An Ampacet Toolkit
To Ease the Pain of Resin and Masterbatch Price Increases

Cost control, long a focus for plastic processors, has become even more acute given the recent runup in resin and other raw material prices. This upward pressure on raw material prices has tracked an unprecedented rise in oil and natural gas costs, which have also pushed the cost of transportation, utilities, and packaging to new highs.

The fundamental shift in market realities has sent molders and extruders in search of ways to operate smarter and more economically. This article offers a number of approaches available from Ampacet that can help you, the processor, become more efficient and greatly reduce costs.

These solutions approach processing efficiency in a number of ways, such as reducing scrap, recycling more regrind, using less energy and extending costly resins with less expensive materials. When taken individually or in combination, these approaches can yield major savings for any plastic processing operation.

Slash Purge Time to Reduce Resin Waste

When transitioning between colors, processors usually run clear resin through their equipment until no trace of the previous color is seen. This transition from one color to another is a major source of resin waste, as well as of lost machine time and associated labor costs. Much of the contamination in a color changeover comes from color deposits that form on screws and other internal surfaces. Conventional purge agents act after the fact to remove such deposits to speed the transition from one color to another. A relatively new Ampacet product takes a different approach. Called SmartColor™ Masterbatches, they limit color buildup in the first place.

Tests show that SmartColor™ masterbatches shorten purge times by as much as 60 percent when transitioning between colors and reduces the generation of resin scrap by as much as 50 percent. Use of masterbatches in the SmartColor™ family also means fewer color quality issues and lessens the need to perform bare metal clean downs.

Ampacet created SmartColor™ masterbatches through an extensive research effort to identify pigments and additives which are less likely to create color deposits. When these components are used in a masterbatch, they retard the formation of residues that break off and contaminate finished products for all molding and extrusion processes.
Process Aids Boost Productivity

Process aids improve efficiency by coating extruder barrels and dies with a fluoropolymer compound. This lowers the friction between the melt and metal surfaces thus improving throughput and productivity. Conditioning extruders from hopper to die with fluoropolymer masterbatch also eliminates melt fracture, which generates less scrap. This reduction in friction, also cuts energy use (lower amp draw), allows narrower die gaps, eliminates die buildup, and reduces back pressure and gel formation.

Ampacet offers a range of process aids for use with LDPE and LLDPE. Ampacet 10919, a traditional process aid, and Ampacet 102113, for higher temperature applications above 450F, are both designed for the blown film process. Another process aid masterbatch, Ampacet 100458, was developed to withstand the higher shear and longer residence times inherent in cast film, extrusion coating and blow molding operations.

Add Antioxidants to Boost Recycle

Recycle is often added to the process to partially replace virgin resin. Recycle use is limited by the oxidation or crosslinking that occurs as a polymer is exposed to multiple heat histories. However, if an antioxidant is present, it can prevent much of this crosslinking, allowing for a greater amount of recycle.

In blown polyolefin film applications, for example, addition of excessive recyle content increases gel formation and the incidence of black specs and other imperfections. Incorporating Ampacet 100401 antioxidant masterbatch into polyethylene films can remedy this.

In one case, a processor was unable to add more than 10% regrind without running into downstream printing issues due to gels. By adding 1 percent of Ampacet 100401 masterbatch to their formulation, they were able to double the regrind usage to 20% without causing gel formation. Another film operation lost key film properties when regrind level went above 10%. Ampacet 100401 allowed use of significantly higher recyle levels with no loss in film performance.

The primary and secondary antioxidants in Ampacet 100401 masterbatch interact with free radicals formed in processing to prevent crosslinking. This masterbatch is most effective when added initially as a preventive measure.
**Improved Flow Leads to Reduced Cycle Times, Reduced Energy Consumption, and Reduced Scrap**

The lower the viscosity, the faster a resin can move through equipment without causing excessive back pressure. One way processors reduce polymer viscosity is to raise its temperature, but doing so increases energy costs and can degrade temperature-sensitive ingredients.

Ampacet has developed a line of masterbatches that offer an alternate approach to lower resin viscosity without resorting to higher temperatures. Offered as Performance Plus™ masterbatches, this line of products improves throughput in injection molding and extrusion by 15 to 20 percent compared to masterbatches containing conventional pigments and additives. In addition to shortening cycle time and reducing energy usage, Performance Plus™ masterbatches also improve pigment and additive distribution, which creates more consistent parts and reduces resin waste.

**Extend Costly Resins**

To reduce raw material costs, processors often replace some of the resin in a recipe with calcium carbonate. Ampacet helps processors take this approach in two ways. For non critical applications, calcium carbonate can be added to its masterbatches at the expense of the carrier resin to lower overall masterbatch costs. Ampacet also offers heavily loaded calcium carbonate masterbatches for direct use in processing.

Ampacet tests show that replacing 25% of the resin in masterbatches with an equivalent amount of calcium carbonate does not affect the performance of either the masterbatch or the finished product. In blow molded bottles for instance, a masterbatch containing 25% calcium carbonate yields a maximum concentration of 1% calcium carbonate in the bottle at typical letdown ratios. At this level, it has little effect on bottle properties.

In terms of direct addition, an Ampacet study of blow molded bottles having 7.5%, 15% and 25% calcium carbonate found this mineral not only reduced resin cost but also reduced cycle time by 20% in equivalent weight bottles. The savings comes at a price, however. The greater the amount of calcium carbonate used, will negatively impact the physical properties of the bottle such as stress crack resistance, column crush level and drop impact resistance. Calcium carbonate masterbatches recommended for blow molding include Ampacet 10847 and 101870, which contain 70% and 75% of this mineral, respectively.

In blown film, calcium carbonate extends the base resin while aiding productivity and throughput. This was seen in a series of tests by Ampacet on LLDPE monolayer films at calcium carbonate loadings of 15%, 25% and 35%. The tests found this mineral to: reduce extruder back pressure by as much as 15%, thus lowering energy consumption; increase heat transfer coefficient, which accelerates bubble cooling and thus improves bubble stability; allow increase line speeds by as much as 10%.
Other benefits noted included a broader processing window, as much as 30% better impact strength and up to 10% better film stiffness, thus allowing for downgauging. Calcium carbonate addition also lowered initial COF and reduces film blocking as much as 70%.

Ampacet calcium carbonate masterbatches for blown film include Ampacet 101703 for general applications, Ampacet 101802, a high performance grade, and Ampacet 101735, a specialty grade having a metallocene LLDPE carrier. The company also offers Ampacet 101613, which has an LDPE carrier and is recommended for cast films and other high-temperature applications.

Call Us to Create a Strategy for your Operation

Ampacet invites you to call its technical services group for help in creating the best balance of cost saving strategies for your operation. For more complex issues, take advantage of our Six Sigma trained Black Belts, who can provide insight into optimizing processes and developing cost savings initiatives. In seeking to reduce costs, Ampacet takes a broad approach that goes beyond raw material pricing to gain economies throughout the entire process cycle.

For more information, please contact Ampacet’s technical support team at 888-822-7546 or 812-466-9828.

Disclaimer: The information and recommendations contained in this document are based upon data collected by Ampacet and believed to be correct. However, no warranty of fitness for use or any other guarantees or warranty of any kind, expressed or implied, is made to the information contained herein, and Ampacet assumes no responsibility for the result of the use of the products and processes described herein. This is an uncontrolled document and information may be out of date.