Maximize mixing efficiency with a Planetary Mixer.

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Planetary Dual Disperser with two helical planetary blades and two high speed disperser shafts. A rotating scraper arm is also shown.

Types of planetary mixers

High viscosity industrial mixtures, regardless of their end use or material composition, are largely prepared through planetary mixing. Finished products and intermediates in the form of pastes or gels, dough-like compounds and other semi-solids formulations share this common processing approach. Within this category, the classic Double Planetary Mixer (DPM) is arguably the most popularly used production-scale equipment. While some R&D labs do utilize commercially available Single Planetary Mixers, the use of such kitchen-style devices is fairly limited to laboratory and small scale volumes. In addition, Single Planetary Mixers cannot effectively handle highly viscous applications, especially materials that are too sticky, thick, heavy, or have a tendency to climb up the stirrer.

For these reasons, the more robust and scalable DPM is often the more practical and reliable mixer choice. It is equipped with two identical stirrer blades that rotate on their own axes while revolving around the mix vessel. Batch components are constantly recombined and carried from one part of the vessel to another until a homogeneous state is achieved. Mixing efficiency is also enhanced by blade-to-blade interaction which is not present in a Single Planetary Mixer.
Double Planetary Mixers operate at relatively low speeds and impart shear to high viscosity materials. They can handle products up to around 6 million cP when equipped with the proper blade design. But aside from compounding viscous formulations, DPM’s are also typically used for vacuum drying powder blends and preparing granulations.

High speed planetary mixing

When working with solid-liquid mixtures between 100,000 cP to around 2 million cP, a combination of high speed and low speed mixing may be helpful in creating a fine dispersion. A Planetary Disperser like the Ross PowerMix is ideal for this viscosity range because it can impart high shear when the batch is still too low in viscosity to benefit from the DPM’s kneading action.

The Planetary Disperser combines the thorough mixing action of a planetary stirrer with the added benefit of a high speed disperser. Both the planetary stirrer and the disperser rotate on their own axes while revolving around a central axis. The planetary stirrer continuously sweeps material near the vessel walls and bottom, carrying them toward the saw-tooth blade. This accelerates dispersion and evenly distributes heat generated by the high speed disperser.

More challenging applications benefit from two planetary stirrers and two high speed disperser shafts, a powerful mixer design supplied by the Ross PDDM Planetary Dual Disperser. The combined mixing intensity of all four agitators enables rapid incorporation of large amounts of solids into an already viscous starting liquid vehicle. Energy per unit volume is extremely maximized and particle size reduction is accomplished even faster than in a Planetary Disperser. Shear levels and flow patterns in the PDDM are easily fine-tuned because the stirrers and dispersers are independently driven and controlled.

Take advantage of mixing flexibility

Apart from its robust processing power, the Ross PDDM offers a unique flexibility which is very useful for manufacturers looking to produce multiple products in a single mixer. Because each agitator is removable, the PDDM can be operated as a classic Double Planetary Mixer or as a Planetary Disperser.

Some sample PDDM applications:

- Advanced composites
- Adhesives and sealants
- Pigment dispersions
- Battery electrode pastes
- Thermal interface materials
- Softgels
- Conductive inks
- Cosmetics
- Medical pastes
- Molding compounds
- Polymer dispersions
- Specialty ceramics
- Epoxy coatings
- Fumed silica dispersions
- Medical pastes
- Conductive inks
- Lubricants
- Propellants