**APPLICATION SUMMARY:**

Polyester is one of the most commonly utilized resins in the manufacture of inexpensive yet high-performance composites and coatings. Automotive and marine fiberglass parts, building panels, junction boxes, sporting goods, body fillers, fairing putties and other polyester-based products are essentially resins intimately mixed with reinforcing agents, pigments, fillers and/or additives to achieve a specific set of physical and chemical characteristics.

The mixing technologies utilized in the production of polyester composites vary from one formulation to another. Mixer selection and specification is based on a number of factors including viscosity profile, shear requirement and order of addition.

**Ross Multi-Shaft Mixers and Planetary Mixers**

Ross Multi-Shaft Mixers are well-proven equipment in the preparation of polyester composites and coatings with viscosities up to several hundred thousand centipoise. Equipped with two or more independently-driven agitators working in tandem, Multi-Shaft Mixers deliver a robust combination of high shear agitation and laminar bulk flow. The agitators can be engaged in any combination and at any speed for any interval during the mixing cycle.

The most economical design is the Dual-Shaft Mixer which features a low-speed anchor and a high-speed saw-tooth disperser blade. A typical mixing procedure starts with charging of the resin matrix – a viscous, pale-colored liquid which is a solution of polyester in styrene or other type of reactive monomer – and bringing it to temperature. Agitator speeds are then fine-tuned as solids like talc, calcium carbonate, fibers, fumed silica, microspheres and pigments are introduced through the mixer cover. All fillers, reinforcing agents and additives must be completely dispersed throughout the resin before the catalyst is added.

Composites and coatings that cannot have any entrained air are processed in vacuum-rated Multi-Shaft Mixers. Solids are added to the batch in increments so that vacuum can be applied at each stage before mixing is resumed. In other formulations, powders may be injected into the liquid sub-surface provided the starting resin is not too viscous (<10,000 cP). Utilizing a modified rotor/stator assembly, this technique allows for fast dispersion and minimal dusting.
Polyester-based compounds that undergo very high viscosity peaks (above 1 million cP) are better prepared in Planetary Dispersers and Double Planetary Mixers. Planetary-style mixers consist of two or more blades which rotate on their respective axes as they revolve around the mix vessel. The agitators continually advance into the batch and contact fresh product all the time.

Combining slow-speed planetary agitation with an orbiting high-speed disperser, the Ross PowerMix Planetary Disperser quickly incorporates large amounts of solids into a thick liquid base. Each agitator is independently controlled so flow patterns and shear rates are easily optimized with every change in product rheology. The classic Double Planetary Mixer, on the other hand, is ideal for formulations which start out as a semi-solid or highly viscous paste. Moving at relatively low speeds, the identical planetary stirrers impart increasing levels of shear as the batch gains considerable viscosity. A typical processing method in the Double Planetary Mixer is mostly high viscosity mixing (i.e. withholding a portion of the liquids) to ensure satisfactory solids dispersion, followed by a let-down step towards the end of the cycle. Testing is recommended to confirm the best mixing strategy and equipment for a particular polyester composite.