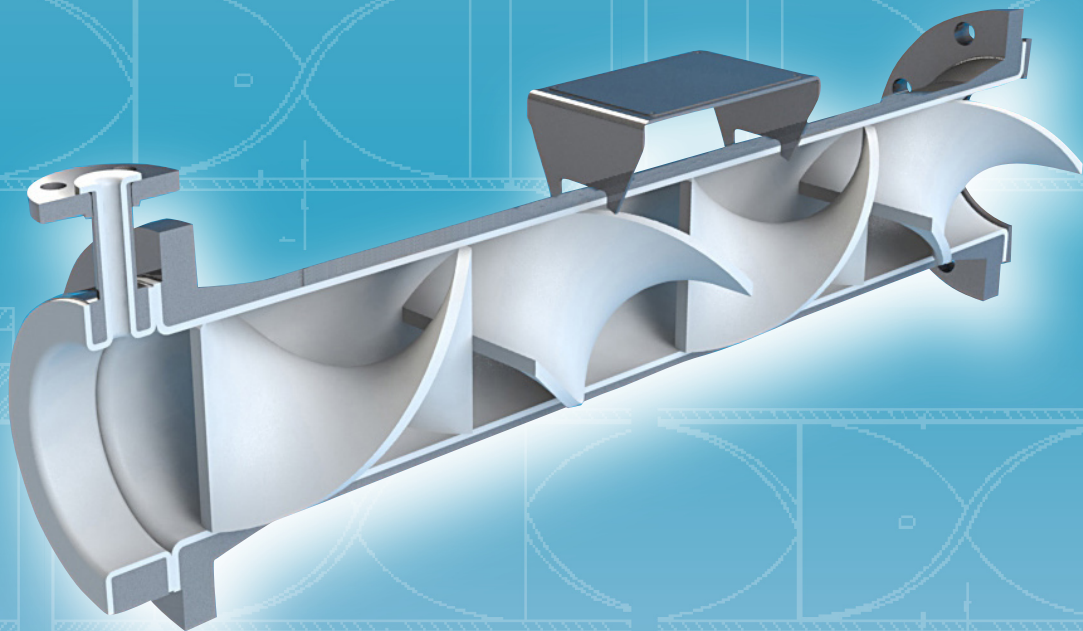


Static Mixers

Bespoke Solutions



Introduction.

Static mixers are used for a wide range of applications including mixing, heat exchange and dispersion, due to numerous unique innovations our products are especially suitable for hygienic processes where CIP (cleaning in place) is required, and also a broad range of temperatures and viscosities.

Static mixers and Heat Exchangers can be designed to meet your specific requirements our team of engineers will be pleased to help with your application to ensure optimum process performance.

Applications

- General chemicals – agri-chemicals, paint, slurries.
- Polymers – polyesters, nylons, ethylene's, silicones adhesives, sealants
- Food & Beverages - sauces, chocolates, dairy products, salad dressing, sugar syrups.
- Energy – petrochemicals, fuel oil
- Pulp & Paper – Kraft soaps, black liquor, oils.
- Waste water treatment applications

Product design & development

All of our new products are designed using the most advanced CAD 3D modeling and process application software by our team of application and CAD design engineers, our experience and resources are available to offer the optimum solution for your application.

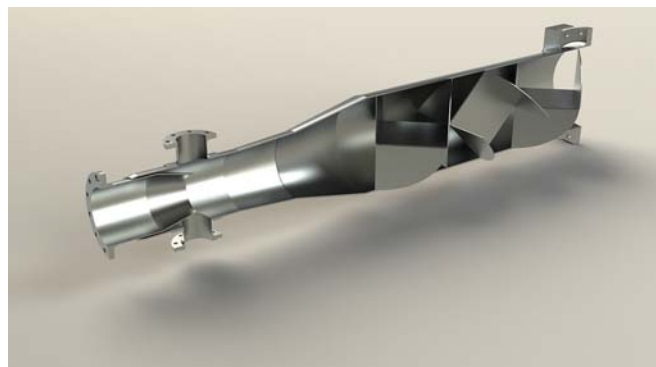


Technical profile

The Static Mixer basically consists of a set of serially placed twisted, helically shaped elements with a pitch of 34°. After a rotation of 180°, a new rotation starts in reversed direction. Each leading edge of the succeeding element is rotated 90 deg from its predecessor. Euromixers – Primix static mixers can be constructed with diameters ranging from 3.5 mm up to 2,000 mm.

The Quatro static mixer

Construction of the quatro element is comparable to the standard helically shaped element, but it is manufactured by bending a flat metal strip and grinding afterwards, to the final shape and diameter. The finished profile is determined by the diameter.



Laminar flow

Flow through the static mixer element is diverted into two separate streams. Optimization of the profile induces equal radial and axial flow, the helix pitch creates a rotation of the fluid, by which the fluid flows from the outside to the inside and reverse. The differences in velocity that occurs creates a shearing of the fluids.

After one rotation through the static mixer element a second diversion takes place and simultaneously a reverse of the succeeding rotation in the next mixing element occurs.

To illustrate this process please see figure 1 opposite.

As the number of streams or layers increases, the layer thickness decreases.



After only 20 rotations in a 50mm diameter Primixer, mixing at molecular level is achieved 20 diversions of the fluid creates 220 separate layers, each 0.05 micron thick.

Turbulent flow

Mixing is achieved by the rotation and shearing of the layers at the point where the direction of rotation is reversed. When lower shear rates are required the pitch can be modified to delay the rotation after which the reverse transition starts more gradually, which produces good mixing.

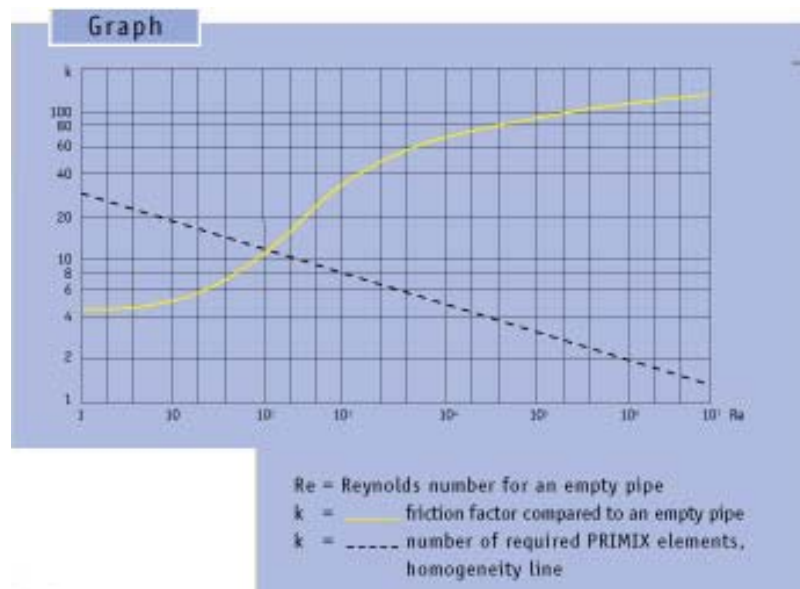
Radial-axial

Radial mixing is based on the premise that the fluids to be mixed enter the mixer in the correct proportions simultaneously

In situations when this is not the case (e.g. when using a Dosing Pump), the pump frequency and the mixing time are tuned to one another. In an axial direction, 20% of the volume is properly mixed.

Homogeneity

Homogeneity of the mixture can be measured best by defining the differences in temperature or concentration at the outlet of the static mixer. In theory the probability this is expressed in terms of standard deviation, in comparison with the average concentration.



The above graph clearly indicates the point at which the fluid reaches homogeneity.

Dispersion

Dispersions and emulsions are formed at the boundary area of two elements being mixed, at the point where the rotation of the fluid is reversed. Surface tension is broken and diffusion of the layers is achieved. With a decreasing diameter and increasing velocities, particle size will decrease.

Indicative table, showing the velocity of the fluid when achieving the desired particle size (in m/s).

Particle size Diameter	1mm	300 microns	100 microns	10 microns
10 mm	0.1	0.35	1	4
20 mm	0.2	0.7	1.3	5
50 mm	0.3	0.9	1.6	6
100 mm	0.4	1.3	2	7
200 mm	0.5	1.5	2.3	-

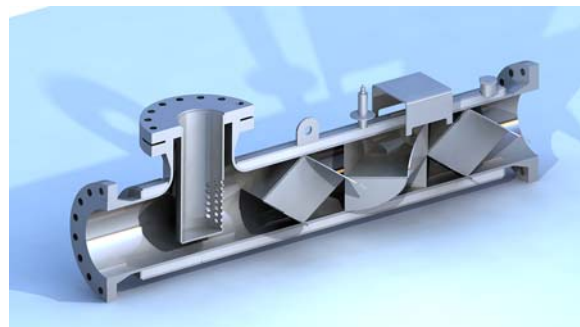
Exceptional performances

As a result of internal rotation, new layers of liquid have contact with the internal pipe wall, velocities along the wall are twice as high as the average axial velocity. During the processes of heating up or cooling down, static mixers will improve the heat exchanging performance of an internal pipe wall system by a factor of 3. When close tolerances and nickel-high vacuum-brazed techniques are implemented, this factor can be up to 10.

Enquiries

Please contact our application engineering team we will be pleased to help with your Static mixer & Heat Exchanger application.





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