

## TECHNOLOGY BRIEF:

Many batch mixing processes can be optimized with the addition of an inline rotor/stator mixer. The supplemental agitation and shear provided by an inline mixer boosts production by reducing cycle time. Multiple batch tanks can be serviced by a single inline mixer and benefit from its pumping capabilities. Another practical advantage to an inline mixer is that it is easily installed without disturbing pre-existing equipment.

# Inline high shear mixers instantly boost batch production without disturbing existing equipment.



Inline high shear rotor/stator mixer

## Optimizing batch processes

A wide variety of products are manufactured in batch operations, especially when dealing with relatively low production volumes or if the materials involved are difficult to process in a continuous fashion.

Efforts at optimization endeavor to ultimately achieve a desired product quality at the most economical cost. One challenging aspect is improving a certain process without having to disturb existing equipment and utilities.

## Inline high shear mixers: theory of operation

An inline high shear mixer consists of a rotor/stator assembly installed in a housing with inlet and outlet connections. The rotor is driven by a shaft that is directly or belt connected to the motor. A mechanical seal is utilized on the rotating shaft to isolate the mix chamber from the environment. Interchangeable stators provide flexibility to adapt to a variety of mixing needs for different product recipes.

The inline rotor/stator mixer behaves like a centrifugal pumping device. It is not self-priming and thus requires static pressure (gravity-feeding) or positive pressure (pump-feeding) to introduce materials into the mix chamber. Because an inline mixer is typically positioned on the floor or on a platform below the liquid level, gravity usually feeds the product into the mix chamber. Here the product is subjected to high shear as the rotor turns at tip speeds ranging from 3,000 to 4,000 ft/min and expels the mixture out of the chamber through the holes of the stationary stator. Ultra-high shear mixer designs with rotors that run up to 11,000 ft/min or higher are also available.

*Continued on page 2*

## Anatomy of a Ross Inline High Shear Mixer



Four-blade rotor and interchangeable stators (slotted, round hole disintegrating and fine-screen).



Cartridge-type single mechanical seal. Double mechanical seals may be chosen for high-temperature or demanding applications.



Stainless steel 316 product contact parts, polished to 150-grit (32 Ra) finish. Sanitary 3A-approved models available.



Explosion-proof high efficiency motor. Stainless steel and/or washdown duty motors available.

For more information on high shear mixers:

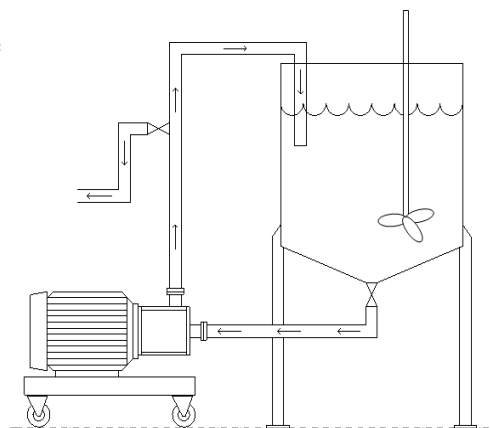
Click [here](#) to view a video or visit the website [www.highshearmixers.com](http://www.highshearmixers.com).

Depending on the rotor/stator geometry, an inline mixer can handle viscosities up to 10,000-20,000 cP without external pumping assistance. With an auxiliary pump, it can process products up to 200,000 cP.

### Boosting batch production with an inline mixer

Inline high shear mixers are practical solutions for batch tanks equipped with gentle-blending devices. The supplemental shear and agitation they provide can dramatically reduce cycle time. One main advantage to an inline mixer is that it is easily installed without disturbing pre-existing equipment. Its configuration eliminates the difficulties of trying to squeeze a top-entering mixer into a vessel along with pre-existing agitators, baffles and other obstacles.

Unlike a batch mixer, which requires a high-horsepower motor to generate adequate circulation in a large vessel, an inline mixer can handle a 2,500-gal stirred tank as easily as it handles a 25-gal batch. In fact, with appropriate piping, a single inline mixer can serve multiple batch tanks of various sizes. Typical installations utilize simple valves to divert finished product downstream or switch instantly from one source vessel to another.



### Sample Application: Liquid Soaps and Cosmetics



A cosmetics manufacturer blended ingredients for their liquid soap products in 3500-gal jacketed tanks with axial blade turbine agitators. Total batch time was over two hours. As production requirements increased, it was necessary to substantially reduce cycle time.

While the company considered replacing the batch system with a fully continuous process, they realized this would diminish their flexibility in producing a wide range of present and future products. Instead, they chose to install a 25HP Ross inline high shear mixer.

The batch is now heated in the tank during filling and component addition. The inline mixer takes the batch material and recirculates it back into the tank during the mixing cycle. Once the batch is complete, the inline mixer pumps the product to downstream equipment. The company slashed batch time by 50% and improved product consistency.

Following this success, they have been able use the inline high shear mixer on other product lines. The mixer is on wheels, with quick disconnect couplings, so it is easily removed from one line and connected to another.

