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Cycletime Tips - General

Volume 13: Regrind...How Much Should You Use?

By Mike Van Duine

Contamination, inconsistent pellet configuration, glass fiber breakage, and polymer degradation all can occur in regrind. Each of these issues causes problems such as dimensional control, processing inconsistencies, and inferior part physical properties. The question remains as to how much regrind can be used and still continue to maintain product integrity. This is a frequent and valid question to ask. In this tech tip, we will address the issues that surround this question, and offer some information about current regrind usage techniques.

Problems with Regrind

In most cases, contamination is caused by improper material handling. At the plant, there should be specific and detailed material handling procedures in place that cover areas like grinder and hopper cleaning, keeping material barrels and gaylords covered, etc. Please take the time to revisit Mark Shade's CycleTime Tips (February '96) where he addressed "Proper Pellet Handling" for additional information.

Some degree of fiber breakage through both processing and regrinding is typically found when utilizing glass-filled materials. If this reground material is used, two things may happen. First, the physicals of the materials will be reduced, most notably tensile and impact strength. Second, the ability to maintain your dimensional control becomes more difficult because the shrinkage rates in the flow versus the transverse direction will change. The severity of these two issues will depend on the amount of fiber breakage and the amount of regrind you are using.

Some processors say that regrind runs easier than the virgin. I would say in some cases it might appear to be so, such as in a hygroscopic resin that has undergone hydrolytic degradation, or with a material that has been thermally degraded. In both cases, the molecular weight is decreased and the melt flow is increased. In other words, this regrind will generally fill a part easier; so in some people's eyes it would seem to process better. However, the bottom line is that the parts physical properties will not be optimized and the extent of damage will depend on the severity of degradation and the amount of regrind used. What about regrind pellet configuration, e.g., big chunks, small chunks, and fines? If the pellets are not uniform in size, problems may occur such as a non-uniform melt temperature condition and variable drying rates for hygroscopic resins. This means that the smaller particles and fines will melt and release moisture first, due to their surface-to-volume ratio, and vice versa for larger chunks. If you inject a non-uniform melt quality material into a multi-cavity mold, you will get variation in shrinkage rates throughout the part and or parts. This could end up as warpage or other dimensional control problems. This is particularly true for crystalline resins. Fines in the process stream have also been proven to cause black specks or milky streaks in materials that are transparent.

Methods of Regrind Use

Today there are multiple schools of thought on how regrind should be handled. First, the one that has been around for quite some time and published by many material suppliers is a 75% virgin to 25% regrind blend. This works reasonably well provided the regrind is uniform in pellet configuration, not contaminated or degraded, and blended properly. This method is routinely practiced by many molders across the country.

Another method that was studied and developed a few years ago is called “Cascade” regrinding. With this method, the first production run is 100% virgin. The regrind generated by this run is stored and marked as first generation and then used at 100% in the second production run. The regrind generated by this run is marked and stored as second generation and is then used at 100% in the third production run and so forth. This procedure will continue until all of the regrind is used. This is a valid option since there is data to support this method available through Dow Chemical or RJG Associates.

The third method is based solely on the application requirements. In other words, for one job you may be able to run 100% regrind because the application demands are negligible. On the other hand, you may have to run 100% virgin to meet stringent product and/or customer requirements. Finally, you may be able to blend in a certain percentage of regrind, and again depending on the application requirements.

Regrind usage will always have its place in the plastics industry; so the disciplines you instill on the plant floor will determine its successful use. In addition, if any of these methods are employed, it is suggested that parts produced with regrind are fully qualified via customer or internal methods to ensure adequate product stewardship.

By Mike Van Duine is a General Polymers technical service representative in Lenexa, Kansas.