



Cycletime Tips - General

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As appliance, automotive, and other markets become even more globalized, competitive pressures dictate that products be made with consistently higher quality and lower cost. Cost saving practices, which can improve manufacturing costs for thermoplastic components are therefore very important. Changing the method for coloring thermoplastics has been one technique used to reduce both raw material and processing costs in injection molding plants, especially as costs and lead times have escalated for precolored, compounded materials. Coloring thermoplastics resins to the final desired appearance is achieved in either of two primary ways. Color can be compounded (pre-color) or the color can be added at the molding facility (self-coloring). Some molders use a liquid or powder color concentrate, but the most common concentrate is the solid pellet form.

As with all the steps involved in manufacturing a quality part, none is more important than handling color concentrates and making sure that distribution and mixing are achieved to the maximum levels. Attention to detail, using the correct mixing techniques and exact percentages of ratio mix are paramount.

To achieve quality parts with minimal scrap and rejections, there are several areas we must address. The types of equipment used to convert from precolor to self-coloring will range from units as simple as color concentrate feeders on each molding machine to gravimetric blenders, central blending of natural resin and color concentrate, or even complete material receiving, conveying, drying, and color feeding systems.

Self-coloring involves considerably more than just adding blending equipment. Molders who are evaluating alternatives in their plant should know what additional points have to be considered. Performing the final color addition at the molder means that the molder assumes more responsibility for the final color than would be the case with precolored resins. This involves approval of color concentrate raw materials at receiving, blending concentrates with a natural resin at the correct ratios, melt blending the concentrates to give a uniform color, and a color approval of the finished products.

Capable color concentrate suppliers who are participating in the self-coloring market understand that more is required of them than simply supplying a color match. Proper pigment selection and dispersion have always been important, but now color houses are also selecting polymer vehicles for the colorants, which will facilitate the melt blending of color concentrates with the natural resins.

Volumetric auger feeders with improved control features now give consistent, reproducible concentrate addition, automatically, over a wide range in molding conditions. The addition rate is increased or decreased using digital microprocessor controls to maintain the same dosage rate for changes in screw speed, barrel temperature, or back pressure.

Concentrates must be uniformly mixed and melted into the natural resin for the final part to be accepted. Complete mixing is usually accomplished by appropriate design of the concentrate theology and adjusting the molding conditions. Slower screw speeds and increased back pressure are the typical adjustments made to improve concentrate mixing. Occasionally, concentrates will still not completely mix with the material. This usually results from an inefficient design of the plasticising screw in the molding machine. There are two molding machine hardware changes that can be considered to finish the color mixing. The first is to install a mixing nozzle in place of the standard nozzle. Several types of mixing nozzles can be recommended to complete the color mixing without adding excessive shear to the polymer melt. The second change involves changing the screw itself. By installing a new screw specifically designed to increase melt mixing, not only does the color mix well, but also the temperature settings for the melt can often be reduced because there are smaller temperature gradients between the heated barrel wall and the center of the melt in the barrel. Operating at reduced melt temperatures has the potential to shorten the cooling portion of the molding cycle and thereby increase the number of parts molded per unit of time.

Whether you currently use precolor concentrates, the trend towards the future seems to be implant coloring. The benefits to the molder using concentrates would be less obsolete inventory (having to order more precolor than needed due to minimums required in ordering), shorter lead times, and in most cases, lower part costs.

Just remember, a good homogeneous mix in blending the concentrate and the material, leads to a good homogeneous mix in the barrel which leads to uniform quality part out of the mold. Until next time - happy molding.

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