

PolarFit™ Cryogenic Grinding Solutions for Efficient Size Reduction



“At Air Products, we offer a ‘cool’ approach to size reduction. We can help you increase throughput, achieve uniform particle size and distribution, and save energy.”

Jon Trembley
R&D Manager
Cryogenic Applications





Cellulose Nitrate



Silicone



At Air Products, we understand that grinding applications may differ. The desired end result, however, is often the same—achieving the finest particle size and most uniform particle distribution while maximizing production rates and minimizing overall operational costs.

Air Products can make this happen.

You can count on our leading-edge technology, equipment and experienced engineers to help you efficiently grind a range of materials from multicomponent scrap to tough composites and heat sensitive materials.

Our PolarFit size reduction systems use the cooling power of liquid nitrogen to remove heat produced in the grinding process, allowing you to achieve finer, more consistent particle size distribution and higher throughputs for a wide range of products. With our systems, you may be able to grind the toughest of materials to particle sizes as small as 10 microns.

Advantages

Our cryogenic specialists can help you determine which part of your process needs to be cooled to help achieve your goals, including particle size and distribution, throughput, and cycle time. PolarFit size reduction systems use liquid nitrogen to control the temperature of your product or mill to grind more efficiently in an inert atmosphere. These systems offer many benefits over conventional grinding methods. These benefits can include:

- Higher production rates
- Improved product quality, including contained taste and aroma
- Finer particle size and more uniform particle distribution
- Improved separation and dispersion of composite materials
- Lower capital investment
- Improved safety

Applications

PolarFit size reduction systems can help you more efficiently grind materials such as:

- Adhesives and waxes
- Carpets
- Color concentrates and pigments
- Composites
- Grains
- Pharmaceuticals
- Plastic
- Powder coatings
- Metal
- Multicomponent materials
 - Chrome-plated ABS
 - Uncured rubber
 - Motors
 - Plastic/metal laminates
 - Plastic/plastic laminates
 - Vinyl-coated fabric
 - Wire/cable
- Rubber
- Spice and herbs



Extruded Wire



Cinnamon





ABS Chrome

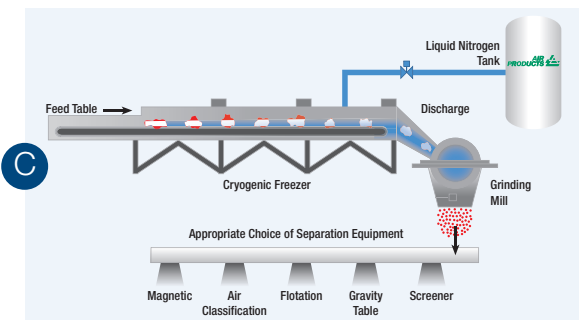
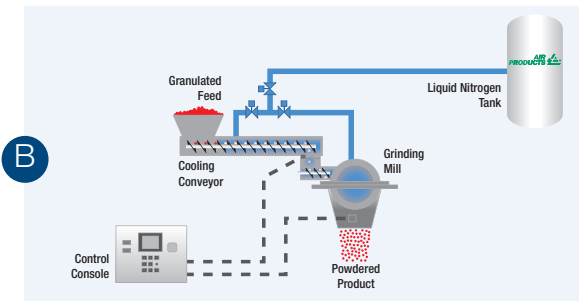
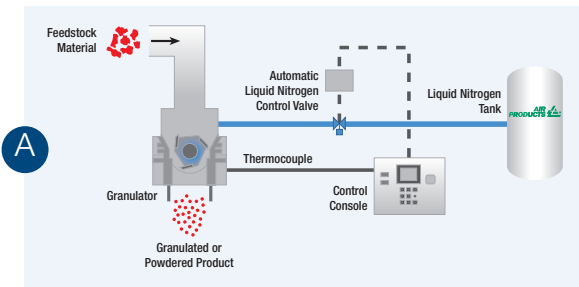


Halogenated Butyl Rubber



PolarFit Size Reduction Systems

Air Products experienced engineers can help determine which PolarFit system is best for your operation based on your current system, the material you process, and your goals—whether it's our turnkey cryogenic grinding system or components of the system that we retrofit to your existing equipment. Below are descriptions of the three size reduction system configurations we offer.



Carpet



Bran

A. Nitrogen Flow Controls and Control Panel

Many polymers experience chemical and physical deterioration from heat generated during conventional granulation or grinding. Examples include uncured rubber, hot melts, plastic films, organic pigments and some thermoplastic resins such as ABS. This configuration of our size reduction system can help you eliminate the heat by injecting liquid nitrogen into the grinding chamber. The liquid nitrogen cools the process and stabilizes the temperature below the critical reaction point. As the liquid nitrogen vaporizes, it leaves the chamber atmosphere purged of oxygen and virtually inert. This minimizes oxidation and reduces the hazard of explosion. This system has an automatic temperature control and a low capital cost.

B. Nitrogen Flow Controls, Control Panel and Cooling Conveyor—for Tough, Resilient Materials

Tough, resilient materials require complete embrittlement prior to actual grinding. With this configuration of our size reduction system, you can process materials such as rubber, shoe soles/heels, weather stripping, urethane foam, chrome-plated ABS and vinyl-coated fabric. The cooling conveyor transfers the feed from the hopper to the grinding mill. Liquid nitrogen sprays onto the material as it moves along the conveyor, resulting in a high heat transfer coefficient on the pellet surface. This rapid cooling makes the material brittle and easier to grind by a variety of impact-type mills.

C. Nitrogen Flow Controls, Control Panel and Tunnel Freezer—for Large Materials

This size reduction system configuration can help you process larger materials such as rubber scrap, reinforced hose, electrical cable, and paint cans. Embrittled material passes from the tunnel freezer to an impact mill where the individual components are separated and ground. Our tunnel cooling system can also be retrofitted to many types of existing mills.

PolarFit Technology and Service

Air Products has over thirty years of laboratory and plant experience in cryogenic grinding. As a leader in cryogenic applications, we offer complete technical service from our experienced staff and fully equipped facilities. Our cryogenic specialists can work with you to meet your product and process needs.

At our trial facilities in Allentown, Pennsylvania, we can run your product on production-scale equipment to help determine the feasibility of using cryogenics in your process and also help quantify the benefits versus the cost.



For More Information

Air Products can provide a range of solutions, from nitrogen supply to turnkey cryogenic grinding solutions. Please contact us to better understand how we can help you achieve your goals.

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tell me more
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Laminate



Chocolate



Nitrile Rubber

