APPLICATION SUMMARY:

Dispersing solids into molten wax is a common operation encountered in the manufacture of various products, from cosmetics, coatings and crayons to hot-melt adhesives, investment castings and thermal imaging inks. Natural waxes (carnauba, beeswax, paraffin, microcrystalline, etc.) and synthetic waxes (polyethylene and other polymer-based waxes) are often blended together or mixed with oils, resins or dispersants before dry ingredients are introduced.

Depending on the specific formulation, a solid dispersion in wax may resemble a flowable liquid, a paste-like material, semi-solid gel or even a wet granulation during processing. Mixer selection is based on a number of factors including viscosity profile, shear input and method of powder addition.

RECOMMENDED MIXING EQUIPMENT FOR Solid Dispersions in Wax

Ross High Shear Mixers with SLIM Technology

The Ross High Shear Mixers with Solids/Liquid Injection Manifold (SLIM) Technology are well proven for fast and efficient dispersion of powders into molten wax. The SLIM is a unique rotor/stator mixing device designed to draw solid particles sub-surface and inject them into a high shear zone. This mixer operates within a wide viscosity range: from water-like to up to 10,000 centipoise (cP) during powder injection.

A typical procedure starts with recirculating hot wax through an Inline SLIM Mixer. Powders like carbon black, clay, fumed silica, titanium dioxide, calcium carbonate, CMC or zinc oxide are loaded into an asymmetric hopper right above the mix chamber. As soon as the solids inlet valve is opened, the powders are quickly drawn into the liquid stream due to negative pressure generated by the SLIM rotor and with some assistance from gravity. In lieu of the hopper, a bag dump station may be used to improve convenience and further minimize dusting.

Upon injection, loose agglomerates are broken apart and even hard-to-disperse powders are wetted out virtually instantaneously. The resulting mixture is expelled at high velocity through the stator openings and directed back into the recirculation tank. Once all the dry ingredients are added and the desired level of dispersion is reached, the recirculation line is then closed so the SLIM Mixer serves as a transfer pump, moving the finished mixture to a collection tank or downstream process.

The Inline SLIM configuration, typically installed on a mobile cart, is very practical because it can easily serve multiple vessels of virtually any size. The same technology is also offered on batch-style top-entering rotor/stator mixers.
Ross Multi-Shaft Mixers and Planetary Mixers

High viscosity wax-based formulations are batched in multi-agitator equipment and planetary-style mixers depending on their flow characteristics. For example, Ross Multi-Shaft Mixers equipped with independently-driven agitators are ideal for handling viscosities up to several hundred thousand centipoise. These machines usually consist of a low-speed anchor, a saw-tooth disperer blade and a rotor/stator assembly which may be designed for sub-surface powder induction (SLIM Technology). The wings of the anchor agitator include adjustable scrapers for wiping the vessel bottom and sidewalls. This allows for tight temperature control in addition to enhanced product turnover. Solid wax, in the form of pellets or blocks, can thus be heated and melted with great efficiency right in the mixing vessel.

The Ross PowerMix Planetary Disperser and Ross Double Planetary Mixer, on the other hand, are more suited for blending significant amounts of solids into wax wherein maximum viscosity during processing exceeds 1 million cP. The blades in a planetary mixer rotate on their respective axes while revolving around the vessel. In other words, they continually advance into the batch and contact fresh product all the time. This mixing mechanism is excellent for ensuring thermal and compositional uniformity even when the product is not free-flowing, such as when it has a heavy paste consistency or resembles a granulation. Testing is recommended to confirm the best mixing strategy and equipment for a particular formulation.

For more information on Ross Mixers

Visit www.mixers.com or click here to download a brochure.