



Michael Day Enterprises, Inc.
Engineering Thermoplastics
Solutions. Every Day.

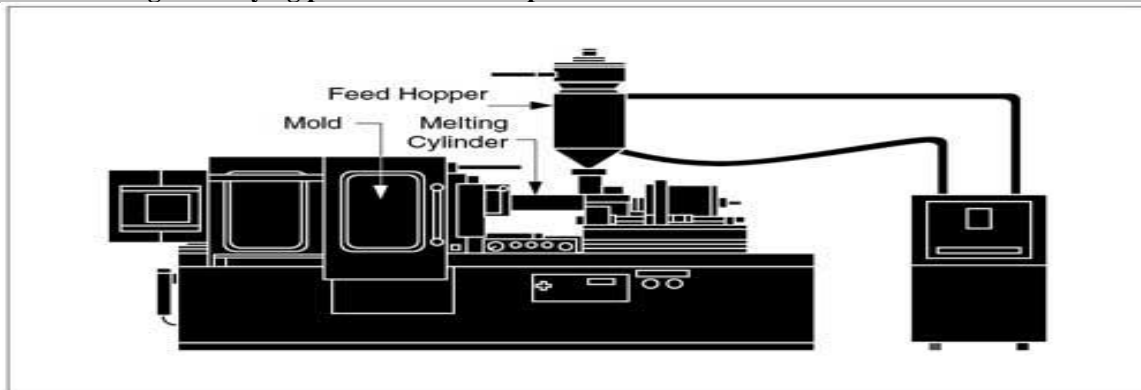
Proper drying guidelines

Proper drying of materials is essential to the successful manufacturing of plastic parts.

Many plastics absorb moisture from the atmosphere; how much they absorb depends on the type of resin. Moisture in materials can cause many types of undesirable effects, including processing problems, loss of mechanical/physical properties (moisture acts as a plasticizer) and poor surface appearance. It is not always possible to see moisture in the part.

Over-drying of nylon materials can also cause undesirable effects. This can lead to dramatic changes in material viscosity. The typical result is either an inability to fill the part or weak weld lines. You will also see higher than normal pressures to fill the part. With heat-stabilized nylons, you will see a color shift from a dark tan and eventually a brown when the resin hits its threshold.

The use of a moisture analyzer is highly recommended. Even though materials are shipped at suitable moisture ranges they can still absorb sufficient moisture in a very short time that exceeds recommended moisture levels. It is recommended that a moisture analyzer be utilized prior to drying to insure the proper time is selected, therefore avoiding over or under drying materials. Periodic checks through the drying process are also helpful.



Injection molding machine

Problems/Visible symptoms in molded parts due to improper drying

1. Surface appearance
 - Splay
 - Silver streaking
 - Internal bubbles
 - Sink areas
 - Increased formation in flash
2. Property Loss
 - Impact strength
 - Tensile strength
 - Elongation

Symptoms when molding

- Drooling
- Bubble formation in purge
- Brittleness in parts

Drying Variables

Just as in moisture absorption, the variables that will affect moisture removal or drying are: the nature of the resin; the dryness of the air; the temperature of the air and the pellets; and the time that the pellets are exposed to the air.

Hot air drying is only recommended for non-hygroscopic resins that only have moisture on the surface of the pellet. i.e.: ABS, Acetal, PP

For hygroscopic materials where moisture is inside the core dehumidifying drying is recommended. i.e.: Nylon, Polyester, PC

A desiccant dryer with a -40°F dew point is strongly recommended for drying hygroscopic materials. Specific drying temperatures and times can be found on the Technical Data Sheets for each individual product.

Effects of initial moisture content

Plastic pellets achieve equilibrium with the surrounding environment. Since the environment cannot always be controlled during shipment and storage, the initial moisture content before drying will vary. The drying times should be adjusted according to this initial analysis.

E.g If the initial reading is higher the drying times should be increased and if the moisture content is low (or within recommended ranges) the drying times should be reduced and possibly even eliminated.

Critical points to remember when drying

1. Drying is a necessary criteria for the quality processing of plastics.
2. Engineering polymers/resins absorb moisture during manufacturing, transportation and when in storage prior to processing.
3. Excessive moisture in the resin results in inconsistency during processing.
4. Excessive moisture trapped inside the resin will result in a sub-standard product, both in terms of appearance and properties.
5. Over drying (under 0.05%) of **nylon** materials can also produce negative effects on processing.
6. Utilizing a moisture analyzer is recommended for proper drying technique.
7. It is seldom possible to establish whether moisture is present by means of visual examination alone.