

Solutions for Your TOUGHEST
MIXING Applications in

CHEMICALS

Introduction

High Speed Dispersion of
Titanium Dioxide

The Process

The Problem

The Solution

The Advantages



CHEMICALS

High Speed Dispersion of Titanium Dioxide

Titanium dioxide (TiO₂) is chemically inert and has exceptional opacity and whiteness. These properties have led to its widespread

use in many industries, illustrated in table I

Industry	Application
Ceramic	Colorant, ingredient of glazes
Cosmetic	Sun protection
Paint	Used in watercolors, enamels, emulsion, gloss, exterior etc.
Paper	Paper filler & coating
Pharmaceutical	Tablet coating
Textile	Delustrant additive, whitener

Table I: Some uses of titanium dioxide

The Process

Titanium dioxide is most commonly supplied in powder form but may also be predispersed in oil or aqueous systems. The diversity of applications leads to many different methods of processing, however process requirements are basically the same:

- TiO₂ is usually supplied in powdered/premicronized form and particle size reduction (grinding) is not applicable in most cases.
- To maximize opacity and gloss properties, TiO₂ must be fully dispersed and evenly distributed throughout the product
- Dust/solvent emissions must be minimized

The Problem

The following problems can be encountered when using conventional mixers and agitators:

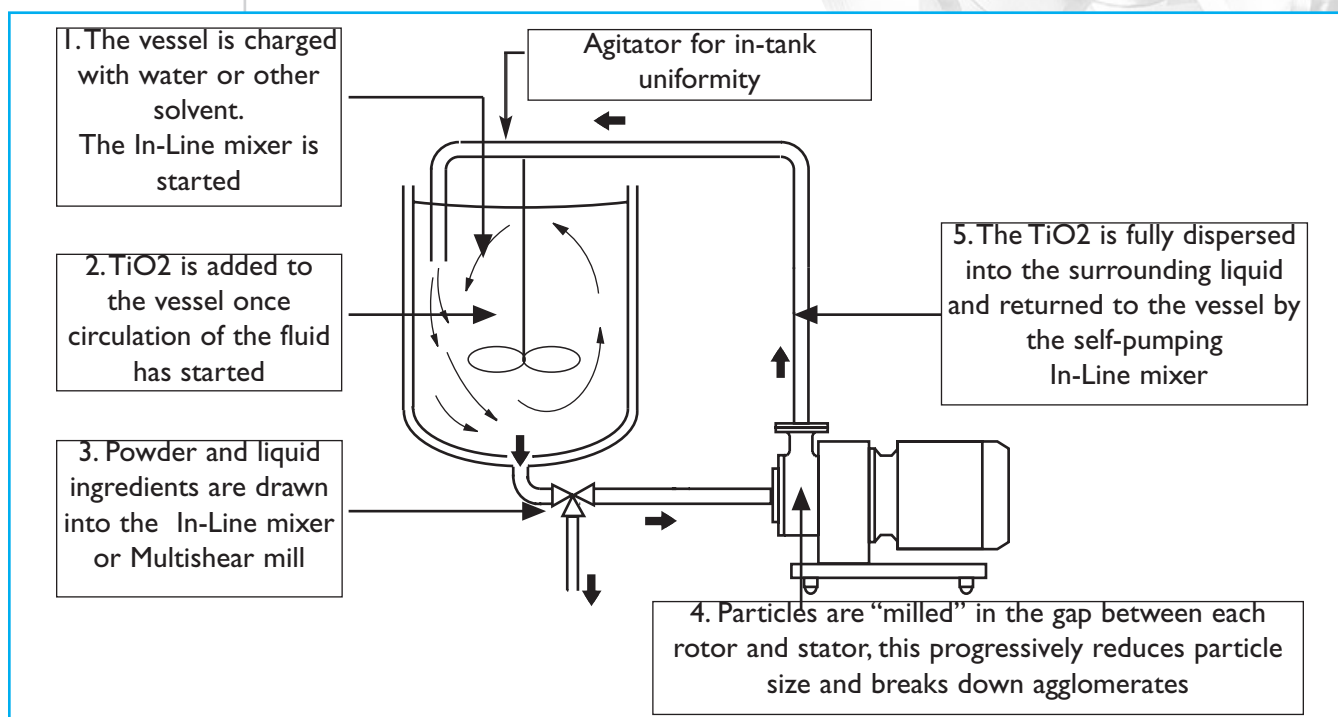
- On addition to the water, solvent, varnish or other media the particles tend to re-agglomerate.
- Conventional mixers cannot break these down effectively
- Long mixing cycles are required to obtain uniform dispersion.
- Extended processing time contributes to solvent emissions.
- Conventional systems are difficult to clean.
- Powder has to be added under controlled conditions which can be time consuming and leads to increased dust emissions

The Solution

The high speed, high shear operation of a Silverson mixer provides the solution to these problems.

The rotor/stator workhead rapidly disperses the TiO₂ particles into the surrounding liquid, leading to a more uniform product and shorter processing times.

This can be achieved using a batch mixer immersed in the processing vessel, or by the addition of a Silverson In-Line mixer to an existing process in a recirculation system as illustrated



The Advantages

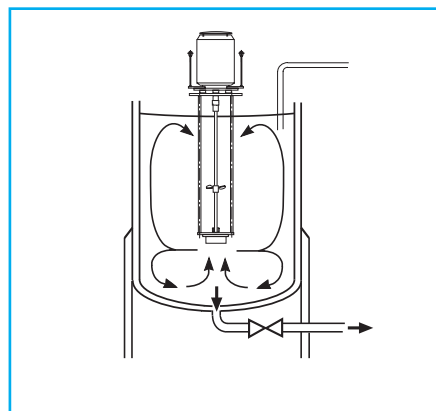
- The TiO₂ is added to the aqueous or organic solvent at a much faster rate, reducing dust emissions.
- The rotor/stator workhead provides an intense shearing action capable of breaking down even hard agglomerates.
- Operation can be carried out in a closed system, reducing solvent emissions.
- It is more energy efficient and economical.
- The shorter processing times required to obtain a uniform dispersion reduce wear and therefore maintenance and spare part costs.

The batch size, formulation, type of ingredients and the viscosity of the end product dictate which machine from the Silverson product line is best suited to individual processing requirements. See overleaf for details:

CHEMICALS

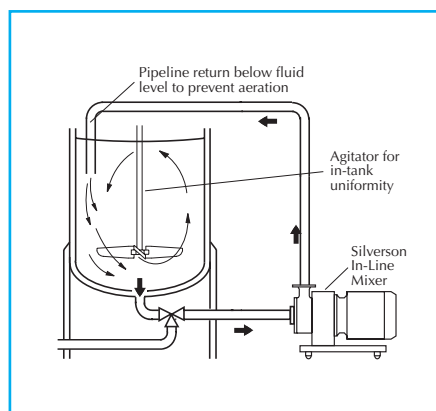
High Shear Batch Mixers:

- Suitable for batch sizes up to 400 gallons
- Can be used on mobile floor stands
- Sealed units available to control solvent/dust emissions



High Shear In-Line Mixers

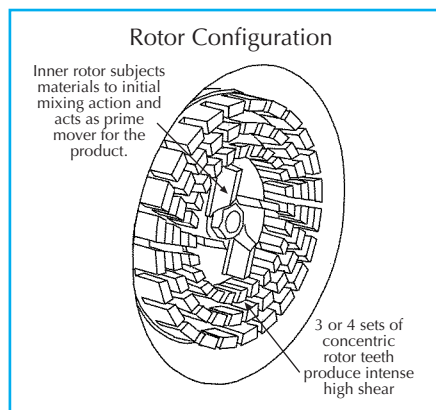
- Ideal for larger batches
- Aeration free
- Easily retro-fitted to existing plant
- Self pumping
- Can be used to discharge vessel



Multishear Mill and Multi-stage In-Line Mixer

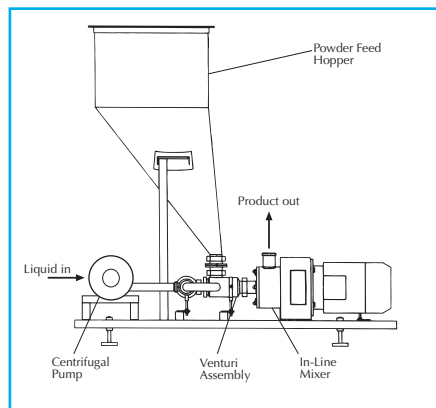
Offer the advantages of In-Line mixers plus:

- Designed specifically for dispersion of harder pigments and dyestuffs.
- The intense high shear imparted by the series of concentric rotors and stators can eliminate the need for conventional milling.
- Where conventional milling is required, the product supplied by the Multishear Mill or Multi-stage In-Line mixer allows the mill to operate with greater efficiency and reduces the number of passes required.



Flashblend

- Ideal for larger batches
- Capable of rapidly incorporating large volumes of powder
- Minimized aeration.
- Minimized cleaning requirements.
- Minimum operator input required.
- Easily automated.



Silverson Machines, Inc. 355 Chestnut Street, East Longmeadow, MA 01028
Ph: (413) 525-4825 • Fax: (413) 525-5804 • www.silverson.com

Issue No. 21CA2

Information contained in this report is believed to be correct and is included as a guide only. No warranty is expressed or implied as to fitness for use or freedom from patents. Silverson Machines reserve the right to change product specification without notice.