10 Questions to Answer When Considering Which Dryer is Right for Your Application

The answer to the question "Which dryer is right for my application?" is most likely… "Well, it depends." And here are some of the things that it depends on:

1. WHAT MATERIAL(S) ARE YOU RUNNING?

The material or materials you are drying will influence almost every decision you make about a dryer and, if you are running many different materials, you'll want to specify it with your most challenging material in mind. But different materials require different things from a dryer, particularly when it comes to temperature setpoints. PET, for instance, needs to be dried at 350°F (176°C), while some PETG dries at 140°F (60°C). If you are running PETG, you may need a precooler in the system, while you don't need one with PET.

Other material related issues include volatiles. If you are running a material that gives off volatile compounds during drying, you need to specify a volatile trap to prevent desiccant contamination. And, if you are drying a material that is sensitive to over-drying (PET for instance can degrade if overheated, and certain nylons actually lose mechanical properties if too much moisture is removed) you should consider an temperature set-back feature that monitors return air temperature and automatically reduces drying air temperature to keep the process stable.

2. ARE YOU USING REGIND? IN WHAT FORM (GRANULE, FLAKE, FLUFF)? AT WHAT RATIO TO NATURAL?

Regrind, particularly film fluff or bottle flake, has a much lower bulk density than virgin pellets. Regrind might be 25 lbs/cu. ft (400 kg/cu. m) while pellets are 35 lb/cu. ft. (560 kg/cu. m). So you need to take this into consideration when sizing the dryer (more airflow may be required for regrind) and the drying hopper. With low bulk density regrind in the hopper, material may not have sufficient residence time in the hopper for proper drying. If regrind has a high level of dust and fines, you might want to consider a secondary dust collection system.

3. WHAT IS THE HIGHEST INITIAL MOISTURE CONTENT YOU ARE LIKELY TO HAVE TO DEAL WITH?

Dryers have only a certain moisture absorbing capacity, so depending on what material you are running (see #1), you may need to specify a different dryer or hopper. Nylon, for instance, can be very difficult to dry if its initial moisture content is high. A nylon stored in a sealed bin or bag may require 4 to 6 hours to dry, while nylon stored without any kind of humidity control may have a much higher initial moisture content and may take 11 or 12 hours to dry. You need to size both the dryer and hopper with this in mind. And don't forget that material is likely to have a much higher initial moisture content in the high-humidity summer months than in the winter.

4. WHAT FINAL MOISTURE CONTENT DOES YOUR APPLICATION(S) REQUIRE FOR MAXIMUM PRODUCT QUALITY AND PERFORMANCE?

In applications where a low residual moisture content is critical to performance, you'll want to make sure your dryer can deliver air with a -40°F (-40°C) dewpoint and that the hopper and rest of the system is sized to ensure adequate drying time even when initial moisture content is very high. In extreme cases, you may even need to think about using a hot-air pre-drier to raise the temperature of the resin and start the drying process. Then the desiccant dryer can be used for final drying down to the resin manufacturers recommended residual moisture specification.

At the other end of the spectrum, there are materials like ABS, PBT and even polycarbonate that, depending on the application, do not need to be dried perfectly in order to develop acceptable physical and mechanical properties. In these cases, you could consider reducing residence time or even think about using a compressed air dryer (which normally only develops a 0°F, or (-17.7°C) dewpoint), instead of a desiccant dryer.

5. WHAT IS YOUR MATERIAL THROUGHPUT RATE?

Throughput is almost totally dependent on hopper size. You need a hopper big enough to hold material under proper drying conditions for the specified length of time at the normal throughput rate. A 1000-lb (454-kg) hopper can hold enough material to allow for 4 hours of drying time at a 250-lb/hr (114-kg/hr) throughput rate. If your throughput is likely to vary considerably from day to day or week to week, you may want to think about having more than one dryer, or getting a dryer that allows you to adjust airflow to match the volume of material in the hopper.

6. WHAT ARE TYPICAL UTILITY RATES (ELECTRIC AND GAS) IN YOUR AREA?

Especially in areas where low-cost natural gas is available, and in high-volume, high-temperature applications (like PET preform molding), natural gas heat is nearly always more economical. While the capital cost of a gas-fired dryer tends to be greater than that of an electric dryer, it may be worth considering which energy source provides the lowest overall cost in your particular situation.

7. DO YOU ANTICIPATE NEEDING ADDITIONAL DRYING CAPACITY IN THE FUTURE?

If you expect that you will need to dry more material in the future, consider sizing the dryer and hopper to accommodate the additional volume, but ask about systems that allow you to vary airflow so that you can maintain proper drying conditions at both low and high throughput rates.

8 WHAT TYPE OF DRYER/HOPPER FITS THE APPLICATION...MOBILE DRYER/HOPPER, PRESS-MOUNTED, CENTRAL?

A caster-mounted mobile drying cart (MDC) will give you added flexibility. You can start the drying process off-line and then take the dryer to the machine when you are ready to start the job. You also eliminate heavy hoppers from on top of the processing machine and gain added safety from the fact that maintenance personnel don't need to climb on the machine to reach the dryer. An MDC does take up floor space around the machine and if that space is at a premium, a machine mounted dryer may be a better option. Or, consider a central drying system in which all material is dried in a remote location and conveyed (using desiccated air) to the processing machines on demand. A central system is especially advantageous when short runs require feeding multiple materials to multiple machines.

9. WHAT LEVEL OF SOPHISTICATION DO YOU NEED FROM THE DRYERS CONTROL? BASIC/ENTRY LEVEL VS. HIGH-END/ COMMUNICATIONS?

Some processors only need simple controls that maintain proper setpoints and then alarm when a problem is detected. If you want more visibility into your process or if you need to gather data for statistical process control or quality validation, you'll want a more sophisticated control with communications capabilities. Add audible and/or visual alarms if you don't have operators or maintenance personnel nearby to monitor the operation of the dryer.

10. DO YOU NEED AN AUTO-START FEATURE?

Auto-start is essentially a timer that starts the dryer at a specified time. Plants that do not operate 24 hours a day, seven days a week, may find auto-start valuable so that the drying process can be started several hours before production is scheduled to begin and properly conditioned material will be immediately available.

Polymer drying is a process that is both critical and multifaceted. Each material and each application presents specific factors that need to be considered during the specification of a dryer. It is always best to seek the assistance of a competent supplier who can evaluate your particular situation and make intelligent recommendations. Don't forget to consider the supplier's record for up-time and reliability, ease of maintenance, and timely aftermarket service and spare parts support.

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