

Solutions for Your TOUGHEST  
MIXING Applications in  
**CHEMICALS**



Agrochemical Industry -  
Manufacture of Pesticides

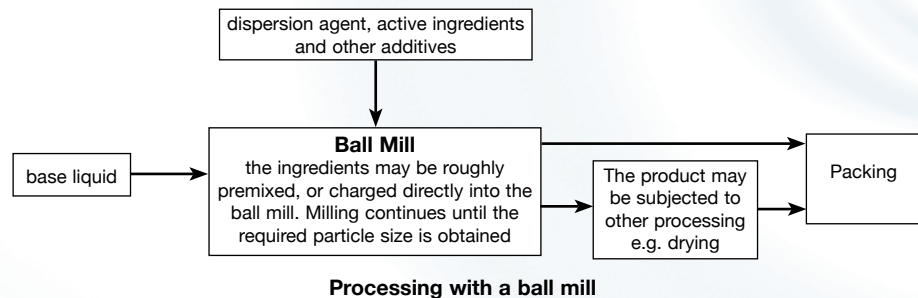
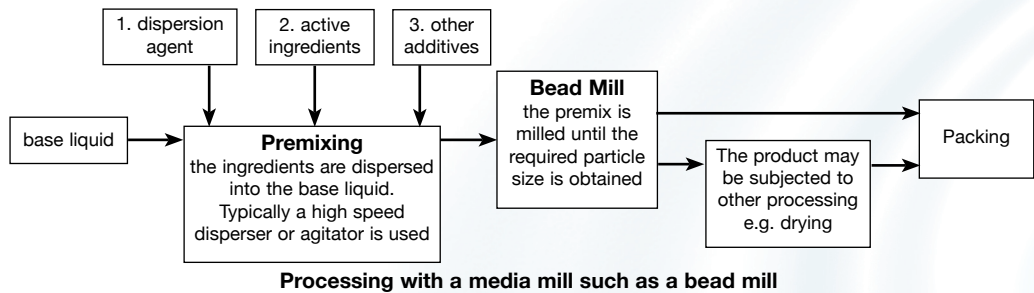
# Agrochemical Industry - Manufacture of Pesticides

Pesticides can be categorised into several groups - Fungicide, Herbicide, Insecticide, etc. There are many different methods of application and use and products are available in a number of formulation types, e.g. powder, granules, liquid concentrates and sprays.

Pesticides are typically suspensions of insoluble active ingredients in water; aqueous or oil based solutions are also used. Small amounts of ingredients such as thickeners, antifeeze, antifoaming agents and dispersion and wetting additives complete the formulation. The active ingredient content varies considerably, although this is typically around 50%.

## The Process

Typical processing methods can be summarised as follows:



The premixing system must be capable of meeting the following process requirements:

- Incorporating and dispersing large volumes and high proportions of powders.
- Some degree of particle size reduction is required.
- Each formulation has its own set of process conditions - the system must be versatile and adaptable to the many variations in product type.

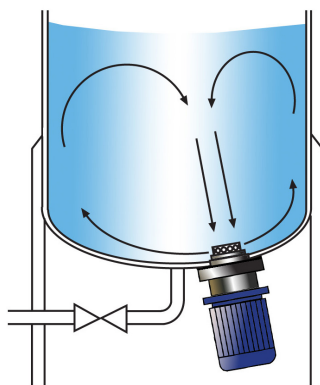
## The Problem

- High speed dispersers used for the premixing stage have a high energy requirement.
- Similarly, ball milling is a slow, energy intensive process.
- Agitators are not capable of readily breaking down agglomerates and have difficulty in wetting out light powders which tend to “raft” or float on the liquid surface.
- Some ingredients, e.g. thickening agents, only make up a very small proportion of the formulation, but must be correctly dispersed to obtain functionality.
- A poorly dispersed premix will require more passes through the mill, further increasing process time and energy requirements.
- Active ingredients can be harmful to the operator. Powders must therefore be incorporated into the base liquid as hygienically and safely as possible, with minimised handling and dust emissions.

## The Solution

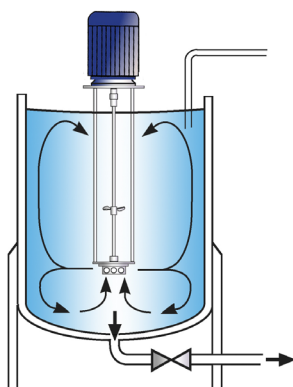
The above problems can be overcome by premixing with a Silverson High Shear mixer. The three stage action of the rotor/stator workhead draws liquid and solid ingredients into the mixing zone, subjects them to intense hydraulic and mechanical shear, then projects them back into the mix. In a short mixing cycle all the material passes through the workhead many times, progressively reducing particle size. This produces a uniform, low particle size premix for the milling stage.

The batch size, formulation, type of ingredients and the viscosity of the product dictates which machine from the Silverson range is suited to individual premixing requirements:



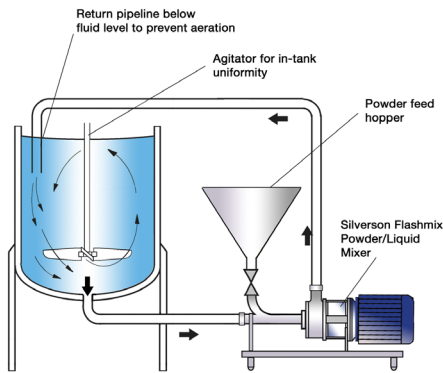
### High Shear Bottom Entry Mixers

- No immersed shaft - reduces cleaning requirements
- An In-Line mixer can be added in a recirculation system to further reduce process time
- For large batches or higher viscosity products an agitator may be required to maintain in-tank uniformity



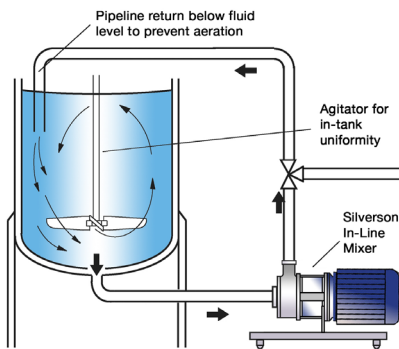
### High Shear Batch Mixers

- Vessel mounted batch mixers are suitable for volumes of up to 10,000 litres. These can be used in conjunction with supplementary in-tank agitators if required
- Small/medium units are suitable for batches of up to 1000 litres. They can be mounted on mobile floor stands and easily moved from vessel to vessel
- Laboratory and pilot scale units available



### Silverson Flashmix

- Ideal for large batches
- Capable of rapidly incorporating large volumes of powders
- Minimised aeration
- Minimised cleaning requirements
- Suitable for higher viscosity mixes
- Suitable for operation at higher temperatures
- Dust extraction systems available
- Ultra Hygienic models available
- Minimum operator input required



### High Shear In-Line Mixers

- Ideal for large batches
- Aeration free
- Easily retrofitted to existing plant
- Self-pumping
- Can be used to discharge vessel
- Ultra Hygienic models available
- Multistage units available
- High Viscosity models available

## The Advantages

This offers a number of advantages:

- Rapid dispersion of the powders.
- The intense shearing action of the rotor/stator workhead breaks down agglomerates.
- Guaranteed particle separation of pre-micronised powders.
- Reduced energy requirements.
- Improved process hygiene.
- The shorter processing time required to incorporate the powders reduces dust emissions.
- A single machine can carry out several different mixing operations on a wide range of product types.
- Improved consistency and uniformity of premix dramatically reduces the time taken in subsequent milling stages. In some cases a single pass is sufficient to obtain the required particle size after premixing with a Silverson.



For more information click here to go to [www.silverson.co.uk](http://www.silverson.co.uk)

Silverson Machines Ltd. Waterside, Chesham, Buckinghamshire England HP5 1PQ  
Tel: +44 (0) 1494 786331 Email: sales@silverson.co.uk

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.

Issue No. 42CE4