

Angel Hair & Streamers Can Tie Up Production

Drying Done Right

Proper maintenance is a key to having your dryer perform to your expectations.

Also, dryers need to be equipped differently depending on the resin you are processing and the required drying temperature, high (225° - 300°+ F) or low (below 225° F). Here are some factors you should consider to ensure that the dryer performance meets the requirements of the resins you are processing.

- 1 Monitor Dew Point** – The dew point produced by a dryer is not directly tied to the dryness of the resin, but rather the dryness of the air produced by the dryer. However, knowing the dew point can tell you that the dryer is probably operating up to its specifications. The dryer should have continuous monitoring of the dew point to help you in determining if it's fit for the job.
- 2 Monitor Air Flow** – Proper air flow is important. It is both the vehicle that provides the low dew point air for drying of the resin and it carries the heat from the process heater to the resin. The best practice is to have a continuous monitor – typically a pressure drop device – which gives a warning when air flow is reduced.
- 3 Keep Air Filters Clean** – There are filters in both the process and regeneration air streams. The filters should be checked frequently (every 2 weeks) and Always have an extra set of clean filters ready for changing. It's never a convenient time to shut down the dryer to clean and change the filters but operation of the dryer without filters, even for a short period, can allow plastic dust to get into the heater and can lead to destroying the desiccant or even a fire.
- 4 Monitor the Return Air Temperature to the Desiccant** – Molecular sieve desiccant dries the process air best at low temperatures. When the temperature of the air returning to the desiccant bed exceeds 140-150° F the dryer will not achieve a -40° F/C dew point. If the return air temperature is exceeding this level, then there is too much process air or too high a processing temperature. A thermocouple or temperature indicator,

at this point will let you know this. In some modern systems, this temperature is fed back into the controls so that a VFD (variable frequency drive) can change the air flow rate automatically. Maintaining a return air temperature of 140-150° F also minimizes energy usage.

- 5 Take Precautions for Low Temperature Drying** – Drying temperatures lower than 160-170 F are difficult to achieve for most standard dryers. These temperatures apply to some nylons, co-polyesters, PLA and a few other resins. Although the return temperature to the dryer may only be 140-150 F, there is a temperature rise as the air passes through the blower and another rise as it goes through the desiccant. For these applications you'll need to add, typically, an extra post-dryer cooling coil in the case of desiccant drying. This is also a difficult thing for twin tower dryers to achieve. They experience a spike in temperature each time the towers switch as the partially cooled regenerated bed comes on line. Another option for these low temperature resins is the membrane type dryer that can typically get to low temperatures without the need for water. They are limited to throughputs of about 200 lb./hr.
- 6 Take Precautions for High Temperature Drying** – When drying resins at temperatures in excess of typically 220 F, there should be a post hopper cooling coil with tower water. This may also have a water saver valve to limit the amount of cooling water used. Remember, over-cooling (below 130 F) the air in the cooling coil will require additional heating in the process air heater and additional load on the cooling water system.
- 7 Keep volatiles out of your desiccant** – Volatiles (organics) can come off of some resins during the drying process. Resins such as PET, nylons, PBT and some others can give off significant amounts of these, over time, and they can contaminate and destroy desiccant. Even more, this contamination can lead to carbon dust and that can enter the drying hopper and contaminate the resin. All systems subject to volatiles should have a well maintained plasticizer system.

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8 Check Moisture Level in the Resin – The moisture in the resin isn't just a function of the -40° dew point from the dryer. Best practice is to use either an on-line or off-line measurement tool to verify that the resin leaving the drying hopper meets the process requirements. Many products can have flaws from under-dried resins and some, like nylon and PBT, can become brittle if over-dried. The only true way to know if you are sending properly treated resins to the process is to measure the resin moisture.

9 Inspect Your Desiccant - The desiccant types that are typically used in plastics industry dryers are Molecular Sieve beads, Silica Gel beads and Pure Crystalline Molecular Sieve. The molecular beads are typically used in twin bed dryers and produce -40°dew point drying air when functioning properly. They have a base of about 30% clay so they are not as efficient as the pure crystalline desiccant and should be replaced on 2-year intervals. You can check it in the following ways – if it is discolored – replace it. If you gather a handful and squeeze it, you should feel it warming up quickly. If it does not – replace it. Silica gel does not produce -40°dew point air so it is typically used to provide a blanket of desiccated air in the tops of silos. Pure Crystalline Molecular sieve is typically used in desiccant wheel dryers. It produces consistent -40°dew point air for several years.

10 Install A Return Air Hopper Screen – As a minimum, there should be a screen in the return air (at the hopper) to insure that resin pellets don't leave the drying hopper.

11 Check for Leaks – Leaks anywhere in a closed loop system are bad. Inspect the system regularly to determine if you have any issues. Leaks generally allow ambient air, with a high moisture level, to enter the “closed loop”. Air leaks can lead to significantly high power bills when more moisture has to be “boiled” off of the desiccant.

12 Don't Ignore Warnings – Most dryer controls provide some kind of warning when something is going wrong in the system. Some controls give very simple warnings while others will tell the operator exactly what is going wrong and even offer instructions for a “fix”. In either case, the warning is indicating that some correctional action is necessary or greater consequences are going to follow. Simply acknowledging the warning and turning it off is not the correct procedure.

Following these simple tips will help keep your production line running more smoothly, with fewer emergencies – and that increase productivity and profits.