7 Steps to Successful Freezing

Following a few basic steps when purchasing a new freezer can help you maximize your investment and minimize your risk.

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From roll-in-rack to cryogenic to high-production spiral freezing, many freezing methods are available. For companies that are looking to purchase a new freezer, choosing the right type can be intimidating. But don't let the process scare you. Maximizing your investment while minimizing your risk is easier than you think. The following seven-step system can help guide you through the process.

1 Choose a Method

The first step is knowing how you want to freeze your product. For example, do you want to freeze it raw, or in a package, wrap or container? Freezing a product raw without any barriers typically costs the least per pound from a thermal processing point of view; however, this might not be the best method for your product. Talk to other people in your industry to get an idea of how other companies are freezing products that are similar to yours.

Parameters such as production quantity, speed and product quality also are important considerations. For example, if your production runs are small and you currently have roll-in-rack capabilities and some existing freezer space, then choosing another rack system will probably be the least expensive equipment option. However, you also should consider the cost of labor and any product quality issues that may arise. If the freezing process is too long, some foods can lose taste, color, texture or all of these characteristics. A faster freeze time is better in most cases.

If your production requirements call for freezing 2 million to 3 million lbs per year in a continuous process, then a cryogenic system is probably the best choice, assuming that the product is suitable for this lower temperature processing method. Cryogenic freezers using either liquid nitrogen or carbon dioxide offer a faster freeze time than roll-in-rack systems. Additionally, the initial investment typically is lower than for mechanical freezers, which makes cryogenic systems particularly suitable for start-up companies with new products or smaller production needs. The main cost with cryogenic freezing is the cost of gas; your production rate will determine your cost. Most suppliers have a spreadsheet that can show the initial cost and all of the operating costs of a cryogenic system. Applications where cryogenics excel are in freezing products that have dehydration issues, like cooked meats (where moisture loss is an issue), or products like lobster meat, shrimp, scallops, ice cream novelty items and fruits that need to be frozen much more quickly than conventional mechanical methods allow.

For production requirements above 5 million lbs per year, mechanical freezing (using ammonia or Freon as the refrigerant) is usually the most suitable option, especially if your plant already uses ammonia or Freon in its existing freezer system. Mechanical freezers typically offer a two- to five-year payback on the initial investment. This also assumes that the product itself is suitable for this processing time and temperature range of between -40 to -10°F (-40 to -23°C) and dwell times of 20 min to 6 hr. Mechanical systems also require more floor space compared to other freezing methods, and a high-side refrigeration system is needed to generate the required low temperatures. Mechanical freezers can be specified as stand-alone systems that can be located near an existing freezer unit, or they can be installed near your plant's engine room. Because of its high-side refrigeration requirements, a mechanical system must be installed carefully to ensure optimum freezer performance. Refrigeration associations and published literature are good resources for information on high-side

refrigeration and mechanical freezing.

2 Do Your Homework

Once you have an idea of the type of freezer and/or refrigeration system you need, the next step is to compile a specification sheet on your company's products and freezer requirements. Parameters to consider include:

- The products to be frozen.
- Incoming temperature.
- Expected discharge temperature at the core. (If you don't know what this is, just ask someone in the industry or a supplier.)
- Production rate per hour in pounds.
- Sanitation expectations.
- Operating hours per day.

Additional details can also be useful. For example, information on the feeding method can help define the required belt width, and the specific heat characteristics of the product (if you can get this information) can help define what tonnage of refrigeration will be needed. You may need some outside help from a consultant or engineering firm to obtain this information. However, the more you do up front to prepare for your freezer, the less likely it is that you will encounter surprises after installation.

3 Choose a Supplier

Choosing a company, consultant or engineering group that has the experience to lead you down the right path can be the most difficult step. If you have no previous experience in freezer selection and are planning to spend more than $1 million on a freezer system with refrigeration, it might be worthwhile to spend an extra $35,000 to have an outside company review the details of the system. The consultant can evaluate parameters such as up front equipment cost, refrigeration system specifications, defrost methods, sanitation details, safety issues, flooring, local regulations on gas usage, electrical considerations, zoning ordinances and other specifications. This extra money can pay dividends when the system works from day one without any major issues. Another option is to rely on a supplier that offers an integrated freezer/refrigeration system. Carefully evaluate a company's experience and service record before making a commitment.

4 Set a Realistic Budget

When evaluating the cost of a freezer system, be sure to include all associated costs before finalizing your budget and submitting it for approval. For example, does your plant have enough power to run an extra 600 A? Are the ceilings strong enough to support the top portion of the freezer panels, which typically weigh about 4 lb/ft²? Or, does the new freezer have to have a self-supporting top on it? Is the plant located in a seismic zone that presents special considerations? Are the drains large enough to carry out the water that will be used for defrosting? Does the plant even have the necessary drains? Many small details exist in any project, and these details must be addressed to ensure that your budget is accurate.

Before buying a new system, listen to your employees' ideas and incorporate them into a plan. This plan should review each critical point of the freezer where improvements can be made, including sanitation, airflows, air temperatures, box openings and coil location in relation to openings, to name a few.

5 Confirm the Total Budget

When obtaining quotes from suppliers, ask for a "ready-to-run" system. Your focus should be on making your products, not on learning everything there is to know about freezers. Ask the supplier to list all of the operating requirements of the system such as piping, electrical (including amps needed), permits, the load capabilities of your floor, water usage and defrost options. Carefully review the quotes, particularly the "not included" section, to see what might be needed but not supplied with the project. Although reviewing these details takes a little extra time up front, it can help you minimize downtime and installation problems later on.

6 Place the Order

Before you place your order, make sure you have considered all of the necessary details so that you can avoid any surprises. If possible, view a similar system in operation. Meet the individuals who would be involved with the three major components of the system — freezer, refrigeration system and electrical — before you commit to an order to make sure everyone is on the same page. Be sure to get a confirmation on the budget and timeline for the project, and check for any last-minute add-ons that have not been discussed previously.

7 Validate the Project

The project is not finished until the freezer is running under its designed specifications. Is the defrost working correctly? Are the products emerging at the specified temperatures? Is the system freezing the number of pounds per hour that were specified? These are small but important details that should be evaluated to ensure that the freezer is operating successfully.

Purchasing a new freezer can be easy if you have done a little research and understand what to look for in a system and supplier. With the right freezer, your company will be in a position to expand its business and its profitability. **PCE**

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