Steel	External	Yes

#### *Mixing Tank:*

Capacity (Gallons)	Lining	Heating Coils	Vacuum
1250	Stainless Steel	Internal	Yes

The 1200 and 2000 gallon reactor and the mixing tanks are equipment load cells with digital display. Atmosphere is – 40 °C dew-point dry air, or nitrogen gas. 1, 5, and 55 gallon size manual batches are also available.

#### *Quality Control:*

- Brookfield Viscosity
- NCO Titillation
- Karl Fischer Moisture Analysis
- Tensile/Elongation Tear Strength Tester
- Shore Durometer Hardness in D, A, OO, OOO Scales
- Bashore Rebound
- Taber Abrasion

#### *Packages:*

Primarily the materials are loaded into 55-gallon size steel drums or 5-gallon size plastic pails with nitrogen gas purge.

### *Other General Information*

We carry many different raw materials for polyurethane resin manufacturing such as various isocyanate monomers, polyol, catalysts, and additives. We also have an access to a wide range of raw materials for production quantity and sample quantity. The manufacturing plant is run by the parent company, which is certified for ISO 9001:2008. Please contact Northstar Polymers for the details.

There are limitations to our production capacity. We do not have explosion proof equipment and cannot handle flammable or combustible materials. We have a limited capacity to handle solid powder additives such as pigment and fillers. These materials needs to be made into dispersion, and the dispersion job may need to be outsourced. We have a small mixer with a dispersion blade to mix a very small quantity for test batches, so we can produce small test samples with powder solid dispersion for the development. Because of the extra cleaning required, addition of colorant will be limited for continuous bulk loads orders or 1 to 5 gallon test samples only.

Please feel free to contact Northstar Polymers at 612.721.2911 Ext 119 for any questions.

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