APPLICATION SUMMARY:

Polyvinyl alcohol (PVOH, also referred to as PVA) is a versatile polymer that plays multiple roles in the manufacture of adhesives, sealants, cosmetics, paper, textiles and many other products.

Various grades of PVOH are available in powder form which needs to be dissolved in water. For this task, conventional stirrers and propellers often prove inefficient, especially in large volumes, because PVOH powders can tend to float and form lumps that take a long time to dissolve completely.

This bulletin describes the benefits of preparing PVOH solutions in a well-designed Multi-Shaft Mixer capable of bulk agitation, high shear deagglomeration, and superior heat transfer.

RECOMMENDED MIXING EQUIPMENT FOR

Polyvinyl Alcohol Solutions

Ross Multi-Shaft Mixers

Ross Multi-Shaft Mixers are widely used in the preparation of polyvinyl alcohol (PVOH) solutions. 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 within a wide viscosity range: from water-like consistency to several hundred thousand centipoise.

The most economical design is the Dual-Shaft Mixer which features an anchor agitator and a high speed disperser. Turning at tip speeds around 5,000 ft/min, the saw-tooth disperser blade creates a vigorous vortex that quickly wets out dry PVOH powders or pellets as they are added into warm or room-temperature water (a defoamer may be pre-blended into the water). The sweeping action of the low-speed anchor agitator enhances the exchange of materials within the vessel, continuously “feeding” the disperser blade with fresh product.

Once all the PVOH powders have been incorporated into the batch, the heater set-point may be raised to around 185°F or higher to accelerate dissolution. Take note that the high speed disperser will also impart heat so actual product temperature must be carefully monitored. Visible white specs of the softened PVOH indicate incomplete dissolution; as mixing and heating progresses, these specs will dissolve completely. Scrapers attached to the anchor help to remove any PVOH that may want to stick to the sidewalls and also promote uniform batch temperature by improving heat transfer across the mix can jacket. Vacuum may be applied during the last stage of mixing to achieve a smooth, clear viscous liquid with no air bubbles.

For added versatility and shear capability, a rotor/stator assembly may be supplied in addition to the disperser blade and anchor agitator. This Triple-Shaft Mixer design is particularly ideal for applications where other raw materials are dispersed into the PVOH solution and a very tight particle size distribution is required in the finished product.
Advantages of Ross Multi-Shaft Mixers

- **Versatility.** Equipped with independently-controlled drives, the agitators in a Multi-Shaft Mixer can be engaged in any combination and at any speed for any interval during the mixing cycle. The combined mixing and heat transfer capabilities of each agitator results in a very robust system that can handle a wide range of viscosities.

- **Protection against contamination.** The Multi-Shaft Mixer is a closed system with no bearings or agitator seals submerged in the mixing area. Self-adjusting scrapers and flush discharge valves eliminate dead zones where product can stagnate.

- **Cleanability.** With change-can design Multi-Shaft Mixers, the agitators are raised and lowered by a hydraulic lift allowing easy access for cleaning between batches. CIP rotary spray nozzles may also be supplied.

- **Scalability.** Standard and sanitary models from 1 to 3000 gallons working capacity are available in both vacuum and atmospheric designs.

- Customers can rely on Ross for customizations and auxiliary equipment including custom sight/charge ports, interchangeable blades and mix vessels, powder injection capability (SLIM Technology), heating units, vacuum pumps, and controls ranging from simple Variable Frequency Drives and Operator Stations to more sophisticated PLC Recipe Systems.

For more information on Ross Multi-Shaft Mixers

Visit [www.mixers.com](http://www.mixers.com) or click here to download a brochure.