TECHNOLOGY BRIEF:

Consider updating your batch mixing process with an ultra-high shear rotor/stator device. This cost-effective upgrade will deliver finer dispersions, solutions and emulsions at viscosities outside the normal range of conventional rotor/stator mixers. Other benefits include reduced cycle times and more efficient powder additions.

Update your food batch mixing process with an ultra-high shear rotor/stator mixer.

Ross PreMax Ultra-High Shear Mixer with Delta Rotor/Stator (US Patent No. 6,000,840).

High speed rotor/stator mixers

Throughout the food industries, high speed mixers are commonly used for a number of objectives including powder wet-out and dispersion, solubilization, liquefaction, particle size reduction and homogenization.

In particular, rotor/stator style mixers, also called high shear mixers, are considered to be one of the most versatile systems due to their ability to prepare fine emulsions as well. Available in batch and inline configurations, these mixers are comprised of a rotor that turns at high speed within a stationary stator. As the blades rotate, materials are continuously drawn into one end of the mixing head and expelled at high velocity through the openings of the stator. The resulting hydraulic shear promotes fast mixing, disintegrates solid agglomerates and reduces the size of droplets in emulsions. Common applications include sauces, dressings, condiments, flavor emulsions, syrups, gum solutions, flavorings, additives, etc.

Continued on page 2
The main drawback of rotor/stator mixers is insufficient product turnover at elevated viscosities. As the batch material approaches 20,000 cP, a conventional rotor/stator system may start to exhibit poor product flow within the vessel, often resulting in localized heating of materials near the high shear zone. In addition, the mixing intensity generated by this type of device is sometimes not adequate for producing extremely fine droplet size distributions for certain emulsions.

**Delta rotor/stator technology**

To address the abovementioned limitations, Ross developed the PreMax Ultra-High Shear Mixer with Delta rotor/stator technology (US Patent No. 6,000,840).

The Delta rotor is specially contoured for high pumping capacity and shear intensity. Product is drawn from above and below the rotor and expelled radially through the stator slots at high velocity. This generates upper and lower vortices allowing for extremely efficient powder additions and rapid turnover rates. Very fine droplet sizes are achieved while solids are quickly wetted out instead of floating on the liquid surface. The PreMax is a top-entering batch mixer typically used as a stand-alone unit. It does not require supplemental agitation for products up to 50,000 cP. For higher viscosity products, it can be used in combination with an anchor agitator in a multi-shaft mixer arrangement.

In addition to the Ross PreMax, inline ultra-high shear mixers are also available for use in continuous or recirculation mode.

**Sample Application: Oil-in-Water Emulsion**

In side-by-side tests, the PreMax has been shown to produce finer emulsions and dispersions than a conventional rotor/stator mixer. Cycle times in the PreMax were also faster by as much as 600%. The graph below shows average droplet sizes of an oil-in-water emulsion prepared on a high shear rotor/stator mixer and on the PreMax ultra-high shear mixer.