

# PolarFit™ Cooling Systems for Powders



For chemical, pharmaceutical, and industrial manufacturing



Is your process too hot?  
Air Products can help you cool things down.

Process cooling can often be a bottleneck during the production or use of powdered materials. Air Products' PolarFit cooling systems use the ultracold properties of liquid nitrogen to help solve your heat removal challenges. Our cryogenic specialists can help identify and implement powder cooling solutions that will optimize your productivity and quality.

## A cost-effective way to improve cooling of powdered materials

PolarFit cooling systems can provide more efficient cooling of a wide variety of powdered materials, including soap, detergent, fine chemical, pharmaceutical, and dry cement powders at various stages of processing. During their manufacture or use, powdered materials may become too hot for subsequent production steps. For example, excess heat may lead

to product clumping, line plugging, downtime, or even equipment damage. Of greater concern, heat can also cause final product defects such as poor mechanical properties, low bioavailability, or undesirable particle size or morphology. Whether you have a seasonal or ongoing production challenge involving excess heat, Air Products can help.

## Multiple benefits result in increased productivity

Because they use liquid nitrogen as a coolant, PolarFit systems can reduce or maintain the temperature of powders within the optimal range for your process, helping you avoid tradeoffs between achieving desired production rates and desired product quality.

### Improved product quality

Liquid nitrogen can achieve the high heat-transfer rates needed to cool powders within a short contact time. Quick cooling helps to prevent defects and degradation in your final product.

### Improved process efficiency

A PolarFit cooling system can typically increase production rates by up to 10–15 percent over ambient air or other cooling systems.

### Quick installation

PolarFit cooling systems can often be integrated into your existing powder production system in less than one operating shift, keeping downtime to a minimum.

### Cost-effective

Minimal capital investment, increased productivity, and improved product quality make PolarFit cooling systems affordable alternatives to existing powder cooling systems.

## Custom solutions to meet your needs

Air Products can easily integrate a PolarFit cooling system into your existing process. Our cryogenic specialists can tailor the right system to meet your specific needs while minimizing downtime and capital costs. While our PolarFit cooling systems typically include a nitrogen flow skid and control panel, we introduce the liquid nitrogen in a way that achieves the best heat transfer for each situation. The case studies in Chart 1 illustrate how Air Products integrated PolarFit systems in several different applications.

### Chart 1: PolarFit System Case Studies

#### Soap Production

**Issue:** Saponification at ambient temperatures caused soap flakes to cake during soap manufacture.

**Solution:** Adding a PolarFit in-line liquid nitrogen cooling conveyor to cool the flakes prevented caking.



#### Detergent Manufacture

**Issue:** Spray drying at ambient temperature caused the base detergent powder to agglomerate and additives to evaporate.

**Solution:** A replacement duct with liquid nitrogen spray nozzles successfully eliminated agglomeration and evaporation issues, resulting in higher production rates.



#### Pharmaceutical Production

**Issue:** An active pharmaceutical ingredient (API) was degrading during a sterile grinding step.

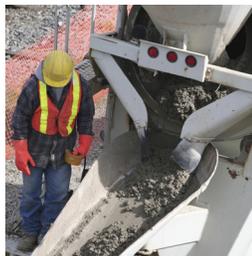
**Solution:** Air Products supplied temperature-controlled nitrogen as the process gas to a grinding mill, thus controlling the process temperature and maintaining the API's biochemical efficacy.



#### Cement Pouring on Site

**Issue:** The high storage temperature of dry cement powder caused overheating and improper curing during on-site usage.

**Solution:** Installation of liquid nitrogen spray nozzles in the existing pneumatic transfer line effectively controlled the temperature of the dry cement, enabling desired cure rates.



## Benefit from our expertise

Air Products has over 40 years' experience applying cryogenic solutions to cooling and other applications. We can provide complete technical service, from feasibility and economic evaluation through start-up and ongoing service. We can test your product at state-of-the-art trial facilities in Asia, Europe, and the United States or at the point of use.

## tell me more

To speak with a specialist regarding your heat removal needs, please contact us at:

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