



## Cycletime Tips - Automotive

### Volume 29: Conditioning of Nylon Parts

Many of you were forced to re-learn the relationship that moisture has with injection molded nylon components this winter. Because of the unique chemical structure, nylon or polyamide (PA) absorbs moisture from the atmosphere. When this occurs, the moisture acts as a plasticizer affecting the mechanical and physical properties of the parts. While we know that moisture can effect processing, this tip is focused on the effects experienced by the molded article.

The bad news is that the dimensions change due to the swelling that occurs during this process. In other words, the parts will swell like a sponge would while soaking up water. All nylon parts will absorb water after molding. Some types absorb less than others do but all display a significant property change when atmospheric moisture is collected. The most common complaint heard when the humidity is low is regarding brittle parts.

Moisture conditioning is a fairly well accepted operation in our industry to combat this problem. The need to introduce water to the parts after molding has provoked the need to understand the mechanism and plan accordingly. The methods of conditioning are listed in the following chart to assist in understanding your options.

Method	Conditions	Advantages	Disadvantages
Tropical climate	105°F / 95% RH	Even distribution	Equipment expense
Packaging in PE bags with moisture	Ambient	Most economical	Cost for bags No control over conditions
Cold water storage	65 - 104°F	Economical	Longer conditioning times
Hot water storage	120 - 195°F	Fast	Discoloration of part Deposit buildup due to monomer extraction (at higher temps) Dimensional change due to post crystallization
Saturated steam	200 - 212°F / 100% RH	Fastest method	Same as above at assigned temps

A simple before and after weight study will tell you the required amount of time for your component in a conditioning application. A little known fact about nylon is that at very low temperatures, the water can freeze within the polymer matrix and cause brittleness.

In that and other cases, we've used impact- modified nylons to battle both the cold and dry environmental issue.

If you're working on a new project, please develop a thorough understanding of the rigors that the part will be subjected to before selecting your nylon. Unfortunately, the lowest cost nylon types are more dependent upon and sensitive to the presence of moisture. Let us know how we can help.

Bill Fierens  
Ashland Distribution Co.  
General Polymers - Automotive  
wjfierens@ashland.com

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