

Food & Pharmaceutical

Carbonating Mineral Water

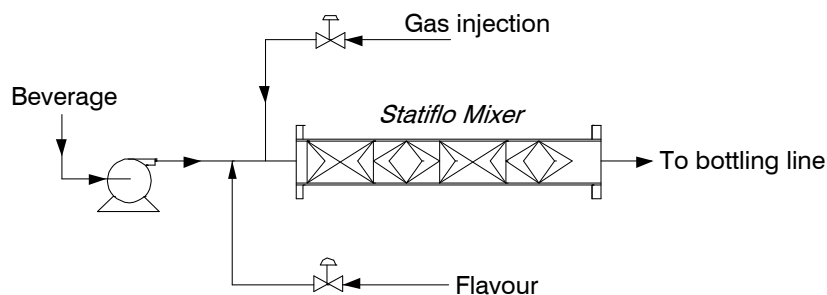
PROBLEM

A leading producer of bottled mineral water was experiencing problems using a conventional glass bead carbonator for dispersing and dissolving carbon dioxide gas in water. Consistent gas bubble sizes were impossible to achieve without frequent maintenance and lost production.

A further problem with the conventional equipment, which was designed without any particular attention to mixing, was that flavours were periodically accumulating in the carbonator and were then released in slugs resulting in very high flavour concentration in the carbonated water and customer dissatisfaction. Regular cleaning was necessary to minimise this problem.

The company required an answer to both process problems to reduce maintenance and the considerable amount of lost production.

Gas / Liquid Dispersion



SOLUTION

The tank and agitator used for mixing the flavours into water and the glass bead carbonator were both removed and replaced with a *Statiflo Series 200 Sanitary Motionless Mixer*. This Mixer was fitted with removable elements, RJT couplings and integral injectors for both carbon dioxide gas and flavour.

The *Statiflo* equipment ensured that total and efficient distribution of flavours and gas was achieved. Gas bubble size and bubble size distribution were predictable due to its almost ideal plug flow characteristic.

The previously complex piping arrangement to the filling machine was greatly simplified as the *Statiflo Motionless Mixer* is an inline device requiring no direct power supply.

Carbonating Mineral Water

RESULT

The installation of the *Statiflo Motionless Mixer* was an instant success. It was soon apparent there was no accumulation of flavour - the *Statiflo Mixer* is a self cleaning device due to its intense mixing action. Downtime and lost production resulting from the old carbonator was eliminated.

Consistent gas bubble sizes were ensured for efficient mass transfer into solution. Complete and uniform mixing of the flavours was guaranteed. The company had earlier suspected that overdosing was occurring to compensate for lack of mixing. It now had the satisfaction that the efficient operation had eliminated the possibility of wasting flavour.

There were still more benefits - the *Statiflo Motionless Mixer* operates without moving parts, without spare parts and with virtually no maintenance. The high running costs of the agitator and carbonator were concerns of the past!

The company immediately installed *Statiflo Motionless Mixers* on all its production lines, after which no more customer complaints were received.

FEATURES OF PRIMARY IMPORTANCE IN THIS CASE STUDY

- Competitive price when compared to traditional methods of gas dispersion and mixing
- Extremely simple installation procedures
- Economic operating costs
- Consistent and predictable performance
- No moving parts or maintenance
- Self cleaning
- Eliminates overdosing

OTHER STATIFLO MIXER FEATURES & BENEFITS

- Minimal space requirement
- Completely sealed system
- Self cleaning
- Available in all sizes
- Eliminates radial gradients
- Available in any material
- Custom designed
- Meets all QA/QC levels
- Available worldwide
- Low installed weight



Statiflo International Ltd
Wood Street, Macclesfield
Cheshire SK11 6JQ
United Kingdom
Tel: +44 (0)1625 433100
Fax: +44 (0)1625 511376
E-mail: sales@statiflo.co.uk

Statiflo GmbH
Auf der Voßwiese 2
51643 Gummersbach
Germany
Tel: +49 (0)2261 913570
Fax: +49 (0)2261 913580
E-mail: info@statiflo.de

Statiflo Corp
95 Wahconah Street
Pittsfield, MA 01201
USA
Tel: +1 (413) 684 9911
Fax: +1 (413) 684 9988
E-mail: sales@statiflocorp.com

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2175 Sheppard Ave E, Suite 203
Willowdale, Ontario M2J 1W8
Canada
Tel: +1 (416) 756 2406
Fax: +1 (416) 490 6937
E-mail: sales@statiflo.com

www.statiflo.com

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Food & Pharmaceutical

Viscosity & Temperature Control – Laminar Flow Heat Exchange

PROBLEM

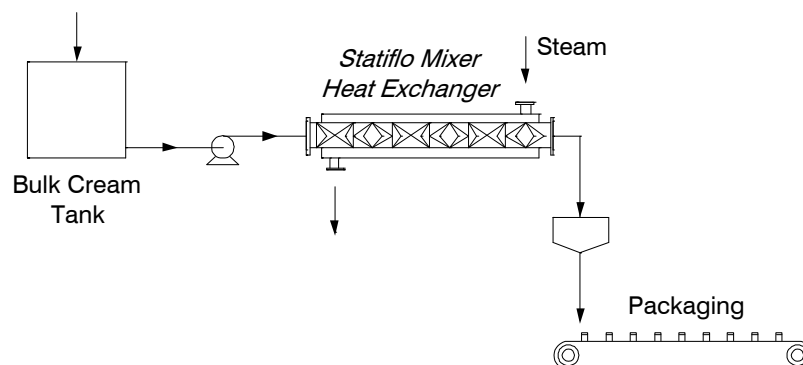
Manufacturers of a world famous cosmetic cream were faced with an unexpected problem just days before a new facility was due on full scale production. The filling operation was unable to satisfactorily fill the jars. Due to the higher than anticipated cream viscosity, air spaces were forming in the bottom corners of the containers. Although the correct weight of cream was being dispensed, consumer trials indicated that customers were unhappy with the appearance of the product in the jar.

SOLUTION

The manufacturer’s engineers quickly determined that the high viscosity of the cream was responsible for poor flow into the jars. Heating the cream would reduce the viscosity, but there was serious concern because the cream was heat sensitive. Conventional heating methods were ruled out because of the high viscosity, laminar flow condition and the certainty of developing hot spots.

Statiflo was approached to design a custom engineered Mixer / Heat Exchanger based on the Series 200 range of sanitary units with removable elements and incorporating a steam heating jacket. A short delivery was vital - full scale production was scheduled to commence in less than two weeks.

The radial mixing action of the *Statiflo Motionless Mixer* is responsible for the elimination of internal film boundaries which are the biggest resistances to efficient heat transfer in laminar flow. Intense mixing also prevents hot spots occurring in the heat sensitive cream.



Viscosity & Temperature Control – Laminar Flow Heat Exchange

RESULT

The design of the *Statiflo Motionless Mixer / Heat Exchanger* was completed in hours and approved shortly afterwards by the customer's engineers. Despite the normal eight week delivery period of this complex equipment, *Statiflo* promised to complete its obligation in ten working days.

The equipment arrived at its overseas site two days early. Installation was very straightforward and immediately solved the problem – and well in time to meet the scheduled date for full scale production.

The cream exited the *Statiflo* equipment at a controlled elevated temperature and reduced viscosity. Flow into the jars was improved sufficiently to completely eliminate the unsightly air spaces. The customer was happy knowing that full production had not been delayed and adverse user reaction had been averted.

FEATURES OF PRIMARY IMPORTANCE IN THIS CASE STUDY

- No moving parts for maintenance free operation
- Sanitary design in polished stainless steel
- Suitable for cleaning in place (CIP) systems
- Extremely simple installation procedures
- Prevents localised overheating and hotspots
- Increases overall heat transfer coefficient by up to 500% compared with empty pipe
- Consistent and predictable performance
- Self cleaning

OTHER STATIFLO MIXER FEATURES & BENEFITS

- Minimal space requirement
- Completely sealed system
- Self cleaning
- Available in all sizes
- Eliminates radial gradients
- Available in any material
- Custom designed
- Meets all QA/QC levels
- Available worldwide
- Low installed weight



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Cheshire SK11 6JQ
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www.statiflo.com

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Food & Pharmaceutical

Colour & Flavour Mixing

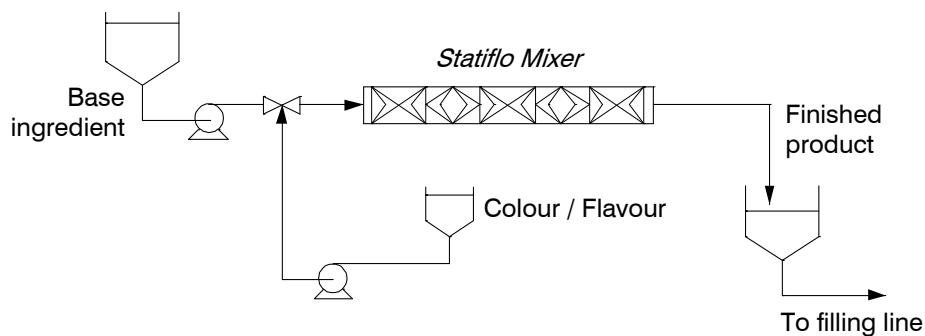
PROBLEM

A well known manufacturer of a leading brand of yogurt was using conventional inline dynamic mixing equipment to blend colours and fruit flavours into yogurt, but was experiencing poor control and colour streaking in the finished product.

For unknown reasons, some colours were more difficult to mix than others and as three or four different flavours and colours were being packaged simultaneously, this resulted in very high product wastage and equipment downtime.

SOLUTION

Statiflo Series 200 Motionless Mixers in sanitary stainless steel construction were recommended to replace the existing dynamic mixer. Complete mixing was assured as a result of the flow division mixing mechanism which is independent of flowrate and viscosity. The low shear mixing characteristic was proposed to avoid degradation and break up of fruit particles in some product lines.



RESULT

Installation of the *Statiflo Motionless Mixer* was an immediate success. Colour streaking was eliminated with consistent product quality and no wastage. Having proved the technique, additional *Statiflo Motionless Mixers* were installed on other product lines on different flavours and colours. Simultaneous dispensing and packaging was then possible with complete confidence. The customer also benefited as a result of the *Statiflo Mixer* operating without moving parts, without spare parts and with virtually no maintenance requirement.

Colour & Flavour Mixing

MIXER TRIALS

Colour mixing is highly unpredictable. The amount of mixing required is subject to the type of colour, colour intensity and appearance to the naked eye. *Statiflo* has an extensive library of existing colour mixing applications in all industries, however, in some circumstances, we recommend that mixing trials are performed if the amount of mixing to achieve product specifications is unknown.

Equipment for trial purposes is usually available. Please contact *Statiflo* for further information.

FEATURES OF PRIMARY IMPORTANCE IN THIS CASE HISTORY

- Degree of mix independent of viscosity and flowrate
- No moving parts for maintenance free operation
- Sanitary design in polished stainless steel
- Suitable for cleaning in place (CIP) systems
- Consistent and predictable performance
- Low shear mixing
- Self cleaning
- Completely sealed system

OTHER STATIFLO MIXER FEATURES & BENEFITS

- Minimal space requirement
- Available in all sizes
- Eliminates radial gradients
- Available in any material
- Custom designed
- Meets all QA/QC levels
- Available worldwide
- Low installed weight



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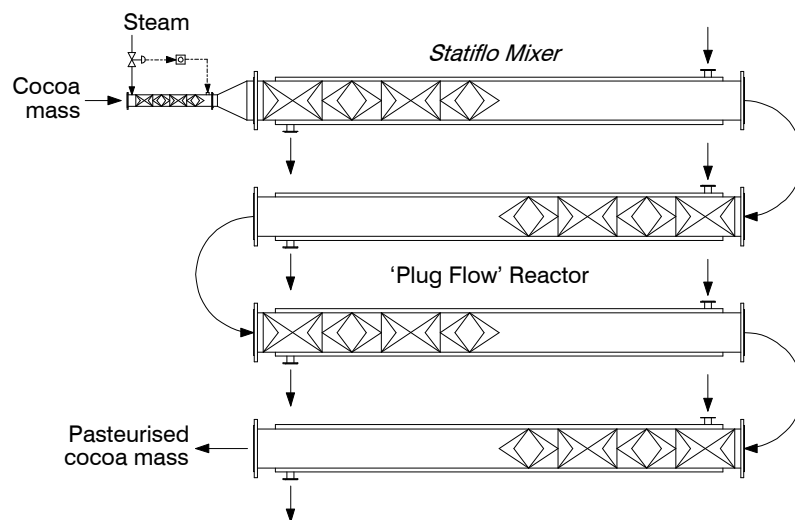
Food & Pharmaceutical

Chocolate Refining

PROBLEM

In the early stages of chocolate refining, cocoa beans are ground to a pulp called cocoa mass, which is prone to rapid biological degradation. This is avoided by pasteurising the cocoa mass shortly after the grinding operation. The cocoa mass is a viscous non-Newtonian slurry with high solids content making it extremely difficult to process.

Traditionally, chocolate manufacturers have used stirred tanks with steam heating coils to raise the temperature of the cocoa mass which is then held for a predetermined period of time to complete the pasteurisation. This is a batch operation involving large tanks with expensive agitators. Rapid buildup of cocoa mass on the steam coils results in very low heat transfer coefficients and an expensive cleaning stage between batches. Residence time control is poor.



SOLUTION

Statiflo was approached to determine whether static mixing technology could solve some, if not all, of the above problems. Following close consultation with the customer, *Statiflo* engineers quickly designed a custom engineered total process solution.

The heating stage was performed by direct steam injection using a small diameter *Statiflo Motionless Mixer* to ensure rapid dispersion of steam to avoid the noise and vibration normally associated with inline steam injection. Due to the completely mixed flat temperature profile, steam injection rates could be controlled by downstream temperature sensors.

Chocolate Refining

SOLUTION (cont)

Having raised the cocoa mass temperature high enough for pasteurisation to occur, it was then essential to provide sufficient residence time to complete the process. This was achieved by several stages of large diameter *Statiflo Motionless Mixers*, designed to provide 'plug flow' for the specified residence time.

The complete package included *Statiflo Series 200 Mixers* in sanitary stainless steel construction complete with all injectors, reducers and interconnections.

RESULT

This system has now been running for over 10 years and has been successfully duplicated on other chocolate refining processes. The original batch operation was superseded by a continuous inline process. Tanks and agitators, together with their heavy maintenance, their high energy consumption of steam and electrical power, and their labour intensive cleaning requirement were made obsolete.

Continuous pasteurisation 24 hours per day, 365 days per year at very high heat transfer coefficients and with excellent control of residence time has been possible.

FEATURES OF PRIMARY IMPORTANCE IN THIS CASE HISTORY

- Approaches ideal plug flow for residence control
- Efficient heat transfer in laminar flow
- Degree of mix independent of viscosity and flowrate
- No moving parts for maintenance free operation
- Sanitary design in polished stainless steel
- Suitable for cleaning in place (CIP) systems
- Consistent and predictable performance
- Completely sealed system

OTHER STATIFLO MIXER FEATURES & BENEFITS

- Minimal space requirement
- Available in all sizes
- Eliminates radial gradients
- Available in any material
- Custom designed
- Meets all QA/QC levels
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Food & Pharmaceutical Industry

Unit Operations

In an increasingly cost conscious world, we are all striving to improve our effectiveness. Process equipment which has no moving parts, which is maintenance free, very energy efficient and which can improve plant performance, must significantly contribute towards lower operating costs. **Several years ago, the American Institute of Chemical Engineers estimated that inadequate fluid mixing cost the US Chemical Industry \$10B, or 3% of turnover.** We believe that mixing has an even more significant role in the Food and Pharmaceutical Industry.

FEATURES & BENEFITS

The *Statiflo Motionless Mixer* is the modern alternative to traditional inline dynamic and stirred tank systems, and has many cost saving benefits:-

- No moving parts, no spare parts, virtually zero maintenance.
- Very low energy consumption, often 90% less than dynamic mixers.
- Energy efficient design.
- Predictable mixing. Additive and chemical savings possible.
- Eliminates tanks and dynamic mixers.
- No electrical connections.
- Extremely compact design. Installation is simple and quick.
- Improves sampling and measurement control.
- Low capital cost.
- Self-cleaning sanitary design with removable internals.
- Enclosed housing eliminates risk of external contamination.
- Excellent for fragile, shear sensitive products.
- Manufactured in the UK and North America.

STATIFLO MIXING TECHNOLOGY

The most effective devices are often the simplest. The novel *Statiflo* mixing element is arranged in a chain and fitted inside a housing. Materials (liquids, gases and solids) passing through the *Statiflo Motionless Mixer* are processed by following the element geometry. There are no moving parts except for the process material itself. As a result mixing is predictable and efficient.

Unit Operations

STANDARD DESIGNS

The *Statiflo Motionless Mixer* is available in both Series 100 standard industrial and Series 200 sanitary versions. The Series 200 has sanitary construction in 304 or 316 stainless steel, with removable elements and RJT, IDF or ferrule type quick release couplings suitable for CIP (cleaning in place) systems. Options include injectors, heat transfer jackets and sampling points. For more details ask for Dimension Sheet 200-001.

APPLICATIONS

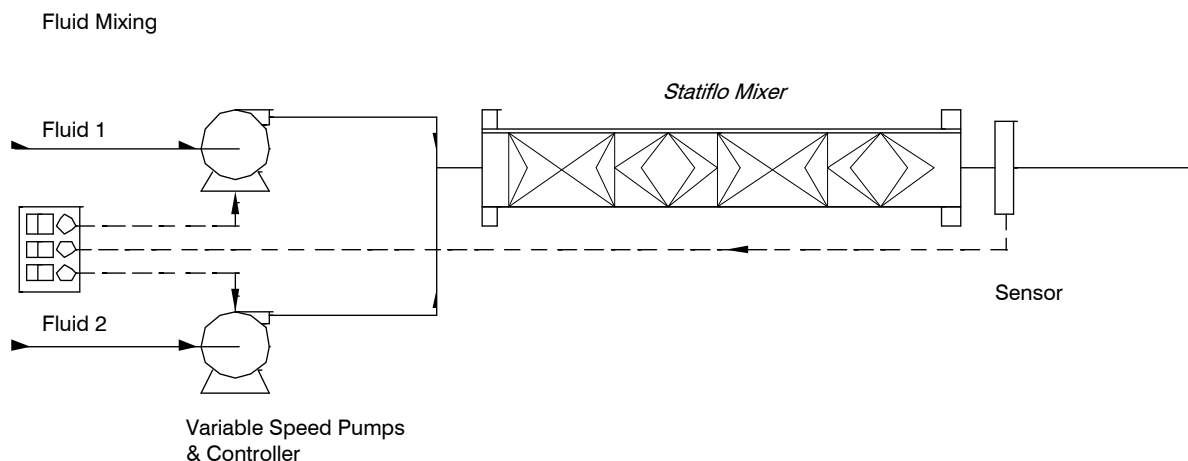
The *Statiflo Motionless Mixer* has hundreds of applications, from simple blending operations to complex inline reactors involving heat exchange.

a) BLENDING

The *Statiflo Motionless Mixer* is used in all process industries for the mixing of two or more miscible or immiscible liquids. As a general rule, if the material is pumpable, then it can be mixed - high viscosity is not a problem. Some typical blending applications are:-

- colour and flavour addition.
- syrup dilution.
- paste formation.
- marbelizing, creating layers and ripples.
- solids suspension in liquids.
- blending process streams for density, viscosity and temperature control.
- acid/caustic dosing for pH control.
- high viscosity blending/additives into chocolate.

Laminar flow mixing of high viscosity liquids enables predictable homogenisation and concentration distributions resulting in improved yields and better product properties. We are not aware of any other device able to achieve a lower energy input per degree of mix.



Unit Operations

b) DISPERSIONS & EMULSIONS

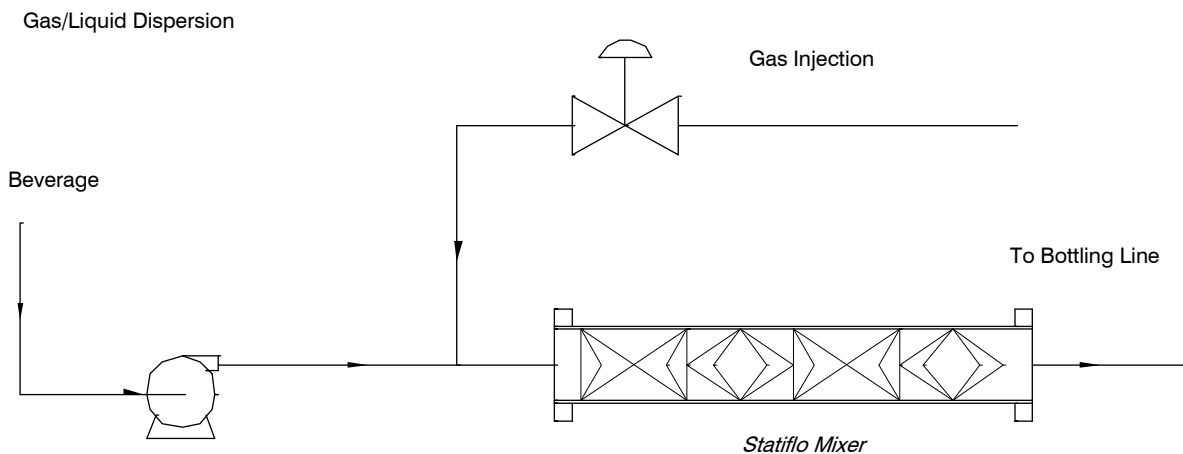
The controlled shear characteristics of the *Statiflo Motionless Mixer* allow production of dispersions and emulsions with low viscosity immiscible liquids. Droplet size is predictable and can be as small as a few microns. Typical applications include:-

- acid contacting/washing of oils and fats.
- caustic washing.
- water and oils, margarine production.
- shampoo and conditioner production.

c) GAS DISPERSIONS

In a similar way, gas injection into liquids is used in many processes including:-

- carbonation of mineral waters, oils and beer.
- sulphur dioxide in sugar liquor.
- nitrogen sparging of vegetable oils.
- aeration of wort.
- steam heating/pasteurisation.



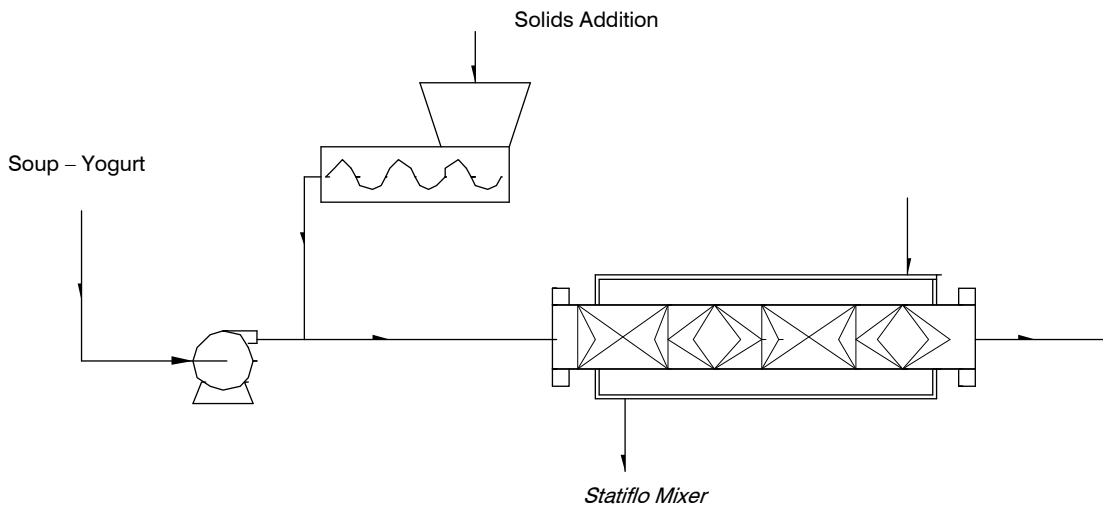
Unit Operations

d) HEAT EXCHANGE IN LAMINAR FLOW

Heat transfer, thermal control and thermal homogenisation of pastes and high viscosity liquids is commonly encountered in industry. The main resistances to efficient heat transfer in laminar flow are poor radial flow patterns and the resulting high inside film resistance. *Statiflo Motionless Mixer* element bundles produce a radial mixing effect which virtually eliminates all radial gradients in temperature, concentration, colour or any other variable. The same mixing effect provides a wiping action on all internal surfaces resulting in greatly reduced or even elimination of film boundaries. Overheating and overcooling is eliminated and overall heat transfer coefficients are improved by 300-500% when compared with empty tubes.

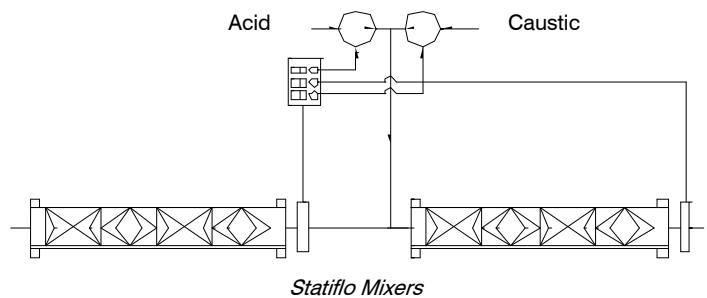
Designs are available with jackets or shell and tube arrangements for larger heat transfer duties. Typical applications include:-

- thermal control of heat sensitive products.
- heating and cooling of chocolate and margarine.



e) REPRESENTATIVE SAMPLING & PROCESS CONTROL

Many production lines demand accurate and sophisticated automatic control systems to achieve exacting quality requirements and health regulations. Conventional batch mixing is difficult to automate and is also slow, expensive and labour intensive. By applying *Statiflo* mixing technology, representative sampling of, for example, density, colour, viscosity and temperature can be achieved and continuously monitored - a fundamental requirement of process control. Measurement sensors can be positioned immediately downstream of the Mixer, resulting in fast response time with minimal off-spec product.

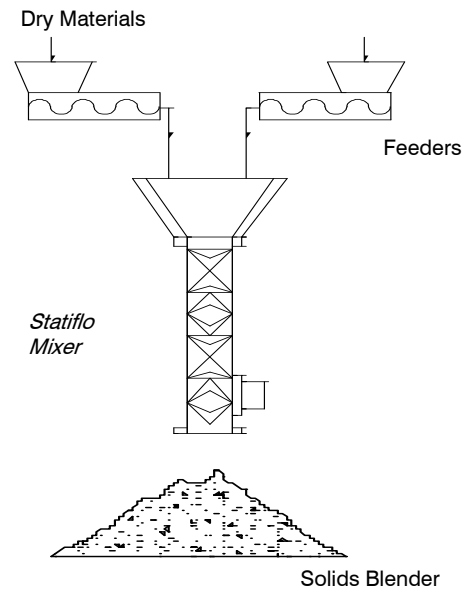


Unit Operations

f) SOLIDS BLENDING

Statiflo Mixing Technology can be applied to blending of most types of solids: dry powders, flakes and granules. Solids may be transported pneumatically or by gravity and, if necessary, flow improved by the attachment of vibration devices. Applications include:-

- detergent powders.
- dried foods.



g) MISCELLANEOUS

- "Plug flow" - The radial mixing action described previously will also provide almost ideal plug flow conditions. Control of residence time is critically important in the design of pasteurisation, reaction and heat exchange processes.
- Low shear - The Statiflo Motionless Mixer is a low shear device, ideal for blending fragile and shear sensitive products such as fruit addition to yogurt.

Statiflo Motionless Mixers are manufactured in diameters from 12mm to several metres in all commercially available materials. Each unit is specifically designed to the customers standards and requirements. Mixers are supplied as simple plain ended pipe sections, flanged with multiple injectors and sampling points, fitted in bends, or in square or rectangular section for ducts and open channels. With no moving parts, virtually no maintenance or direct energy input and offered at realistic prices and deliveries, the *Statiflo Motionless Mixer* is now the modern alternative to many stirred tank systems.



Statiflo International Ltd
Wood Street, Macclesfield
Cheshire SK11 6JQ
United Kingdom
Tel: +44 (0)1625 433100
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The Brewing Industry

Unit Operations

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FEATURES & BENEFITS

The *Statiflo Motionless Mixer* is the modern alternative to traditional inline dynamic and stirred tank systems, and has many cost saving benefits:-

- No moving parts, no spare parts, virtually zero maintenance.
- Self cleaning sanitary design with removable internals.
- Completely enclosed housing eliminates risk of external contamination.
- Predictable mixing. Additive and chemical savings possible.
- Excellent for fragile, shear sensitive products.
- Improves sampling and measurement control.
- Eliminates tanks and dynamic mixers.
- Very low energy consumption, often 90% less than dynamic mixers.
- No electrical connections.
- Extremely compact design. Installation is simple and quick.
- Low capital cost.
- Manufactured in the UK and North America.

STATIFLO MIXING TECHNOLOGY

The most effective devices are often the simplest. The novel *Statiflo* mixing element is arranged in a chain and fitted inside a housing. Materials (liquids, gases and solids) passing through the *Statiflo Motionless Mixer* are processed by following the element geometry. There are no moving parts except for the process material itself. As a result mixing is predictable and efficient.

Unit Operations

STANDARD DESIGNS

The *Statiflo Motionless Mixer* is available in both Series 100 standard industrial and Series 200 sanitary versions. The Series 200 has sanitary construction in 304 or 316 stainless steel, with removable elements and RJT, IDF or ferrule type quick release couplings suitable for CIP (cleaning in place) systems. Options include injectors, heat transfer jackets and sampling points. For more details ask for Dimension Sheet 200-001.

APPLICATIONS

The *Statiflo Motionless Mixer* has hundreds of applications, from simple blending operations to complex inline reactors involving heat exchange.

a) GENERAL PURPOSE BLENDING

The *Statiflo Motionless Mixer* is used in all process industries for the mixing of two or more miscible or immiscible liquids. As a general rule, if the material is pumpable, then it can be mixed - high viscosity is not a problem. Both laminar flow mixing of high viscosity liquids and turbulent flow mixing of low viscosity liquids enable predictable homogenisation and concentration distributions resulting in improved yields and better product properties. We are not aware of any other device able to achieve a lower energy input per degree of mix.

b) CIP (cleaning in place) SYSTEMS

The vital role in CIP systems for *Statiflo Motionless Mixers* is not indicated on the flowsheet. All critical fermentation equipment must be sterilised, at regular intervals, with hot caustic or hypochlorite solutions, which are prepared, diluted and heated using *Statiflo Motionless Mixers*:-

- the Mixers are installed on a simple, compact process control loop where, for example, concentrated caustic or sodium hypochlorite are continuously diluted inline to ensure correct and accurate concentration of sterilising agent is present in the CIP solution before use.
- after chemical preparation, the CIP solution is often heated, by a *Statiflo Motionless Mixer*, either by adding hot water or steam.

c) REPRESENTATIVE SAMPLING

The *Statiflo Motionless Mixer* is a vital component of any inline mixing/control system. Even the most sophisticated control systems will not perform completely effectively if the measuring equipment fails to see a representative sample. Modern process control systems are usually very expensive and despite the Mixer being only a small fraction of the total cost, its role as an essential component, vital to plant performance, is often overlooked.

Installing a *Statiflo Motionless Mixer* allows sampling immediately downstream, within very few diameters of the injection point. This permits the system to rapidly adjust to monitored process changes with **negligible time lag and minimum use of dosing additives**.

Unit Operations

d) PRECONDITIONING

Virtually all breweries precondition the water supply in a variety of ways dependent upon feedwater quality. *Statiflo Motionless Mixers* are installed for pH control duties, using either sulphuric acid or sodium hydroxide solution for pH correction. Water hardness is controlled using calcium and phosphate salts. The Mixers are installed to ensure complete mixing and dilution of injected concentrated chemical takes place, enabling representative sampling, for process control purposes, to occur immediately downstream. This results in minimum system response time and 'on spec' product.

e) MALT EXTRACTION

This stage involves dissolving the maximum available soluble fermentation sugars from the malted barley in warm water. It is carried out in most breweries by firstly *mashing*, followed by *sparging*. The dissolving of fermentation sugars is a temperature critical process often carried out at different mashing and sparging water temperatures. Cold water and steam are normally readily available, however, the provision of warm water at the differing temperatures required for the processes below is not so simple. Bulk preparation and storage of warm water at three or four different temperatures is often costly, cumbersome and occasionally almost impossible.

- *Mashing*: malted barley is conveyed into the mash tun where it is infused with warm water, prepared with *Statiflo Motionless Mixers*, and gently agitated. This allows the soluble sugars (maltose, etc.) to dissolve. The resultant concentrated 'mash liquor' is then pumped from the mash tun to a holding vessel for combination with sparged liquor.
- *Sparging*: spent grains from mashing are transferred to the Lautertun where further warm water, again prepared with *Statiflo Motionless Mixers*, is sparged over the grains to wash and rinse the maximum amount of residual fermentation sugars from the grain. The resultant dilute solution of malt sugars, the 'sparge liquor', is transferred to a holding vessel via a further *Statiflo Motionless Mixer* for wort density control.

f) WORT DENSITY CONTROL

For optimum fermentation, the wort density must be carefully controlled to ensure the ideal concentration of sugars is present for rapid yeast growth and subsequent anaerobic fermentation. A *Statiflo Motionless Mixer* blends mashing malt liquor, sparge liquor and warm water to give a wort with the correct specific gravity for fermentation. The *Statiflo Motionless Mixer* uniformly blends all three components to provide accurate density control at the mixer outlet. Process control can then be applied to any of the three component feed lines, using proportional control, to maintain consistent wort density.

Unit Operations

g) WORT AERATION

As brewery capacity has increased over the years, the time taken for the yeast population to grow aerobically to an acceptable level prior to anaerobic fermentation has become prohibitive. To reduce this lost fermentation time, accelerated aerobic yeast growth can be achieved by increasing the oxygen content of the wort prior to yeast inoculation. This ensures that rapid cell growth occurs in an oxygen rich wort, such that very high yeast populations are quickly reached, reducing delays in starting anaerobic fermentation.

If gas injection takes place in an empty pipe, the oxygen bubbles quite rapidly recombine and a two phase system quickly develops with the wort in the lower half of the pipe and the gas in the upper half. Efficient mass transfer is impossible under these conditions.

Statiflo Motionless Mixers solve this problem and increase mass transfer rates. Oxygen is introduced at the Mixer inlet, sometimes through a sintered diffuser, to ensure that the gas is rapidly dispersed uniformly throughout the wort in the form of very fine bubbles. The even shear characteristic of the Mixer results in a narrow bubble size distribution curve.

Maintaining the fine gas bubbles in suspension for a given time interval promotes high mass transfer rates, resulting in high oxygen content in the wort. The oxygen rich environment is ideal for rapid aerobic yeast growth and subsequent anaerobic fermentation.

h) FILTRATION

The finely suspended solids in the cloudy beer are removed by injection of finings, using a *Statiflo Motionless Mixer* for uniform distribution. Efficient coagulation of fines, yeast cells and debris follows, and at the same time the very gentle shearing action of the Mixer enhances the flocculation/coagulation process with minimum protein break down.

Occasionally, dependent upon solids loading in the beer, a perlite/kieselguhr suspension is injected through a further *Statiflo Motionless Mixer* as a filtration body aid.

i) DENSITY CONTROL

After the filtration stage, the now bright beer has its final specific gravity adjusted by dilution with cold water. This is a critical application as duty is payable based on final alcohol content.

Cold dilution water is injected into the bright beer at the inlet of a *Statiflo Motionless Mixer* where thorough and complete mixing takes place. A densometer, positioned at the Mixer outlet, continuously monitors the bright beer density and, via a simple process control loop, varies the cold dilution water injection rate, to ensure very accurate monitoring and control of the final density/alcohol content.

Unit Operations

j) CARBONATION

Prior to bottling, the carbon dioxide concentration of the bright beer must be increased by using a *Statiflo Motionless Mixer*. As with wort aeration, the carbonation process is significantly enhanced by generating fine gas bubbles which are maintained and uniformly dispersed for a given time interval. A *Statiflo Motionless Mixer* provides this ideal combination.

The final beer is then processed for bottling, canning and kegging.

Virtually all the Mixers illustrated on the flowsheet on page 6 are operating in conventional control loops. Dosed components, whether they be chemicals, hot or cold water or gases are injected at the Mixer inlet. A completely mixed condition is reached within the length of the Mixer, so that representative sampling can take place immediately downstream.

This provides a reliability and consistency of process control unmatched by any other item of process equipment. Such high levels of process control ensure exactly the right amount of dosed component is injected to eliminate both over and under dosing and help provide optimum quality of final product.



Statiflo International Ltd
Wood Street, Macclesfield
Cheshire SK11 6JQ
United Kingdom
Tel: +44 (0)1625 433100
Fax: +44 (0)1625 511376
E-mail: sales@statiflo.co.uk

Statiflo GmbH
Auf der Voßwiese 2
51643 Gummersbach
Germany
Tel: +49 (0)2261 913570
Fax: +49 (0)2261 913580
E-mail: info@statiflo.de

Statiflo Corp
95 Wahconah Street
Pittsfield, MA 01201
USA
Tel: +1 (413) 684 9911
Fax: +1 (413) 684 9988
E-mail: sales@statiflocorp.com

Statiflo Inc
2175 Sheppard Ave E, Suite 203
Willowdale, Ontario M2J 1W8
Canada
Tel: +1 (416) 756 2406
Fax: +1 (416) 490 6937
E-mail: sales@statiflo.com

Static Mixer Sizing Questionnaire

W	
Date	
Item	
Quantity	
Initials	

Process Data

COMPONENT	1	2	3	MIXTURE
Fluid name				
Flowrate, m ³ /h				
Viscosity, cP				
Density, kg/m ³				
Pressure, bar a				
Temperature, °C				
Miscible System				Yes / No
Interfacial Tension, dynes/cm - immiscible systems only				
	Required Variation Coefficient (CoV) at Mixer discharge or diameters downstream?			
	Sample Point Location			

Mechanical Data

Pipe Diameter, mm	
Maximum Pressure drop, bar	
Removable Elements	Yes / No
Injector(s)	* Yes / No
Sample Point(s)	* Yes / No
Sanitary Finish	Yes / No
End Connections / Specification	
Housing Schedule	
Materials of Construction	
Design Code	
Operating / Design Temperature, °C	
Operating / Design Pressure, bar a	
Jacketted	Yes / No
Special Painting	
Tests / NDE	
Other Data	

Brief Process Description with Flowsheet (if applicable)

* If injector(s) and/or sample point(s) are required please sketch number, size and location

Please return completed Questionnaire to your local representative or:

Statiflo International Ltd
 Wood Street, Macclesfield
 Cheshire SK11 6JQ
 United Kingdom
 Tel: +44 (0) 1625 433100
 Fax: +44 (0) 1625 511376
 E-mail: sales@statiflo.co.uk

Statiflo GmbH
 Auf der Voßwiese 2
 51643 Gummersbach
 Germany
 Tel: +49 (0) 2261 913570
 Fax: +49 (0) 2261 913580
 E-mail: info@statiflo.de

Statiflo Corp
 95 Wahconah Street
 Pittsfield, MA01201
 USA
 Tel: +1 (413) 684 9911
 Fax: +1 (413) 464 8239
 E-mail: sales@statiflocorp.com

Statiflo Inc
 2175 Sheppard Ave E, Suite 203
 Willowdale, Ontario M2J 1W8
 Canada
 Tel: +1 (416) 756 2406
 Fax: +1 (416) 490 6937
 E-mail: sales@statiflo.com