



OnCap™ Lubricant Additives

Program Bulletin

Color & Additives

Challenge

As thermoplastics are processed, high temperatures produced by shearing action can lead to degradation, viscosity rise, discoloration and carbonization of the plastic. These processing stresses cause friction between molecules within the melted polymer (internal) and between the polymer and the processing equipment (external). Production throughput can be limited as polymer sticks to processing equipment or fails to fill molds completely.

Solution

Lubricant additives can reduce the internal and external friction of the plastic as it passes through the narrow slots, channels and dies in the processing equipment. Lubricants interact with molecules in the polymer melt and promote flow by allowing the molecules to slide easily as polymer viscosity is reduced. Lubricants also can create a “cushioning” effect between the molecules. When an external force affects the plastic, the very long chain molecules can move more easily without breaking. In addition, lubricants help retain color by capturing the colorant between molecules.

Lubricants are generally organic compounds and fall into four categories: stearates, fatty acids, hydrocarbon waxes and low-molecular-weight polymers. The effectiveness of any lubricant is based on its ability to be dispersed and absorbed into the molecular structure of the polymer. The rate of absorption is governed by the solubility of the lubricant in the plastic, which depends on the polarity of the lubricant and polymer molecules. If the polarities of the plastic and lubricant are close, then the plastic will absorb the lubricant.

Lubricant solutions should be developed for the specific process application and polymer type to ensure that the polymer viscosity change does not result in a loss of desired physical properties or hinder the processing of the polymer.

Value

As lubricants are introduced to the process, the impact of high thermal stresses is reduced. High-quality parts are produced and scrap rates lowered as the desired physical and chemical specifications are met. Cycle times are



shortened and production rates increased as parts slip easily from molds and other processing equipment. Additional benefits of using lubricants include:

- Helps improve the appearance of dull parts by providing a smooth, high-gloss finish
- Promotes efficient coloration of the plastic at low use rates
- Reduces the wear on processing machinery, extending equipment longevity

Implementation

OnCap™ lubricants are available in solid, powder or liquid form and can be formulated to work with most thermoplastics resins. Lubricants are added in very small amounts, typically ranging from 0.5% to 1.0% use rates depending on the processing equipment and the appearance requirements of the final part. The final use rate should not exceed more than 1% in the final part because screw slippage and other negative processing issues may occur. Lubricant concentrates are easy to handle and feed using the conventional feeding equipment used in polymer processing. They can also be combined with colorants into a single OnColor™ Smartbatch™ concentrate.

Applications

Lubricant additives are principally used in injection molding and blow molding operations where high shear has the potential to destroy the desired properties of the final part. They find use across a variety of end use markets, including packaging, consumer goods, industrial goods, transportation, electronics/ electrical and healthcare.

PolyOne offers a one-stop source of color concentrates, additive concentrates, color and additive systems, and associated technology and support services. Our expertise extends across a wide variety of industrial and consumer markets. We have more than 20 manufacturing locations in North America, Europe and Asia, with color labs, design centers and sales offices located around the world.

Please contact your nearest sales office for assistance in choosing the right solution for your needs.

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