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The Pioneering Manufacturer of Static and Dynamic Mixers in Iran

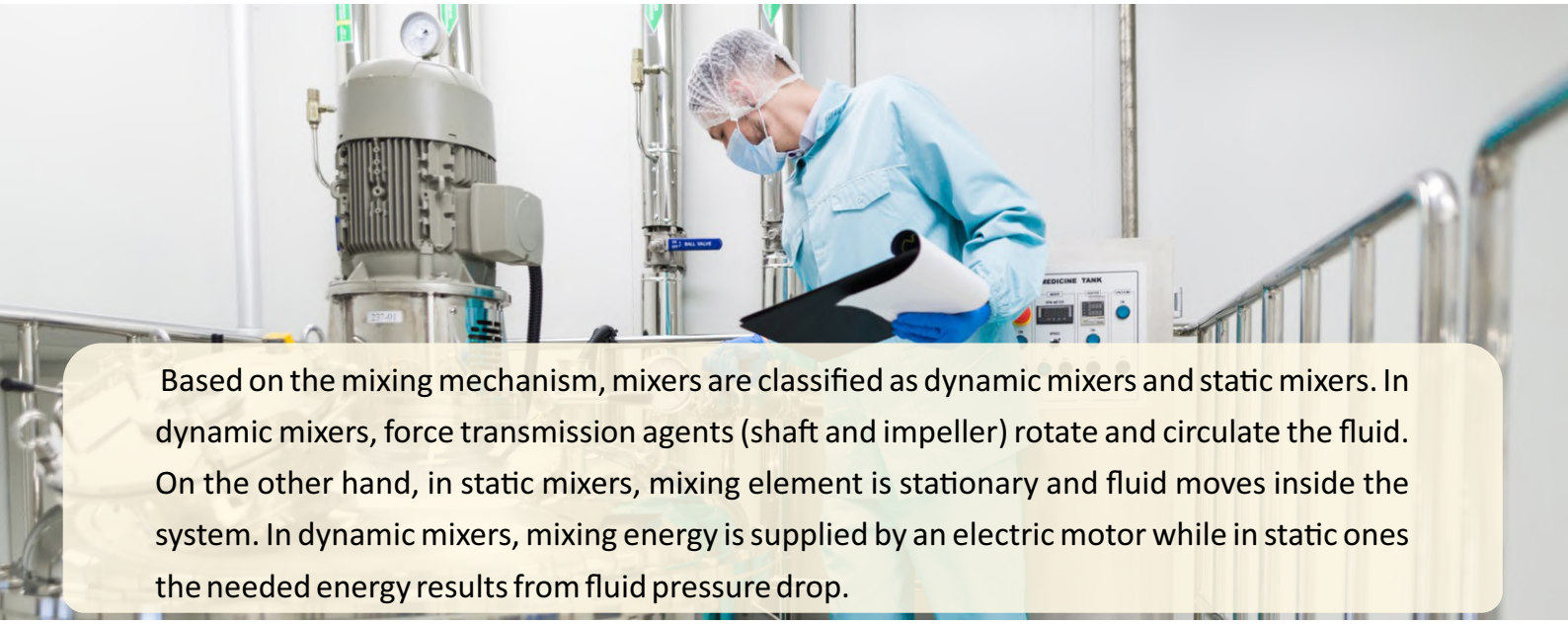
Contents

The Importance of Mixing in Industrial Processes

'Mixing' is one of the most important operations applies in all industries dealing with various materials. Mixing is a process through which raw materials are circulated to decrease their heterogeneity in a specific space. The importance and necessity of using mixers can be demonstrated by specifying industries that need this process. For example:

- Medical and pharmaceutical industries;
- Agricultural industries;
- Chemical and petrochemical industries;
- Biotechnology industries;
- Polymer and Plastics;
- Automobile painting and repairing industries;
- Health and cosmetics industries;
- Food industries;
- Water and wastewater treatment;
- Pulp and paper;
- Mineral processing; and
- Construction and civil industries.

Mixers Classification



Based on the mixing mechanism, mixers are classified as dynamic mixers and static mixers. In dynamic mixers, force transmission agents (shaft and impeller) rotate and circulate the fluid. On the other hand, in static mixers, mixing element is stationary and fluid moves inside the system. In dynamic mixers, mixing energy is supplied by an electric motor while in static ones the needed energy results from fluid pressure drop.

Dynamic Mixers

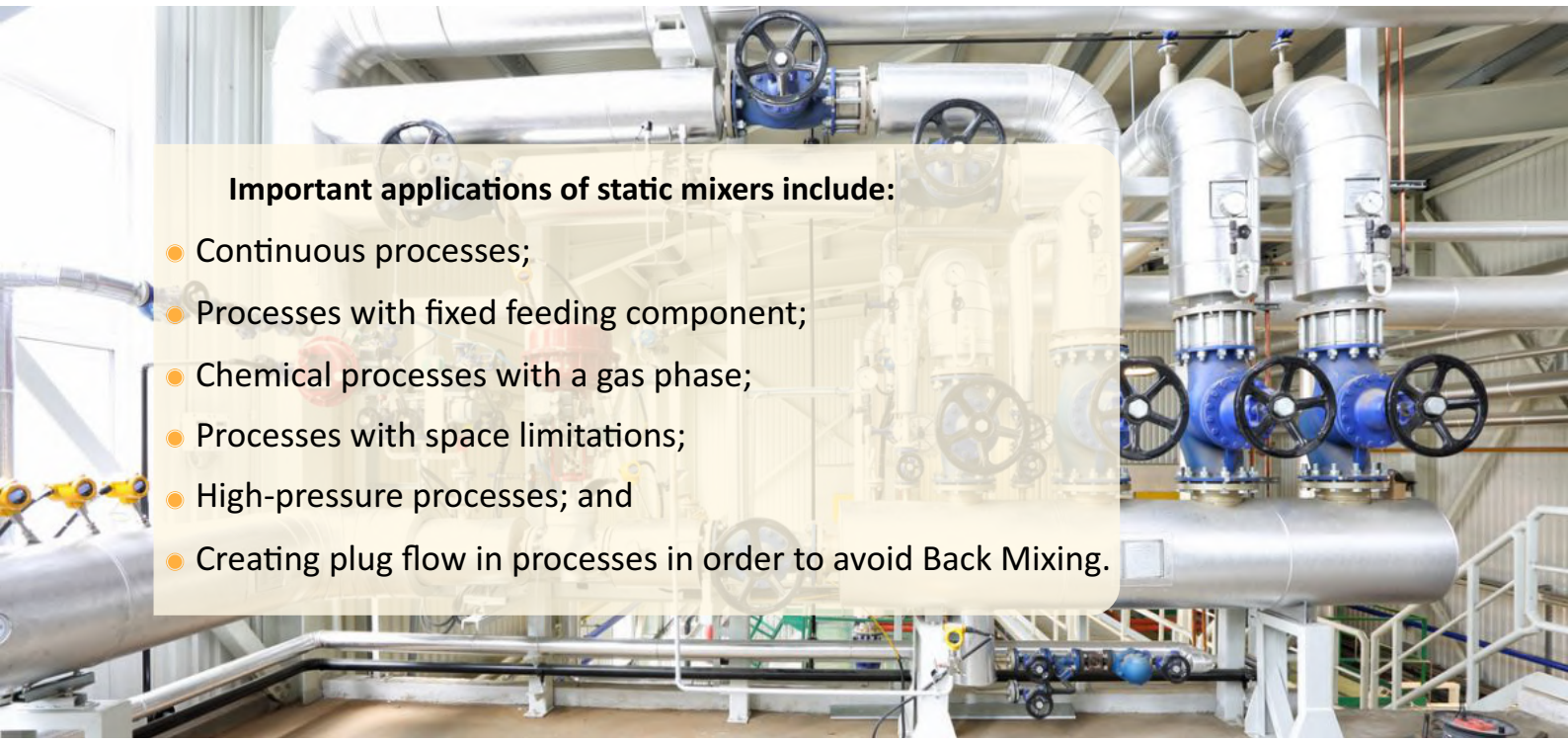
Dynamic mixers are a key component of agitator-based systems. Their effective use can greatly impact various continuous, batch, and feedback processes through reduced capital costs, increased efficiency, and ultimately higher profitability.

Fluid mixing in agitator-based systems is performed for various purposes such as homogenizing phases by particle concentration, physical properties, etc. These mixers function by moving materials within a vessel or tank using blades on impellers. Agitator systems are commonly used in chemical processes for:

- Formulating and producing emulsion solutions
- Homogenizing high-viscosity fluids like paints and polymers
- Suspending solids in crystallizers, polymer reactors, and solvent extraction processes
- Facilitating heat transfer via jackets or internal coils for cooling/heating
- Dispersing gases into liquids for absorption, oxidation, hydrogenation, ozonation, chlorination, and fermentation

Static Mixers

In many industries, mixing is performed in vessels and tanks; however, some types of mixing may take place in pipes. In other words, pipes can be turned into vessels in a certain situation. In many applications, the pipelines connected to the static mixer are an appropriate and cost-effective tool to perform chemical processes. This application is especially important when rapid mixing and suspension time is intended, for example in melted polymer.



Important applications of static mixers include:

- Continuous processes;
- Processes with fixed feeding component;
- Chemical processes with a gas phase;
- Processes with space limitations;
- High-pressure processes; and
- Creating plug flow in processes in order to avoid Back Mixing.

In many industries, Static mixers are designed and produced in millimeter to meter scales. The mixers produced by this company are classified into three groups:

Gas / liquid	Solid / liquid	liquid / liquid	
Blending	Suspension	Miscible	Immiscible
Fermentation	Blending	Homogenization	Emulsion
Dispersion	Crystallization	Chemical reaction	Dispersion
-	Leaching	Heat transfer	-
-	Polymerization	Neutralization	-
-	Dispersion	-	-

Goals of mixing

Mixers are installed for different purposes in different industries. In some processes, mixing takes place for two or more goals. In the following, the definitions prevalent in mixing industry are described.

All equipment worldwide has an output. For example, in an electric motor where the rotor starts rotating within the stator due to electricity, the produced torque is considered the output. In the mixing industry, this output is evaluated using a coefficient called the Coefficient of Variation (CoV).If equal amounts of parts A and B are mixed together and samples are taken from any point in the vessel immediately after the mixer in an ideal situation, then Part A and Part B would have equal concentrations of 50%. In this instance, the CoV would be zero.

$CoV < 0.02 \longrightarrow$ Complete mixing

$0.02 < CoV < 0.05 \longrightarrow$ Normal mixing

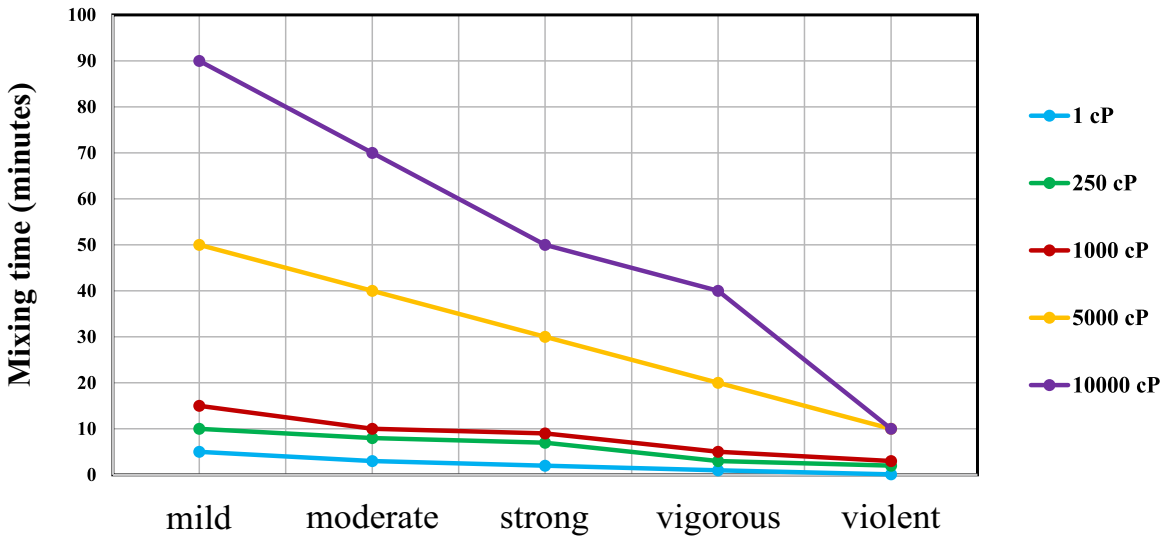
$CoV > 0.2 \longrightarrow$ Preliminary mixing

Mixing process and type of blending

Blending

This type of mixing usually takes place in miscible fluids. If several miscible fluids are minimally mixed, homogeneous solution results after a specific period of time. There are five mixers regarding mixing power for blending fluids. The only difference among these mixers is the time period the homogeneous solution is obtained. Clearly, the higher the mixing power the shorter the homogenization time. The following diagram shows the relationship of mixing intensity, time, and viscosity.

Mixing time diagram at different viscosities



10000 cP	5000 cP	1000 cP	250 cP	1 cP	Mixing power
90	50	15	10	5	Mild
70	40	10	8	3	Moderate
50	30	9	7	2	Strong
40	20	5	3	1	Vigorous
10	5	3	2	0.1	Violent

Dispersion

Dispersion is a process in which bigger particles are broken down into smaller ones. In solid/liquid mixing, dispersion means breaking down the liquid particles while in gas/liquid mixing dispersion is the process in which big air bubbles turn into smaller ones.

Emulsion

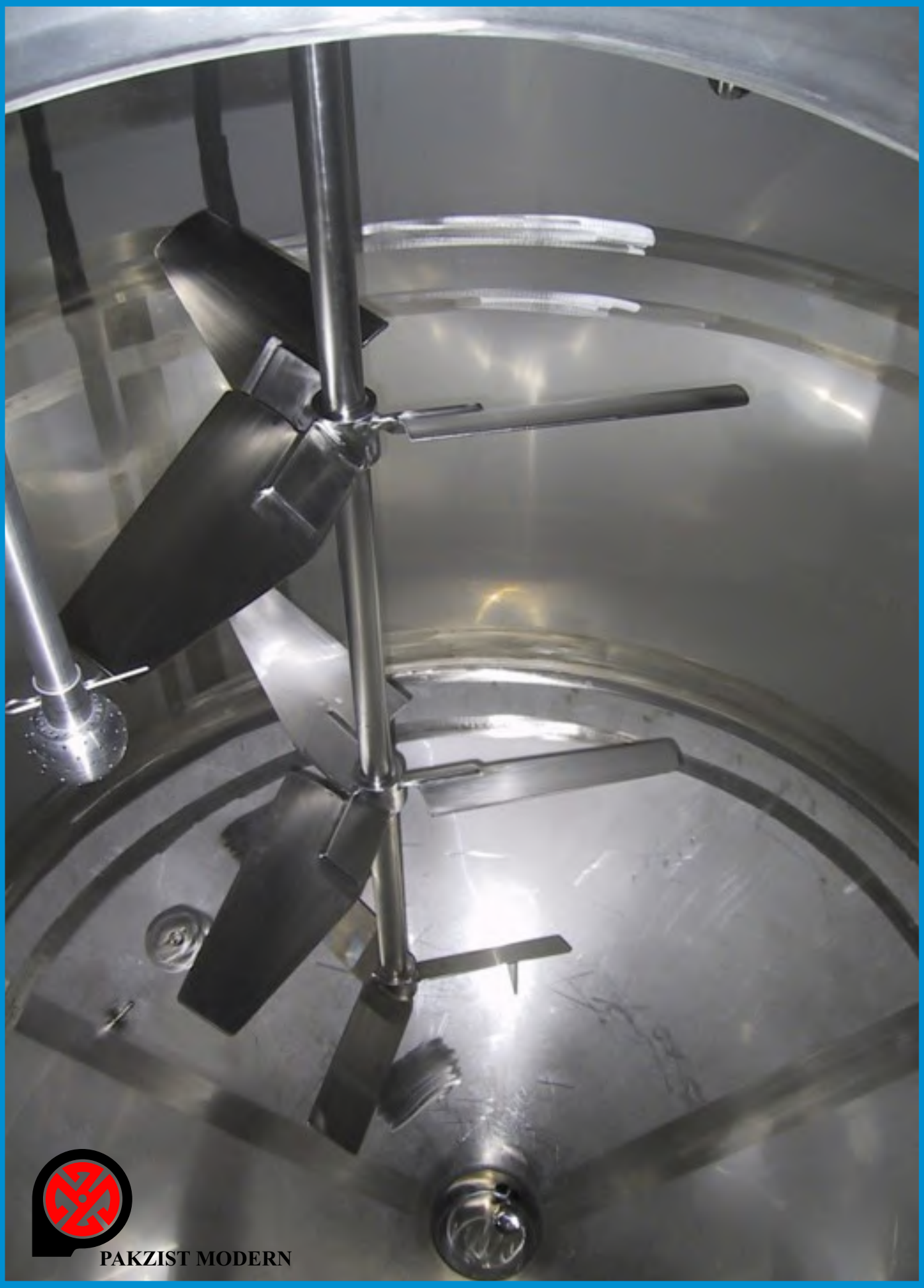
Emulsion is a process whereby non-miscible liquid particles are dispersed in another liquid. If the size of these particles is 1 µm to 1 nm, the mixture is called a colloidal emulsion. Emulsion mixture is one of the most common mixtures used in everyday life. Examples of emulsion mixture include butter, mayonnaise, shampoo, and liquid soap.

Suspension

Suspension is a process in which solid particles are floated in liquid to increase the contact of the fluid with solid particles. In most processes, the goal of suspension is to prevent sedimentation through crystallization, chemical reaction, and solid blending. It is worth noting that the goal of suspension is not always to prevent sedimentation, and sometimes it is sought to accelerate sedimentation; e.g., coagulation process in mineral and water and wastewater treatment.

Fermentation

Fermentation is a process through which bacteria turn one or more elements into other elements or decompose them. This process is one of the oldest methods of treating elements without using chemicals. In wastewater treatment industry, for example, organic solid materials are turned into the harmless and miscible-in-water material by sludges that are known as yeast. Suitable mixing is very important in this process because intense mixing removes the yeast and weak mixing



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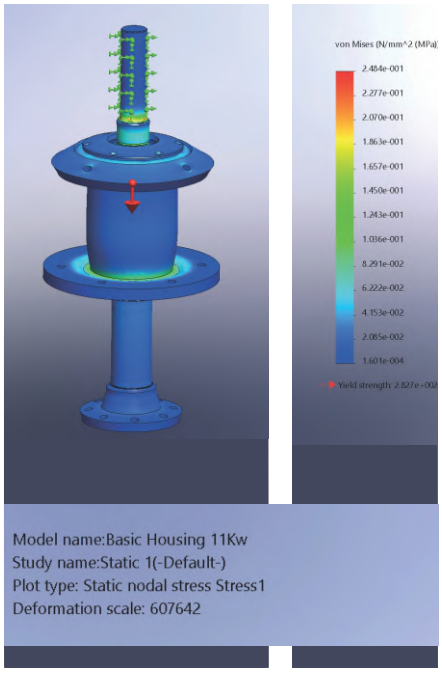
Designing the mixers

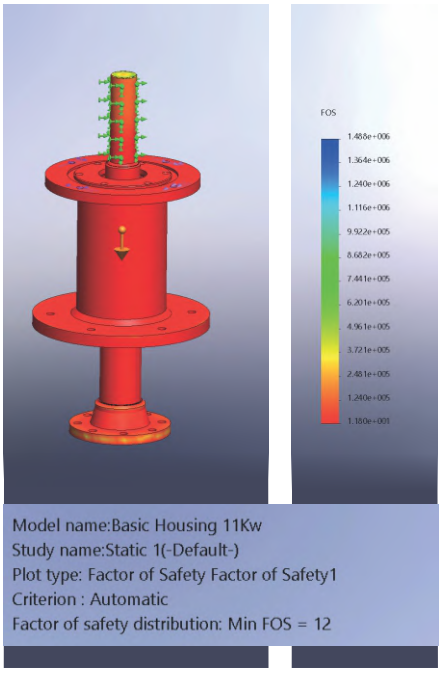
Over the course of thousands of years, the design process has held significant importance in the creation of human-made artifacts. Initially, designs were conceived in the mind and now, with the advent of highly advanced software, the process has evolved. In the early stages, humans relied on trial and error methods to design weapons and tools. During that time, these methods were considered the most effective approach, and companies with greater experience in trial and error could produce higher quality products. Manmade equipment can be broadly categorized into two groups:

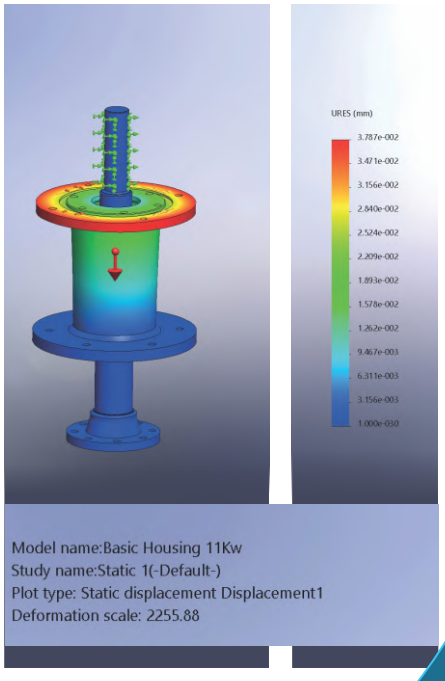
- Static equipment
- Dynamic equipment

Practically, producing and predicting the behavior of static equipment is easier compared to dynamic equipment, especially those interacting with fluids. Traditional methods and manual computations are insufficient for analysis of dynamic equipment in contact with fluids, as the number of variables affecting computational results is high.

In the 1960s, the introduction of Computational Fluid Dynamics (CFD) and Finite Element Method (FEM) revolutionized the industry by allowing for digital analysis of complex dynamic and fluid equations. These computational methods enabled engineering to accurately simulate dynamic equipment behavior interacting with fluids, advancing beyond the limitations of traditional manual calculations
To design its mixers, our company used analytic methods for predicting mixers behavior in contact with various fluids.







Mixer Driver Design

Normally, the driver consists of an actuator like an electric motor, geared motor, or pneumatic motor along with a bearing system. The bearing system serves many functions.

The body design or housing is an element that connects all mixer parts to the main structure. To design the housing, all tensions on the housing must be analyzed. This ensures the yield stress, tensile stress, and shear stress do not exceed tolerances. The aforementioned safety factors indicate structural integrity.

Bearing Configuration

The result of the forces applied to the impeller and shaft is transferred to bearings. In this regard, type of bearing is one of the most important factors.
This bearing should tolerate axial and radial loads. When designing this bearing system, even the distance between bearings should be analyzed, because if the distance between bearings increases, their lifetime increases proportionately; but for resonance frequency, it increases vibration amplitude in the shaft and consequently results in the destruction of bearings.

Lubrication system

The lubrication system of bearings, lubrication sealing, lubricant type, and lubricant replacement time should be considered in designing. The SKF software has been used to choose the bearing type, lubricant replacement time, and sealer.

Mixer Shaft Desing

The power transmission shaft is one of the critical components of a mixer, as its design and production require careful consideration of numerous parameters.

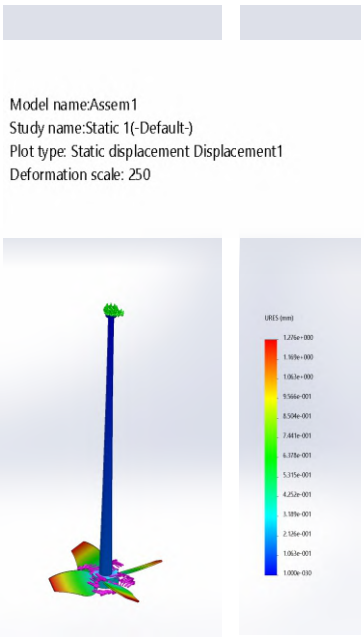
Computing Resonance Frequency or Critical Speed

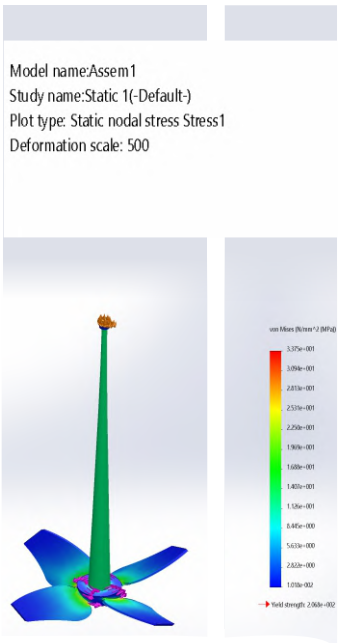
All equipment, whether static or dynamic, has a natural resonance frequency. Subjecting equipment to vibration at its resonant frequency causes the amplitude to increase infinitely, ultimately leading to equipment failure. Shaft rotation induces vibration. By analyzing the frequencies of various equipment components, their corresponding resonant rotational speeds can be computed.

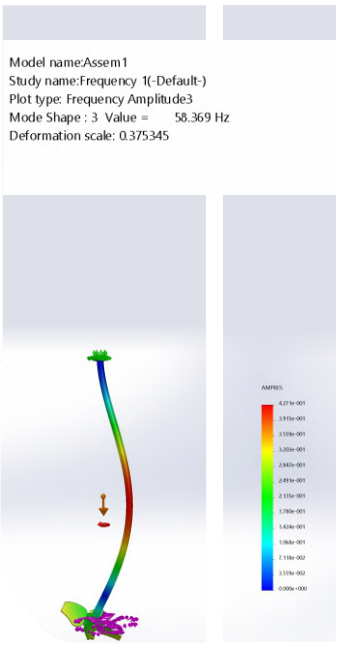
Once resonant frequencies are determined, the mixer's rotational speed should be set at least 40% lower or higher than the first or second resonant frequency to avoid resonance and prevent damage.

Bending Stress

Impeller rotates in the fluid and generates a hydraulic load in the mixer's shaft due to axial and radial flows. The shaft should be very strong and solid against these stresses and its yield and shear stresses must be at an acceptable level so that they do not damage the shaft.







Shaft Deflection Analysis

All rotating shafts experience deflection due to centrifugal force, controlled from one or more points. Minor deflection does not damage the shaft.

However, if deflection amplitude is not controlled and grows too large before reaching the sealing and bearing system, it can damage the housing.

Accurately analyzing the amount of shaft deflection where it exits the housing, such as via simulation software, ensures parameter acceptability and prevents excessive deflection that could compromise the housing integrity. damage the housing.

Impeller design

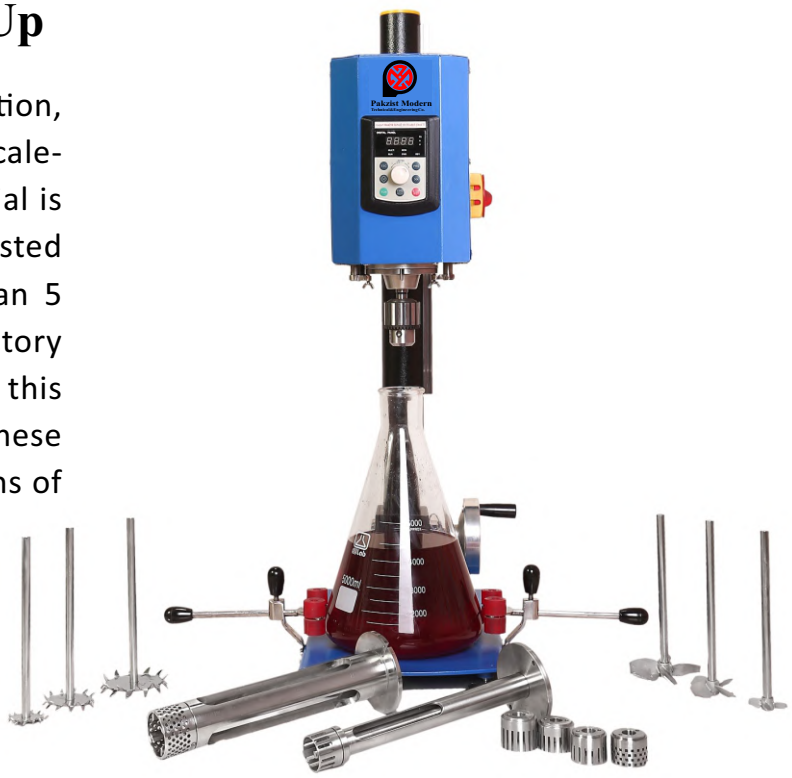
According to the application of mixer and fluids, there is a wide range of impellers. For example, the impeller for suspension is entirely different from the one for the emulsion. In the same vein, the impeller for mixing gas is different from other impellers. There are three methods to design impellers.

1- Design Using Computational Software

Impellers used in various industries have gradually been classified over time and it is almost certain which type of impeller works best for which application. With these assumptions, the only remaining problem is determining the impeller speed and diameter, which are determined based on factors such as tip speed, velocity gradient, mixing scale, and impeller flow rate

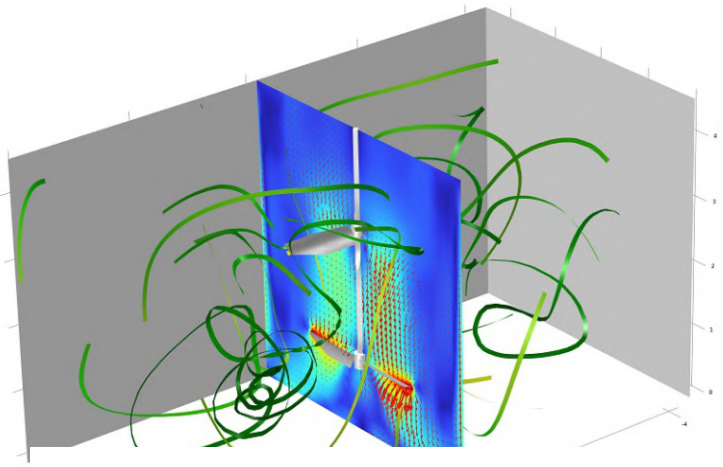
2- Laboratory Test and Scale Up

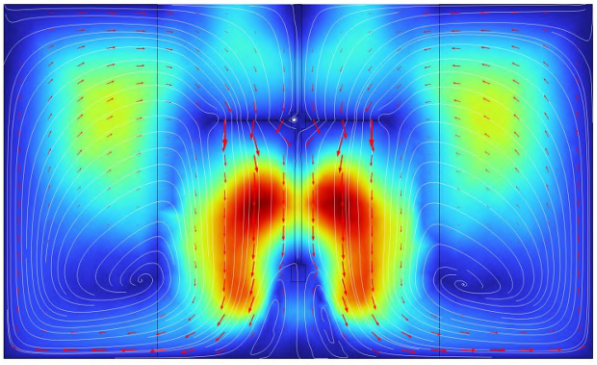
For fluids where the client has little information, the best approach is laboratory testing and scale-up. In this method, a sample of the material is sent to this company's factory where it is tested by the company's experts using more than 5 types of impellers. After achieving satisfactory results, some of the basic components of this equation are extracted and by keeping these equations constant, the size and dimensions of the large agitator are determined.



3- CFD

Computational Fluid Dynamics (CFD) modeling is used to analyze systems involving fluid flow, heat transfer, and other accompanying phenomena such as chemical reactions through computer simulation. CFD is an effective method for calculating pressure drop, mixing homogeneity, and other mixing-related metrics in static mixers. One drawback of the CFD approach is that it can be time-intensive, making it best suited for larger design projects where the modeling investment is justified. Running simulations takes computational time and resources, so CFD may not be practical for quick studies or minor design changes. Overall though, CFD provides a powerful virtual tool for evaluating mixing performance without physical prototyping.





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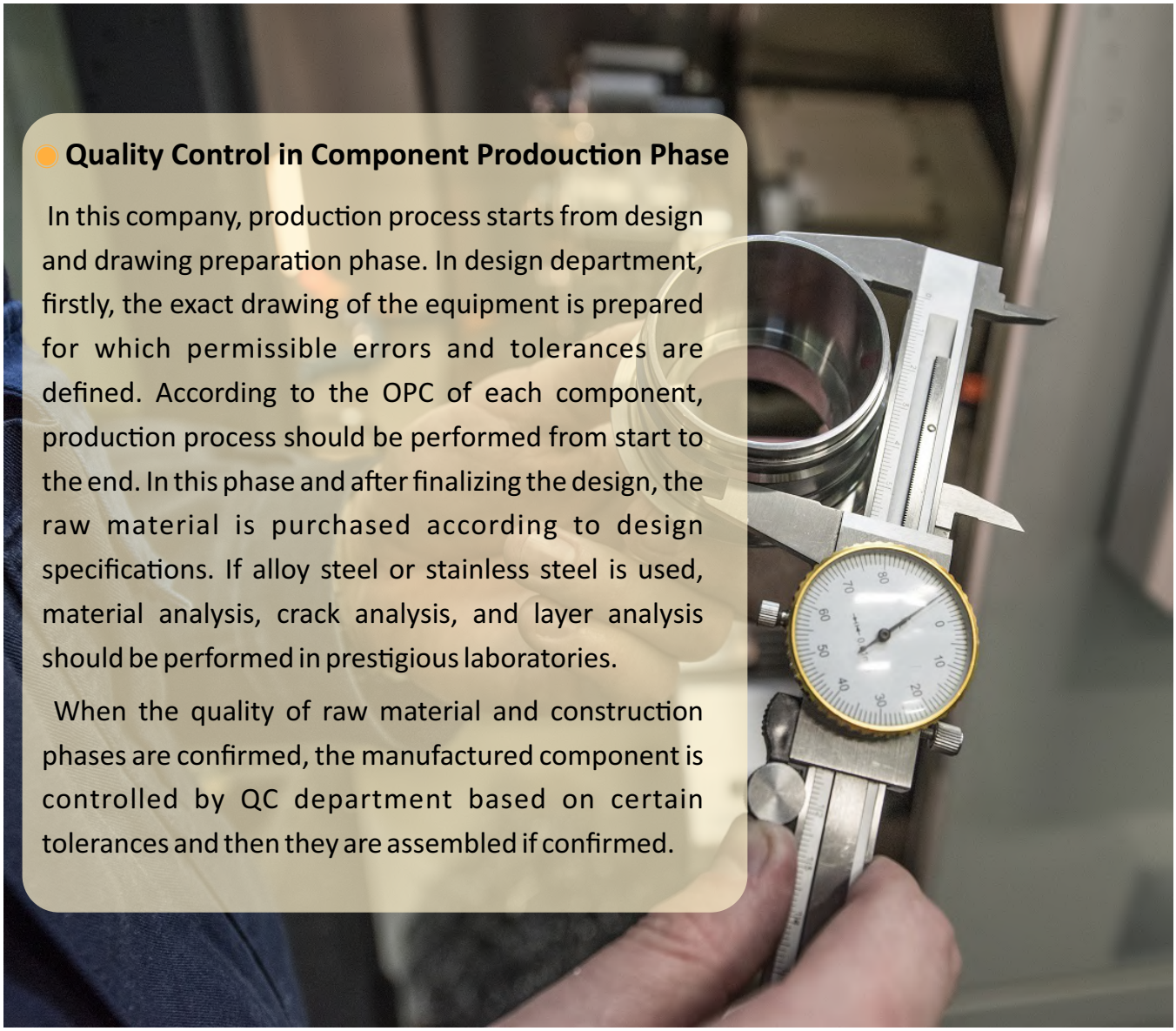
Quality control system

When discussing offering products and services, quality control is one of the main concepts and indices that companies deal with. In production industries, quality control is a process in which the company ensures its products are manufactured and delivered to customers without any defects and that it can meet their needs. Quality control helps ensure the company delivers defect-free products and provides customers the quality they expect.

Given the variety of products, it is necessary to explain exactly the performed quality control and phases for obtaining the desired results.



Quality Control in Component Prodouction Phase

In this company, production process starts from design and drawing preparation phase. In design department, firstly, the exact drawing of the equipment is prepared for which permissible errors and tolerances are defined. According to the OPC of each component, production process should be performed from start to the end. In this phase and after finalizing the design, the raw material is purchased according to design specifications. If alloy steel or stainless steel is used, material analysis, crack analysis, and layer analysis should be performed in prestigious laboratories.

When the quality of raw material and construction phases are confirmed, the manufactured component is controlled by QC department based on certain tolerances and then they are assembled if confirmed.

Final Quality Of Dynamic Products

After assembling and before packaging, the performance of dynamic mixers is tested in the final stage. This test is one of the fundamental production sectors in the company because all design and manufacture errors are detected at this stage. The person in charge of quality control conducts the following tests on the dynamic mixers.

Coating thickness inspection

Mixer housing frames are coated with polyester electrostatic paint. This paint is highly resistant to moisture and sunlight. The thickness of this coatig is measured in various spots to ensure paint thickness.

For the mixers in which shaft and impeller are in contact with very corrosive chemicals, ETFE, and polyethylene coatings are used to protect them against corrosion. Moreover, coating thickness in these critical points is also

Insulation Inspection

In mixers with coated shaft and impeller, we should ensure that no area is without coating. To do this, resistance measurement system or Mega Ohm meter is used. In material sciences, if the electric resistance between two elements is higher than 1 Mega Ohm, those two materials are said to be insulated against each other. In this method, the coated shaft and impeller are submerged into a conductor solution; the first electrode is connected to the coatless part of the shaft and the second to the conductor fluid. By applying a 1000 V, the system measures electrical resistance between the fluid and the coated spot. If the resistance is high, the component is approved, otherwise, it is sent for recoating.

Run-out Inspection

It can be said without hesitation that the most difficult part in manufacturing a rotating equipment is the power transmission system. A system in which several separate parts must be connected without generating any eccentricity.

The existence of eccentricity or run out causes uneven load distribution on the equipment and severely shortens the lifespan. Before energizing the agitators, the eccentricity of the shaft is measured at the impeller seating locations. Different standards exist according to the dimensions of the agitators that must be observed, and if the run out exceeds the permitted limit, the agitator shaft is sent back for re-straightening

Bearing Temperature Inspection

One of bearing system troubleshooting methods is to control their operating temperature. If bearings defect, error in assembly or applying excessive axial and radial loads, results in an abnormal increase of bearings temperature, so that this abnormal temperature rise becomes evident in a short period of time. Temperature monitoring ensures correct functioning of the mixer.

Vibration and Noise Inspection

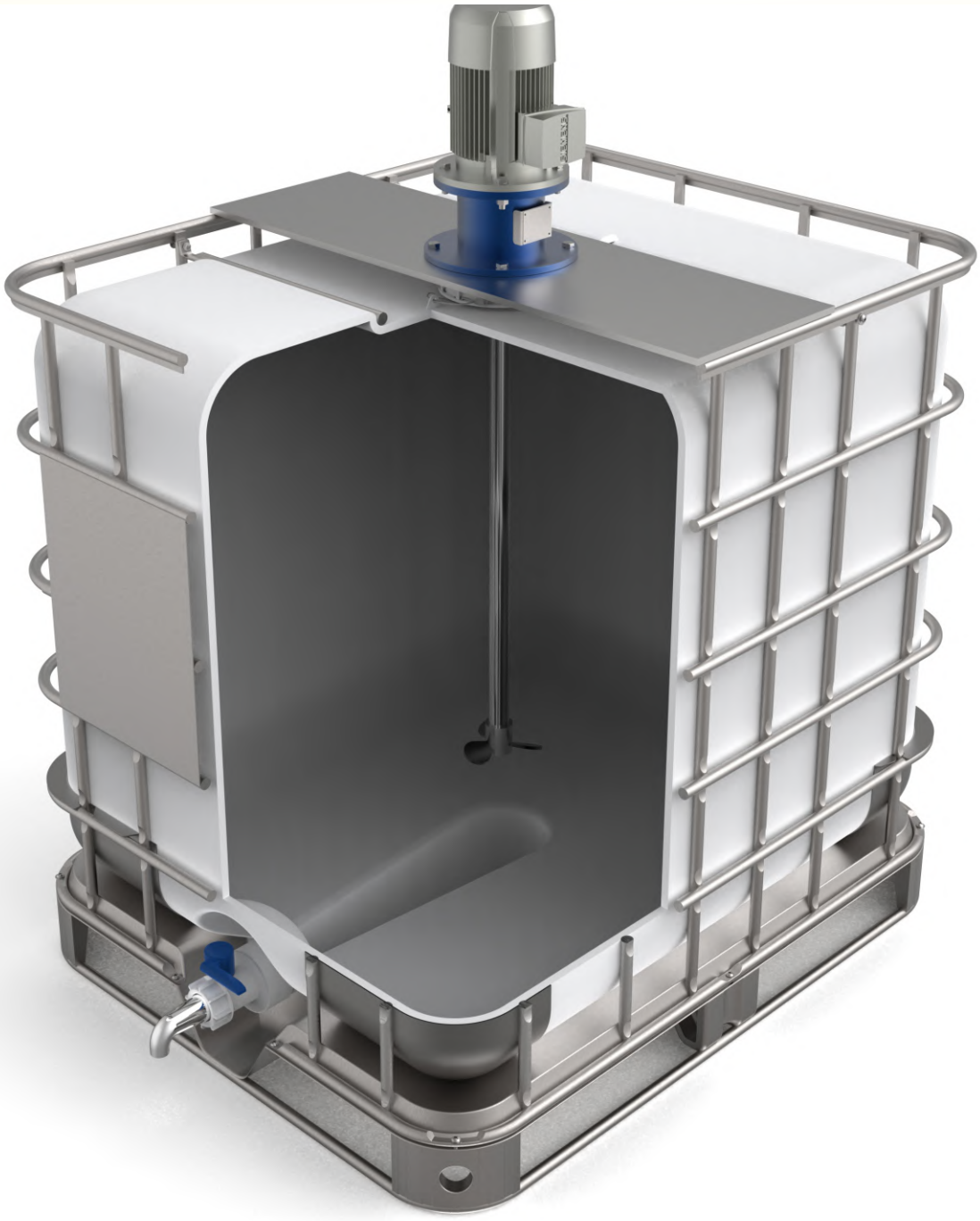
In all equipment involving bearings, vibration and noise are normal operating conditions. Just like all other variables, vibration occurs within various ranges and it should be ensured vibration does not exceed the limits to avoid bearing damage.

When the mixer is assembled, its vibration is inspected at the bearings using a vibration detector. Vibration inspection is carried out in two states-dry operation and operating /running state. In dry operation, the maximum permissible vibration is 3 mm/s and in the operating state it is 9mm/s. If the limit is exceeded, the mixer must be returned to the assembly unit for inspection and troubleshooting.

Inspection Rotation Speed

Mixers are designed for specific speed and their impeller diameter is selected with respect to the designed rotation. The relation between rotation speed and consumed energy follows a power order of 3, suggesting that if the rotation speed is doubled, the consumed energy increases 8 times. Thus, error in selecting the RPM results in an overload of electric motor. In gearbox and motor assembly process, there may be an error leading to drive rotation at an excessive speed.

Fast Rotating Mixers (FRM)



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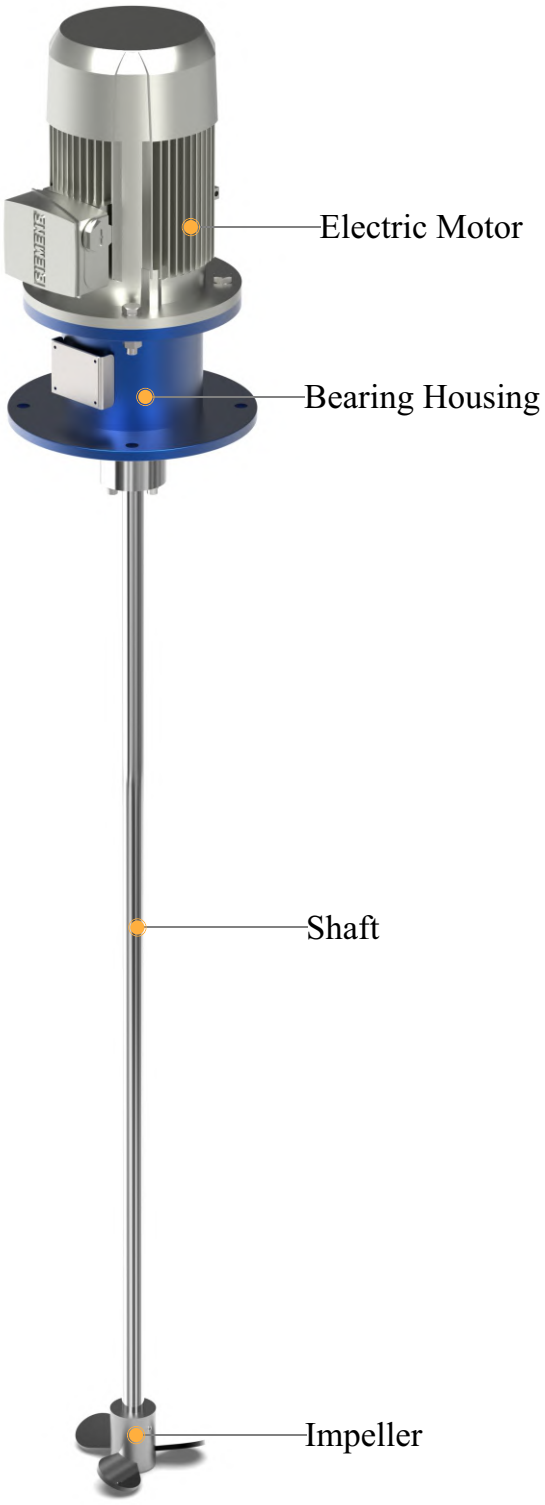
Fast Rotating Mixers (FRM)

These mixers are designed for light to medium-duty applications with tank capacities ranging from 100 to 12,000 liters. The robust design of the bearing system and the use of strong 1.6582 alloy steel in the shaft holder enable 24-hour operation for this series.

As the name suggests, these mixers use only an electric motor to start and rotate the shaft and impeller - there's no need for additional equipment such as a gearbox for speed change. This feature reduces manufacturing, maintenance, and repair costs.

The intelligent design of the FRM series allows for a reasonable price and easy use in various processes, including dissolution, heat transfer and temperature homogenization, liquid-phase mixing, and light suspension production.

If the mixer is used for highly corrosive and oxidizing fluids, ETFE and PE coatings are available at a reasonable price.

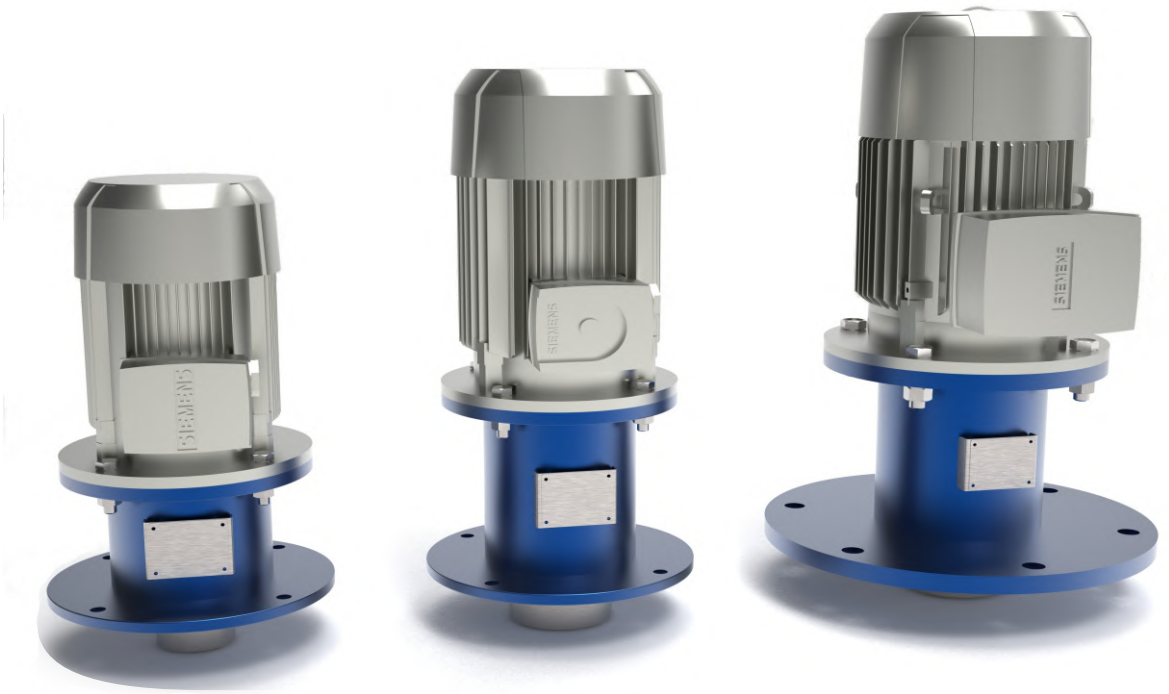


Fast Rotating Mixers (FRM)

The mixers are available in three sizes: Small, Medium, and Large.

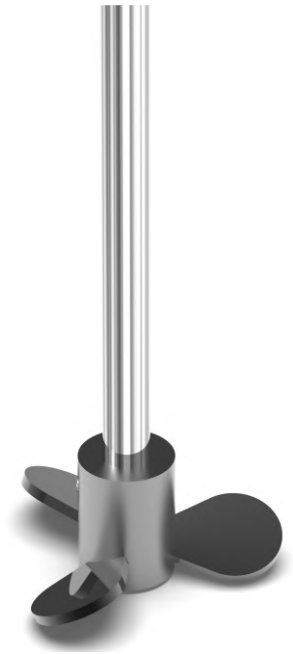
Mixer model	Maximum Shaft Diameter	Max Applicable Power	Max speed	Max Shaft Length	Max Tank Capacity
FRMS	35	0.75 KW	900-1500 RPM	1,600 mm	2,000 L
FRMM	50	1.5 KW		2,400 mm	4,000 L
FRML	75	4 KW		3,200 mm	12,000 L

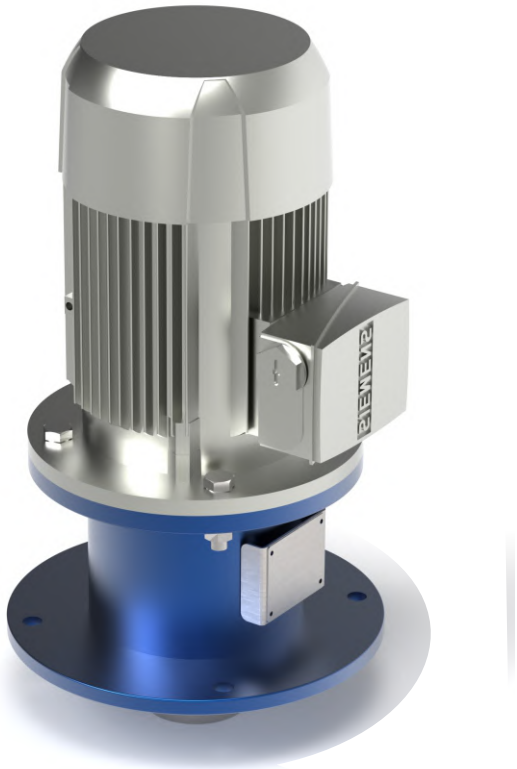
- These mixers come with two types of couplings for connecting to structures and tanks: flange and clamp connections.
- Flange connection is recommended for fixed and non-portable mixers. To prevent vortex formation in flange-connected mixers, use baffled tanks or install the mixer off-center.
- Clamp connection is recommended when the mixer's location needs to be changed and no specific chassis is available for installation. It allows for a 20-degree angle to prevent vortex formation.



Features Of The FRM Series Mixers:

- Suitable for small tanks with low viscosity
- Has the lowest run out and vibration when operation
- Available in single-phase and three-phase types with different voltage ranges
- Operating range of 100 to 12000 liters





- Shaft can be ordered as single or split.
- Coatings such as ETFE and PE can be used for corrosive materials.
- Designed for 24-hour operation.
- Electrostatically powder-coated mixer bearing housing.
- Reasonable investment cost.
- Explosion-proof electric motors available upon request.

Identity Code of FRM Mixers

Mixer Selection

FRM Fast Rotation Mixers

Mixer Version Indicator

S	Small
M	Mediume
L	Large

Tank Capacity Indicator

A	220 Liters	E	500 Liters	I	2000 Liters
B	250 Liters	F	800 Liters	J	2500 Liters
C	300 Liters	G	1000 Liters	K	3000 Liters
D	350 Liters	H	1500 Liters	L	4000 Liters

Impeller Type Selection

1	Propeller With Zero Pitch
2	Pitch Blade Turbine
3	Saw Blade

Wet Parts Material

S4	SS 304
S6	SS 316L
S8	Super Duplex SS

Powder Coating

0	N/A
P	Polyethylene
T	ETFE

Electric Motor Selection

A	IP 55 (STANDARD)
B	EX db IIB zone1
C	EX db IIC zone1
D	EX eb IIC zone1
E	EX ec zone2

Motor Supply

1	Single PHASE 220/230 VAC
3	Three PHASE 230/400 VAC

Shaft Connection Type

DC	Direct Coupling
FC	Flange Coupling

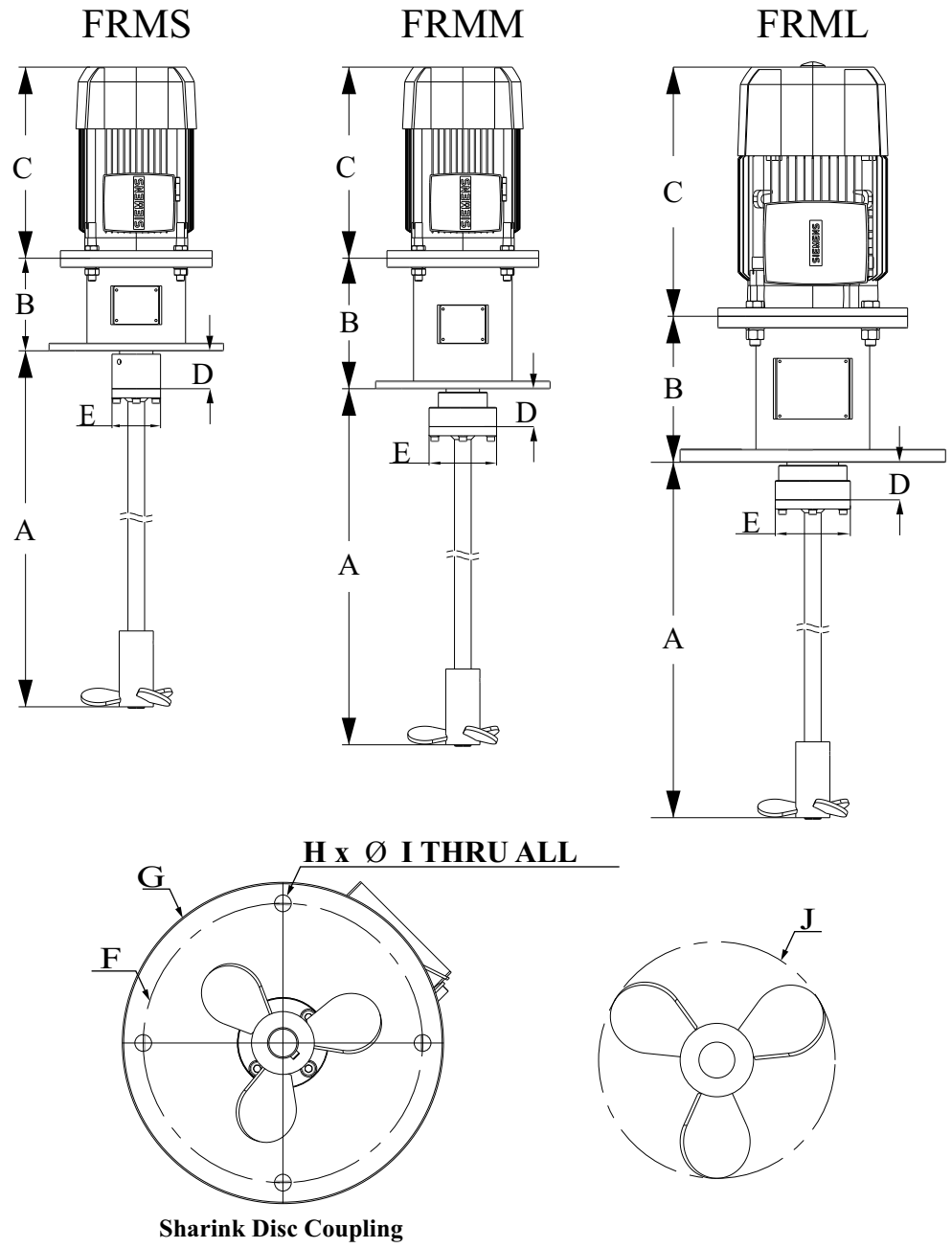
Housing Coupling Type

1	Flange Type
2	Clamp Type

Housing Coating

C1	Polyester
C2	Epoxy
C3	3 Layer Coating

Dimensional Drawing of FRM Mixers



Mixer Model	Motor Frame Size	Speed Range	A	B	C	D	E	F	G	H	I	J
		RPM	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
FRMS	IEC80	1000~1500	600~1600	122	252	50	64	200	230	4	12(M10)	125~180
FRMM	IEC80		1200~2400	172	252		89	200	230	4	12(M10)	145~250
	IEC90				297							
FRML	IEC100		1500~3200	192	335		99	300	350	6	19(M16)	160~300
	IEC112				330							
	IEC132				385							

Slow Rotating Mixers (SRM)

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Slow Rotating Mixers (SRM)

Chemicals used in various industries are typically prepared in small tanks before being transferred to the reactor for chemical reactions. These preparation tanks have a capacity range of 100-5000 L and serve the following purposes:

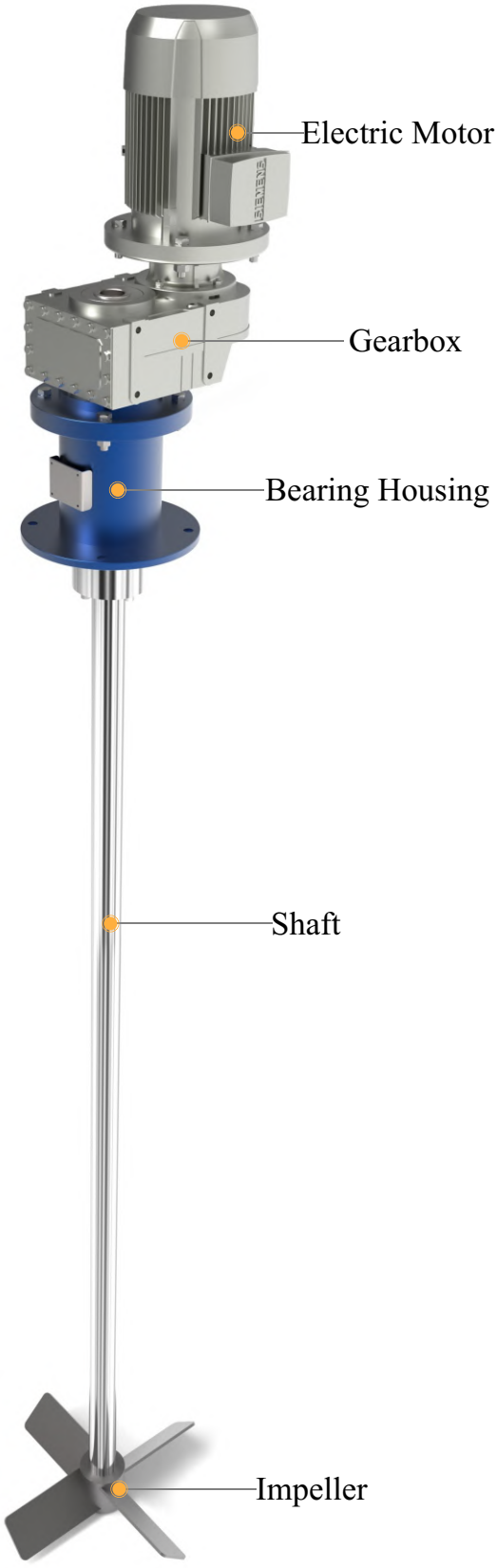
1- For dilution;
2- Changing the phase of chemicals, for example, solid to liquid;
3- Reaching growth stage and maturity of chemicals such as polymerization; and
4-Heat transfer.

SRM mixer is an ideal choice for achieving homogeneous solutions in various industries. Its properties can be considered from both dynamic and process perspectives.

In the rotary equipment industry, low rotation speed is directly related to an extended equipment lifetime. This extended lifetime is possible due to a longer lifespan of the bearing system, reduced shaft and impeller abrasion, and reduced temperature gradients.

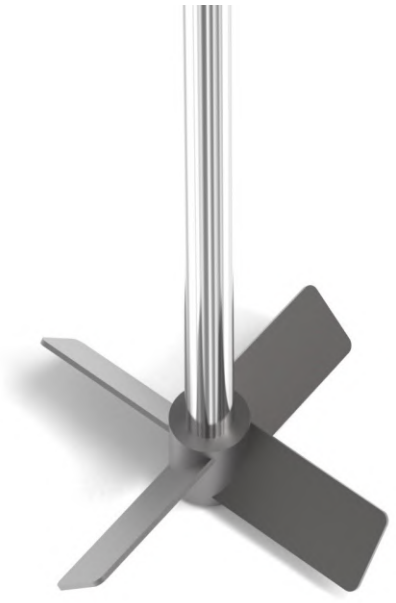
In terms of the process perspective, reducing the rotation speed offers the following advantages:

1-Increased impeller diameter and consequently dead zones reduction in tanks;
2-Increasing fluid pumping by the impeller and producing a more homogeneous solution; and
3-Cavitation reduction and the corrosions as its result.



Features Of The SRM Series Mixers:

- Suitable for use in tanks of varying sizes, from small to large;
- The operating range of these mixers is from 0.2 to 5 m3;
- Capable of handling fluids with viscosities ranging from 0.5 to 500 centipoises;
- Higher lifetime;



- Electrostatic housing painting;
- Suitable for use with explosion-proof electric motors;
- Split and direct shafts can be ordered;
- Produces minimal vibration and run-out during operation.
- Designed for 24/7 operation;
- These mixers can be ordered with ETFE and PE coatings, which have a high resistance against corrosive fluids.

Identity Code of SRM Mixers

Mixer Selection

SRM Slow Rotation Mixers

Mixer Version Indicator

S Small

M Mediume

Tank Capacity Indicator

A	220 Liters	E	500 Liters	I	2000 Liters
B	250 Liters	F	800 Liters	J	2500 Liters
C	300 Liters	G	1000 Liters	K	3000 Liters
D	350 Liters	H	1500 Liters	L	4000 Liters

Impeller Type Selection

1 Propeller With Zero Pitch

2 Pitch Blade Turbine

3 Saw Blade

Wet Parts Material

S4 SS 304

S6 SS 316L

S8 Super Duplex SS

Powder Coating

0 N/A

P Polyethylene

T ETFE

Electric Motor Selection

A IP 55 (STANDARD)

B EX db IIB zone1

C EX db IIC zone1

D EX eb IIC zone1

E EX ec zone2

Motor Supply

1 Single PHASE 220/230 VAC

3 Three PHASE 230/400 VAC

Shaft Connection Type

DC Direct Coupling

FC Flange Coupling

Housing Coupling Type

1 Flange Type

2 Clamp Type

Housing Coating

C1 Polyester

C2 Epoxy

C3 3 Layer Coating

Gearbox Selection

U SIEMENS

V NORD

X BREVINI

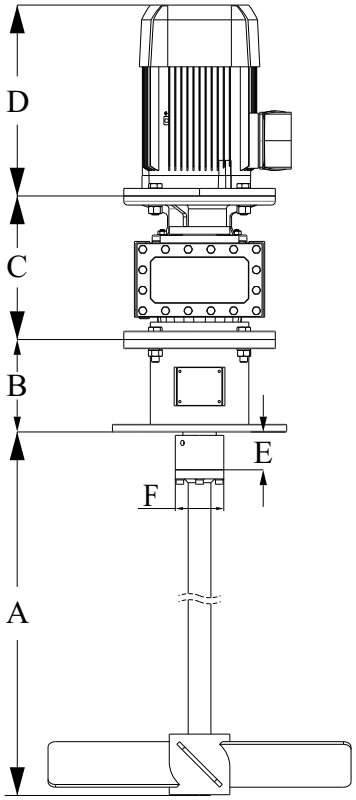
U SIEMENS

V NORD

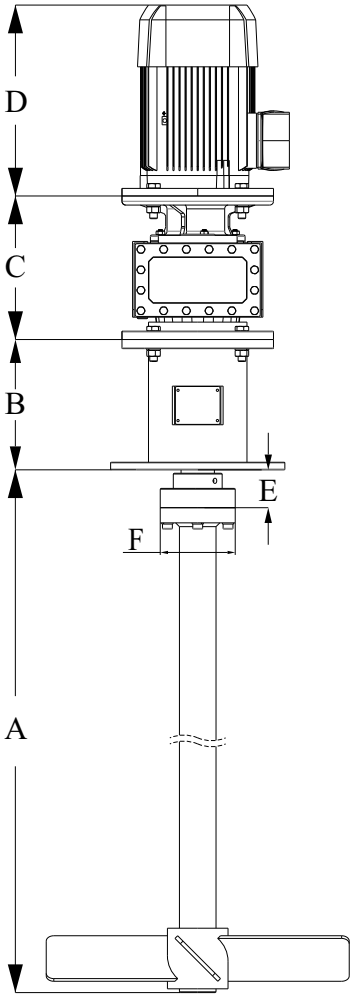
X BREVINI

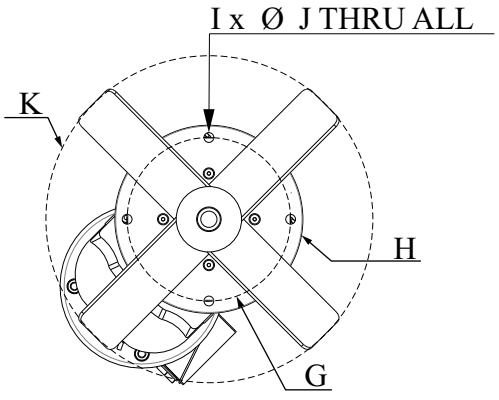
Dimensional Drawing of SRM Mixers

SRMS



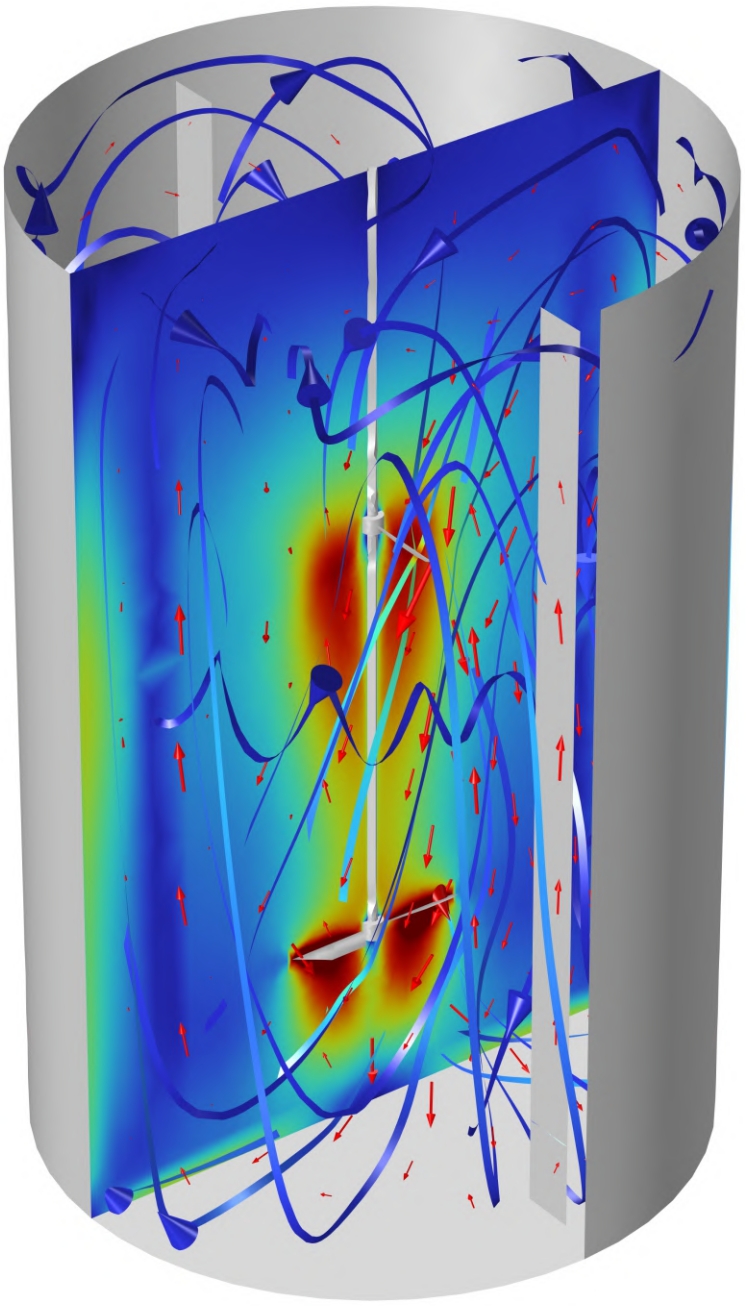
SRMM





Mixer Model	Motor Frame Size	Speed Range	A	B	C	D	E	F	G	H	I	J	K
		RPM	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
SRMS	IEC80/90/100	20 ~ 400	600~1600	122	190	252/297/335	50	64	200	230	4	12(M10)	200~400
SRMM			1200~3000	172				99					250~600

Medium Slow Rotating Mixers (MSRM)



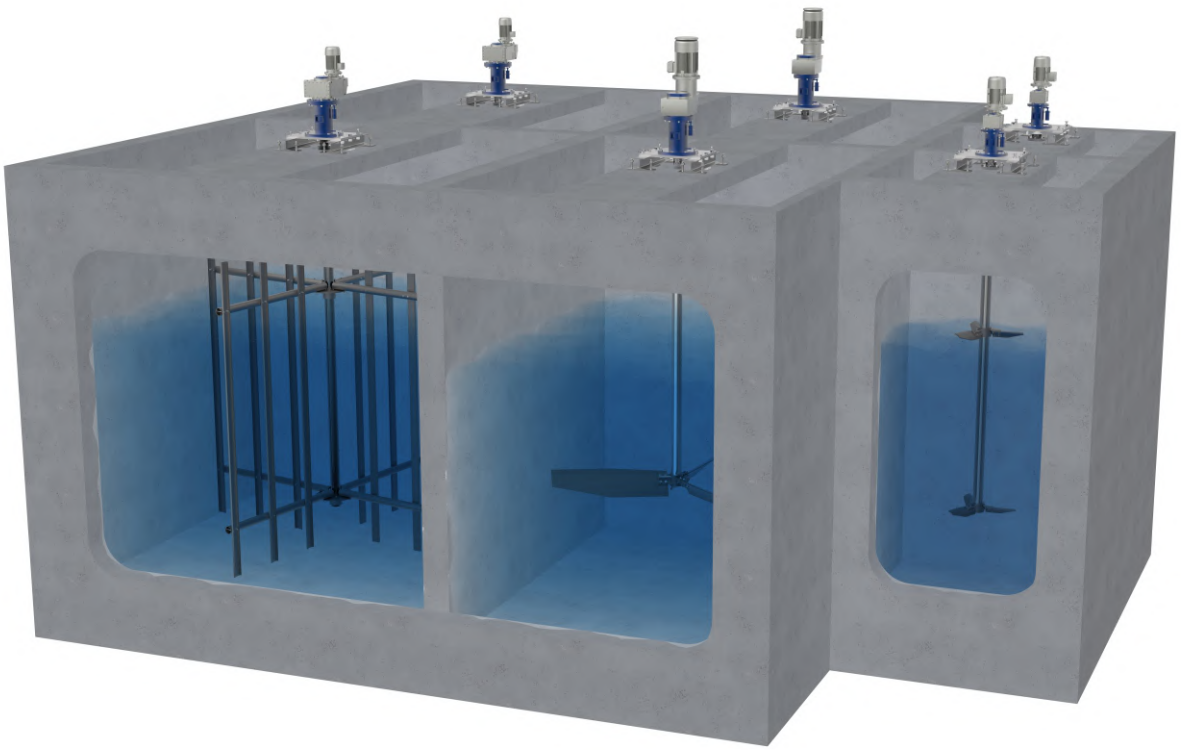
PAKZIST MODERN

Slow Rotating Mixers - MSRM Series

These mixers These mixers are designed and built to be suitable for medium to large tanks in terms of volume, and for mild to vigorous mixing in terms of intensity. They are suitable for installation on concrete and metal reactors and tanks. These mixers are designed for 24/7 operation and can continue normal operation for a long time without the need for repair and maintenance.

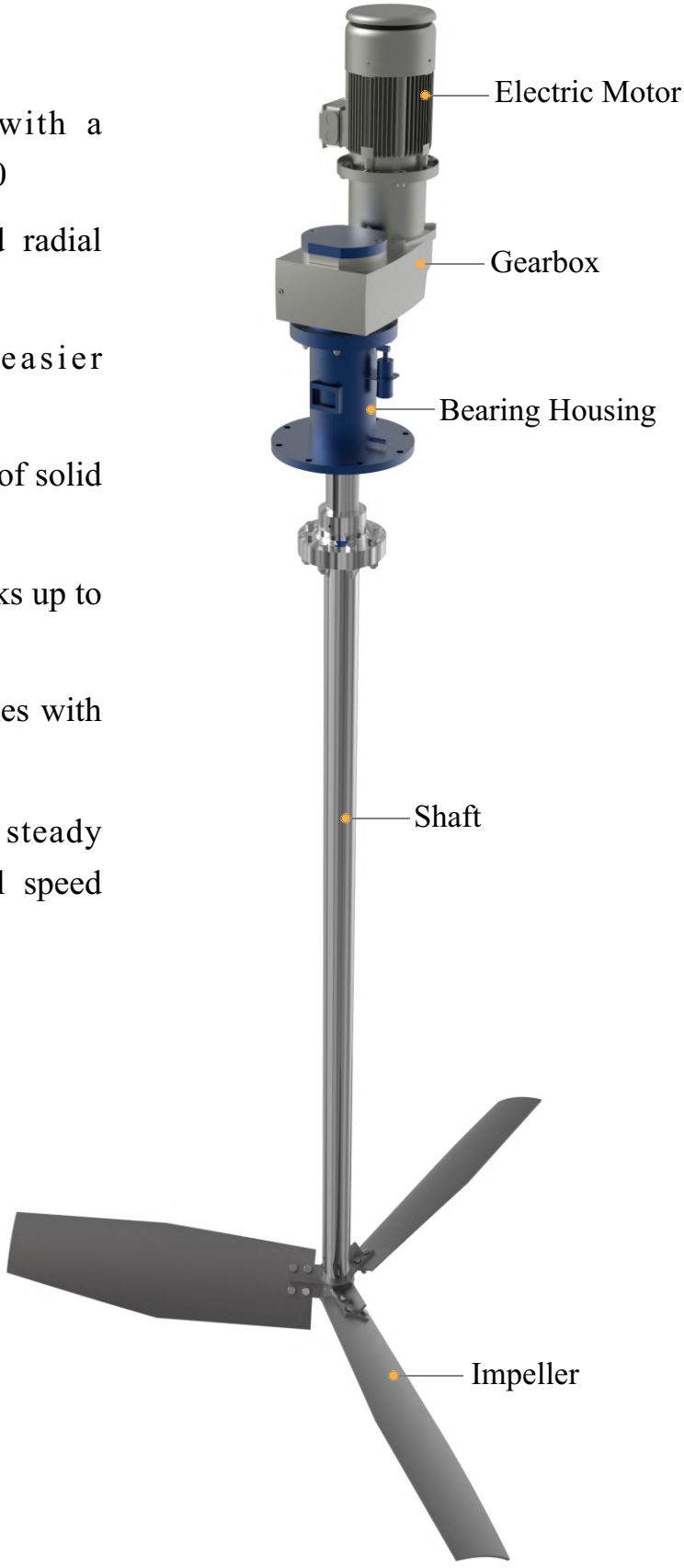
The MSRM series mixers are classified into three sizes: small, medium, and large.

Mixer Model	Maximum Shaft Diameter	Max Applicable Power	Max Speed	Max Tank Capacity	Max Shaft Lenght
MSRMS	90 mm	4 KW	5-150 RPM	40,000 L	5,000 mm
MSRMM	170 mm	15 KW		80,000 L	6,000 mm
MSRML	355 mm	45 KW		200,000 L	12,000 mm



The Features of MSRM Mixers are:

- Double bearing system with a working life of 100,000 L10
- Protection against axial and radial stresses on the gearbox
- Use of split hubs for easier installation and replacement
- Use of hollow shafts instead of solid for lightness
- Installation capability for tanks up to 200 cubic meter capacity
- Use of parallel shaft gearboxes with service factors above 2
- Ability to install bottom steady begaring to increase critical speed and reduce Shaft deflection
- Low initial capital investment



Withstand Radial Forces

These mixers are capable of withstanding the hydrodynamic forces exerted on the impeller by the fluid. They achieve mastery over these radial forces through a very strong and modern bearing arrangement used in their housing.

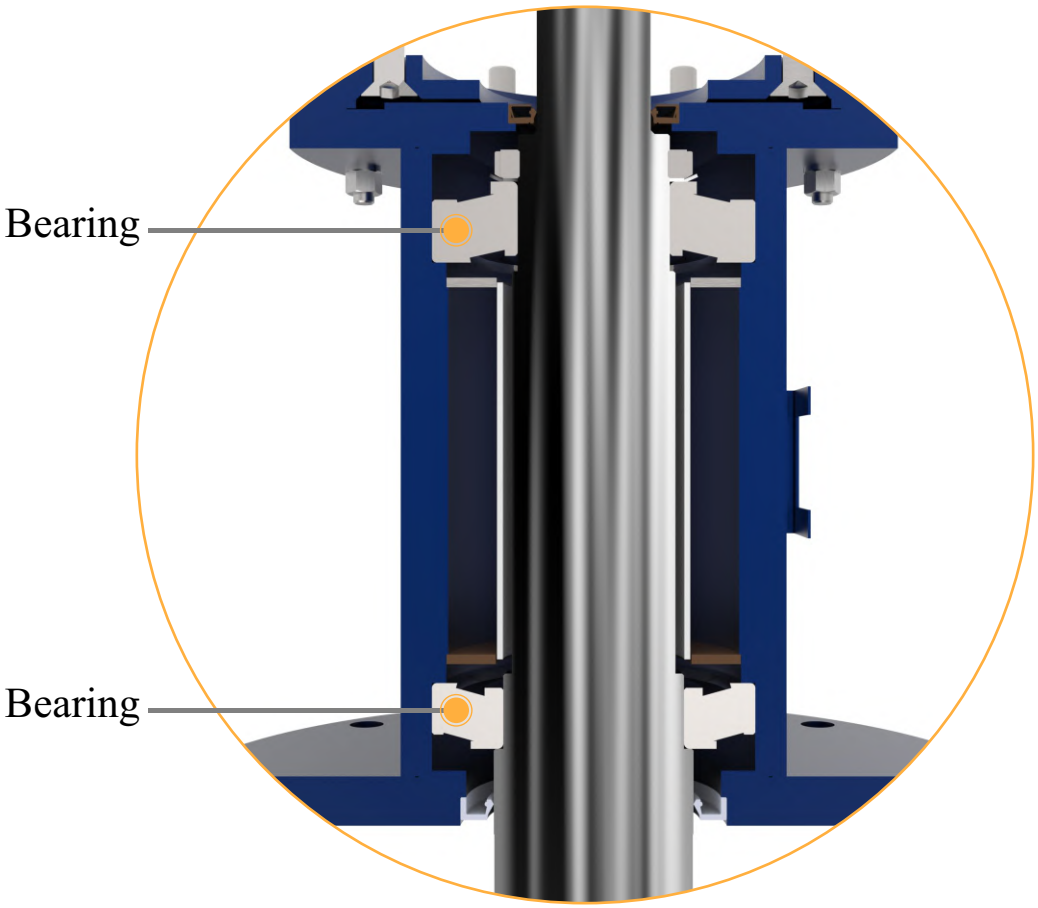
Withstands Axial Loads in Two Dimensions

In mixers that are installed vertically, the weight of the shaft, impeller, coupling, and other components is transmitted to the bearing housing as an axial force. On the other hand, since these mixers have a down pumping design, the fluid is pushed downward. This creates an upward force on the mixer that counteracts the downward force of gravity. These opposing forces are controlled so they do not cause damage to the gearbox.

Lubrication System

The bearings used in these mixers need regular lubrication and maintenance. To enable trouble-free operation, a precise lubrication system for these mixers has been designed.

These mixers are adaptable for different applications, with a working range up to 45 KW. All hydraulic and mechanical components were analyzed using CFD and FEA methods.



Identity Code of MSRM Mixers

Mixer Selection

MSRM Mediume Range Slow Rotating Mixers

Mixer Version Indicator

S Small
M Mediume
L Large

Impeller Type Selection

1 Alex Flow Impeller
2 Radial Flow Impeller

Wet Parts Material

S4 SS 304
S6 SS 316L
S7 Duplex SS
S8 Super Duplex SS

Powder Coating

0 N/A
P Polyethylene
T ETFE

Electric Motor Selection

A IP 55 (STANDARD)
B EX db IIB zone1
C EX db IIC zone1
D EX eb IIC zone1
E EX ec zone2

Motor Supply

1 Single PHASE 220/230 VAC
3 Three PHASE 230/400 VAC

Shaft Connection Type

DC Direct Coupling
FC Flange Coupling

Housing Coupling Type

1 Flange Type
2 Clamp Type

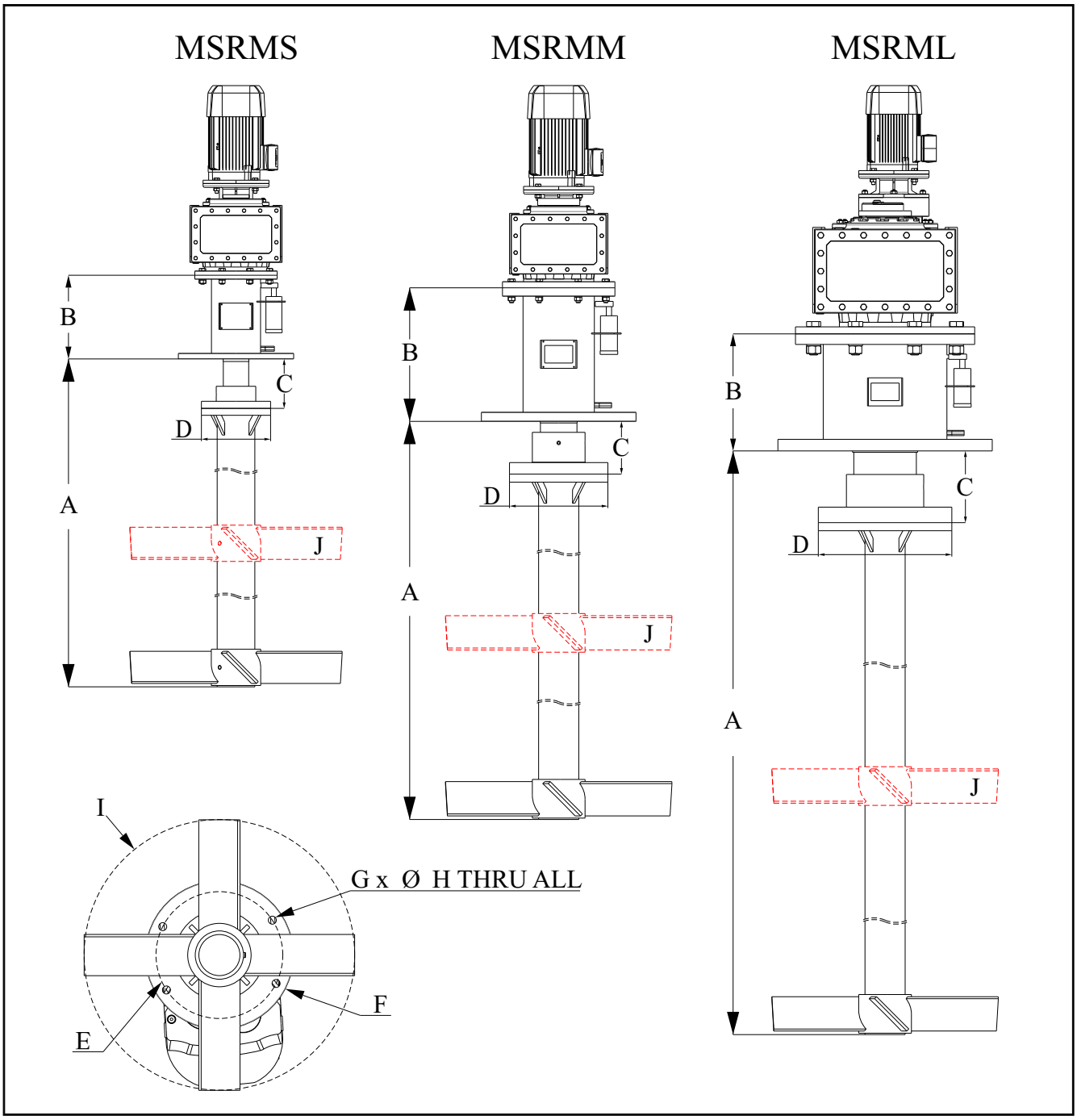
Housing Coating

C1 Polyester
C2 Epoxy
C3 3 Layer Coating

Gearbox Selection

U SIEMENS
V NORD
W BREVINI
X SEW
Y BONFIGLIOLI
Z YILMAZ

Dimensional Drawing of MSRM Mixers



Mixer Model	Speed Range	A	B	C	D	E	F	G	H	I	J
	RPM	mm	mm	mm	mm	mm	mm	mm	mm	mm	Number Of Impellers
MSRMS	5 ~ 150	1000~5000	100~800	150	210	300	350	6	19(M16)	500~5000	1~6
MSRMM		1000~6000		150	280	400	440	8	21(M20)		
MSRML		1000~12000		204	380	540	610	8	23(M30)		

Process Slow Rotating Mixers (PSRM)

PAKZIST MODERN

Process Agitators-PSRM Series

Process mixers refer to a specific type of agitator that forms part of the manufacturing process for one or more products. These agitators are mounted on reactors and help to enhance the quality of chemical reactions by generating a uniformly mixed volume within.

The oil and gas, petrochemical, food and mining industries are among the most important sectors that utilize this equipment.

Products manufactured utilizing process mixers	
Product Name	Mixing goal
HDPE Production	Creating a suspension to enhance polymerization
PVC Production	Creating a suspension to enhance polymerization
Terephthalic Acid	Oxidation process
Aluminum Hydroxide	Crystallization
Gold-Zinc	Suspension for Leaching Process

Process mixers have differences compared to normal agitators which include:

1- Robust design and high-quality manufacturing to reduce time intervals for maintenance and repairs

2- Being equipped with mechanical seals for installation on pressurized or vacuum tanks and reactors

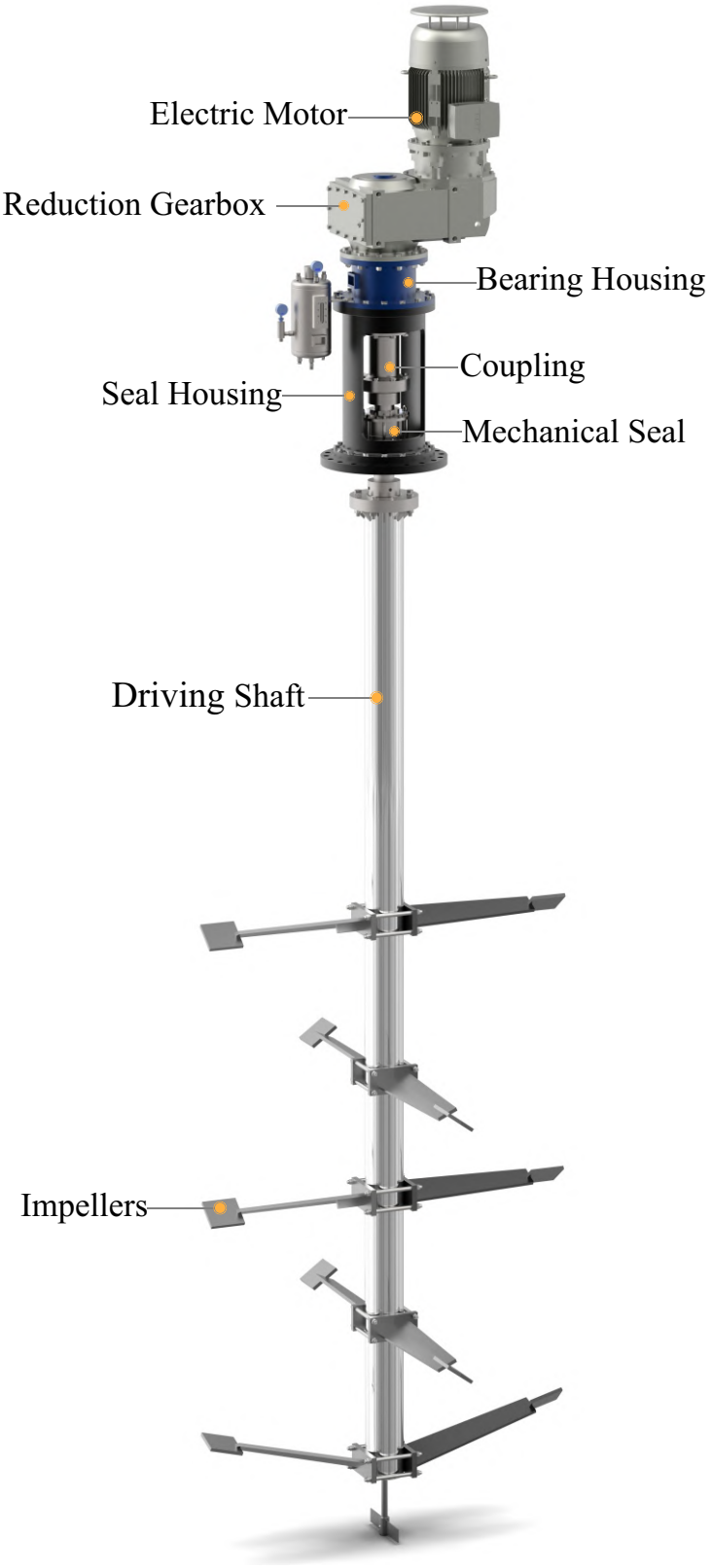
3- Specialized equipment for maintenance and repairs without needing to fully disassemble the agitator

4- Use of special alloys and materials

5- With very large dimensions and power

Process agitators incorporate the following features in their design mechanics:

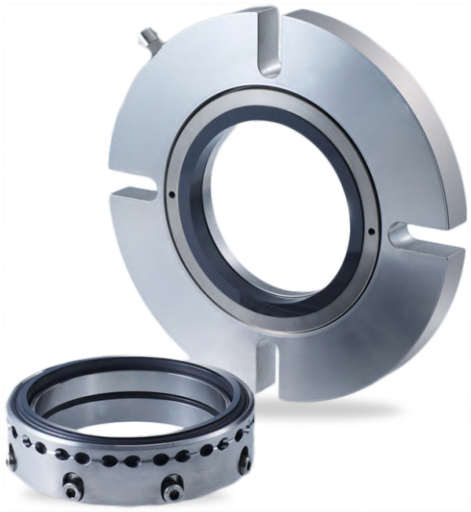
- Electric Motor
- Reduction Gearbox
- Bearing Housing
- Seal Housing
- Coupling
- Mechanical Seal
- Driving Shaft
- Impellers
- Bottom Steady Bearing



Mechanical Seals

A significant portion of process mixers are mounted on vacuum or pressure vessels. This company provides three distinct sealing systems compatible with its agitators to allow for proper installation on pressurized reactors.

Single Dry Running Mechanical Seal



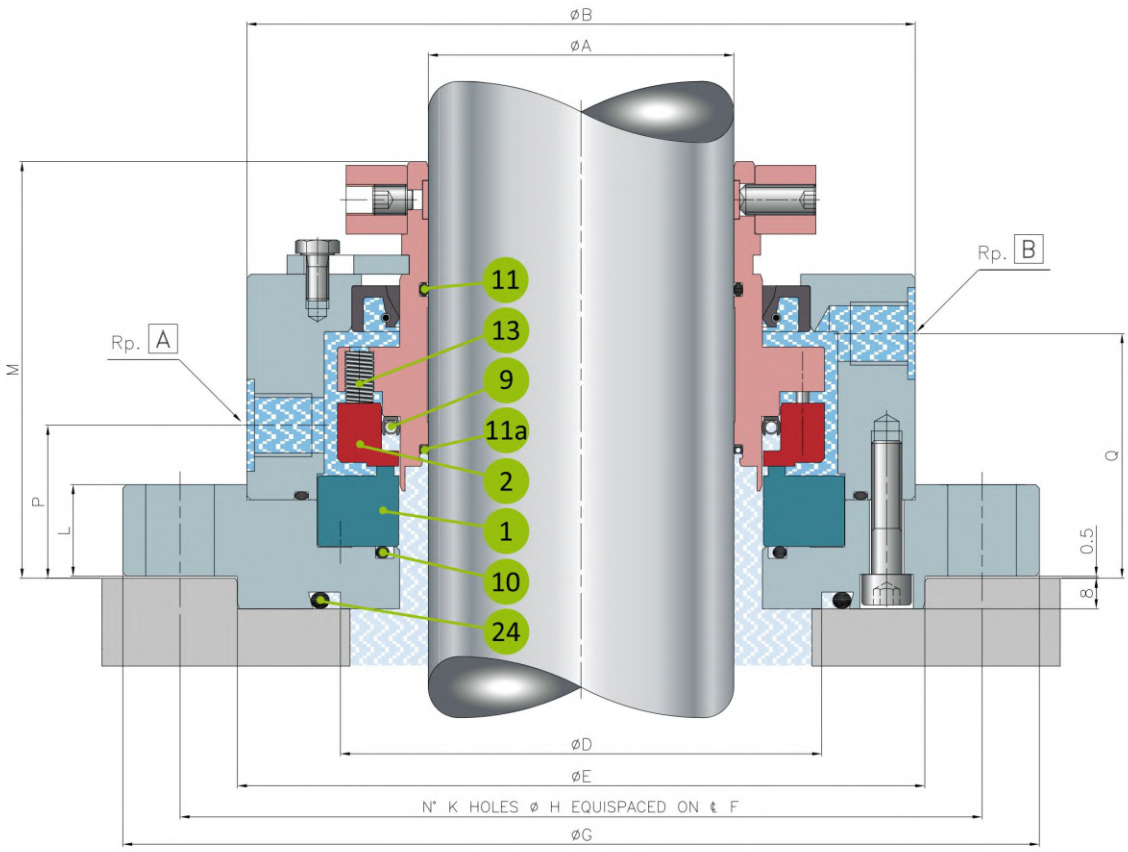
Companies like JOHN Crane, Burgmann and Fluiten have developed a type of mechanical seal capable of operating at lower speeds without requiring cooling. The specifications of these seals are:

- Maximum operating pressure of Full Vacuum To 4 Bar
- Maximum slip speed of 3.5 meters per second
- Require long replacement cycles
- Moderate cost

Single Mechanical Seal With API23 Cooling Option

These seals feature a single cartridge design with a radial seal on the atmospheric side, enabling circulation of a cooling fluid at atmospheric pressure. The specifications of these seals are:

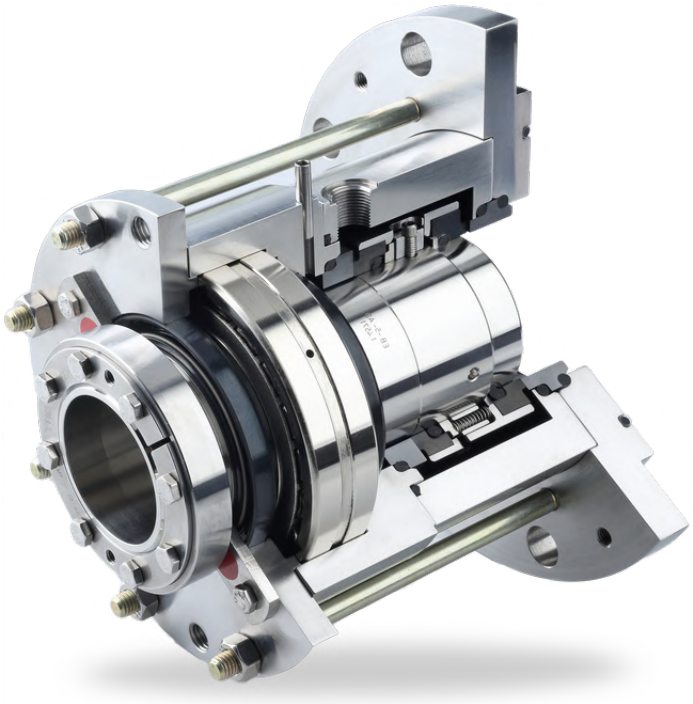
- Maximum operating pressure of Full Vacuum To 6 Bar
- Maximum slip speed of 5 meters per second
- Require long replacement cycles
- Moderate cost



Duble Mechanical Seal With API 53 Cooling System

Double mechanical seals with a cooling liquid are the most commonly used seal types in agitators. These mechanical seals can be cooled using various gases or liquids. The main feature of these seals is the ability to pressurize the area between the two seals and prevent the reactor contents from leaking out. The specifications of these seals are:

- Maximum operating pressure of Full Vacuum To 20 Bar
- Maximum slip speed of 20 meters per second
- Require long replacement cycles
- High cost



Selection of PSRM Mixers

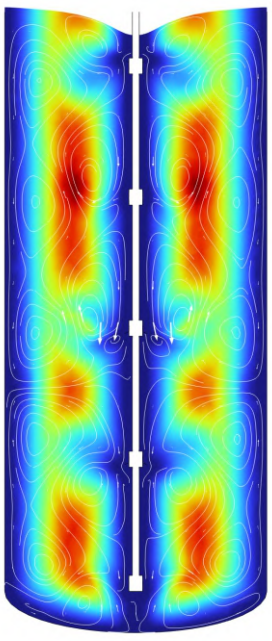
The PSRM series agitators are designed and manufactured by this company with various configurations and the following general specifications:

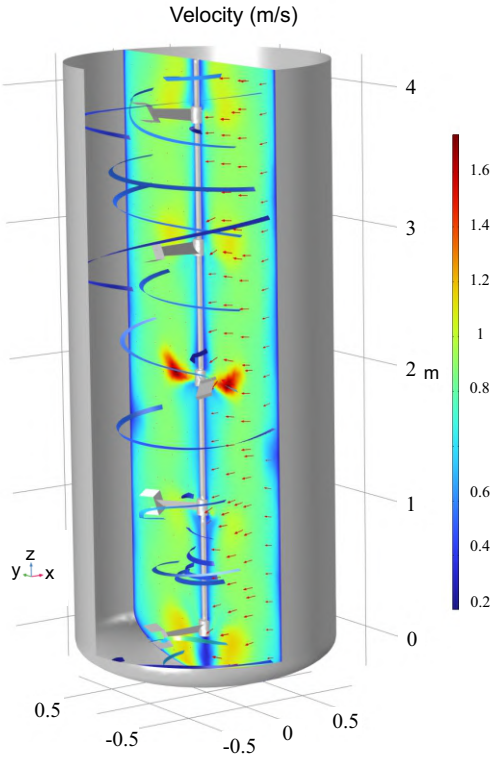
Mixer Model	Max Power Rate (Kw)	Impeller Diameter (m)	Max Shaft Length (m)	Max Number of Impellers
PSRMS	5.5	0.2 ~ 4	20	12
PSRMM	11			
PSRML	45			
PSRMVL	160			

These mixers are an integral part of polymerization processes and are used in the production of a wide range of polymers.

To increase the efficiency of these reactors, computational fluid dynamics is used in the mixer design process to optimally calculate the diameter, number, and spacing of the impellers through simulation and modeling.

This ensures uniform mixing is achieved within the reactor for maximum monomer conversion during polymerization reactions.

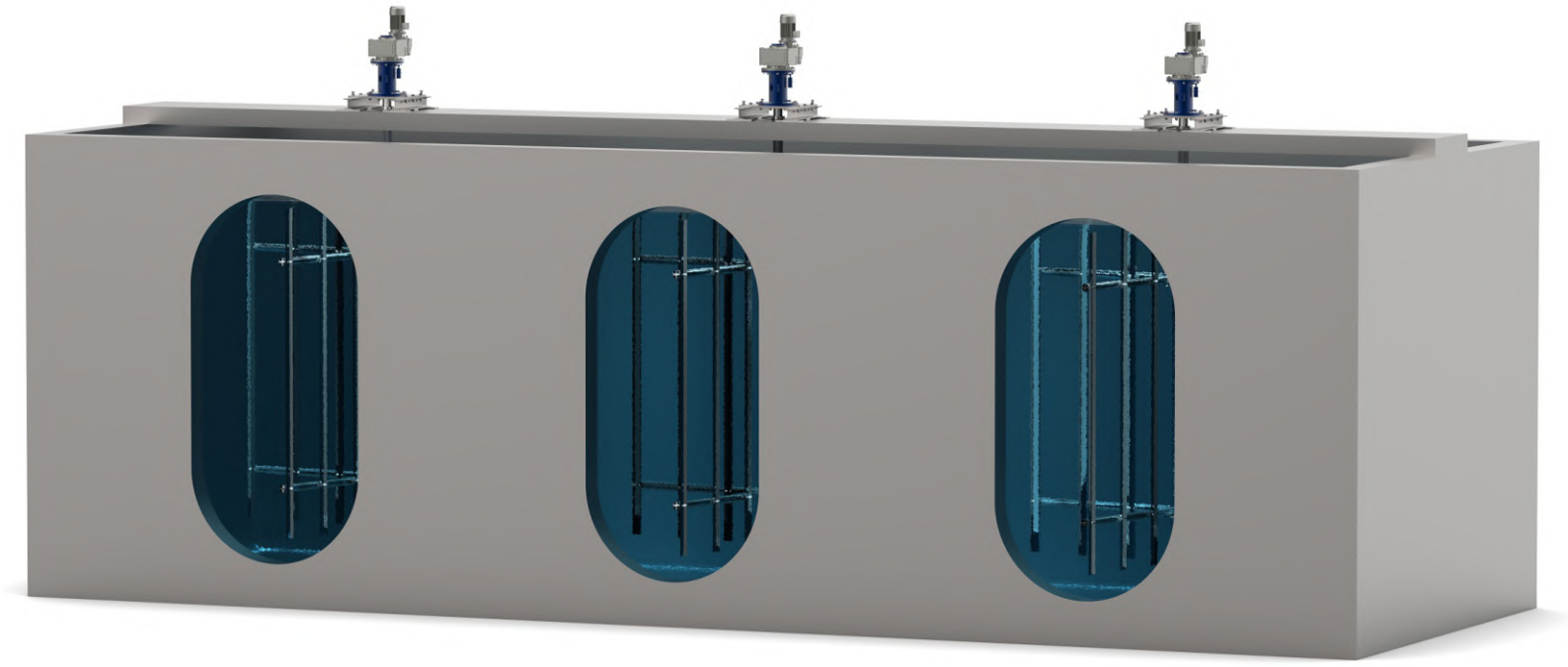




Paddlewheel Flocculator

Fluctuation is one of the important parts in water and wastewater treatment processes.

Fluctuation is a process in which small particles collide with each other softly and create bigger ones. In water and wastewater treatment industry, the starting point is flash mixing that creates micro-Flocs. In fluctuation stage, macro Flocs are produced as a result of Brownian motion in which particles collide with each other. Macro particles can sediment. Modern fluctuation systems are classified into mechanical and hydraulic methods. Among mechanical methods are paddle wheel, turbine mixers, and jet pumps; aeration methods belong to hydraulic methods.



Paddlewheel Flocculator

The commonest fluctuation method is horizontal and vertical paddle wheel fluctuation. Various tests and experiences have proved that this type of fluctuation has the highest efficiency in water and wastewater treatment industry. These methods are mainly used in places where the formation of biggest fluctuations and removing highest amount of solid particles is intended. Despite high initial investment and high preservation cost compared to other methods, this is still among the popular fluctuation methods.

Paddle wheel fluctuations are usually designed as three series tanks whose speed gradients reduces from highest to the lowest gradient.

The following table briefly compares fluctuation methods.

Description	Paddle wheel method	Turbine method	Hydraulic method
Fluctuation type	Big	Small to medium	Very big
Pressure drop	-	-	0.15 m
Process flexibility	Good	Ideal	Low
Investment	Moderate	Medium	Low
Maintenance cost	Medium	Low	Medium
Equipment manufacturing	Nearby difficult	Medium	Nearby difficult

The With many years of experience in producing paddle wheel fluctuation, this company offers its clients all services from design stage to the construction phase.

Process Design

Water and wastewater treatment plants designed by process engineers, are designed for predefined velocity gradients. This company uses software to do the computations and conduct all necessary calculations including power, size of paddles, number of paddles, point-by-point speed, etc. according to tank dimensions and velocity gradient. Computations are conducted according to the latest methods used across the globe.

Mechanical Paddle Design

After design in process phase, the initial design of the mixer is prepared by design department of the company. Before finalizing the design, all critical sections are analyzed by Finite Element Method and all necessary inspections such as frequency, stress, strain, fatigue, displacement, etc. is carefully carried out.

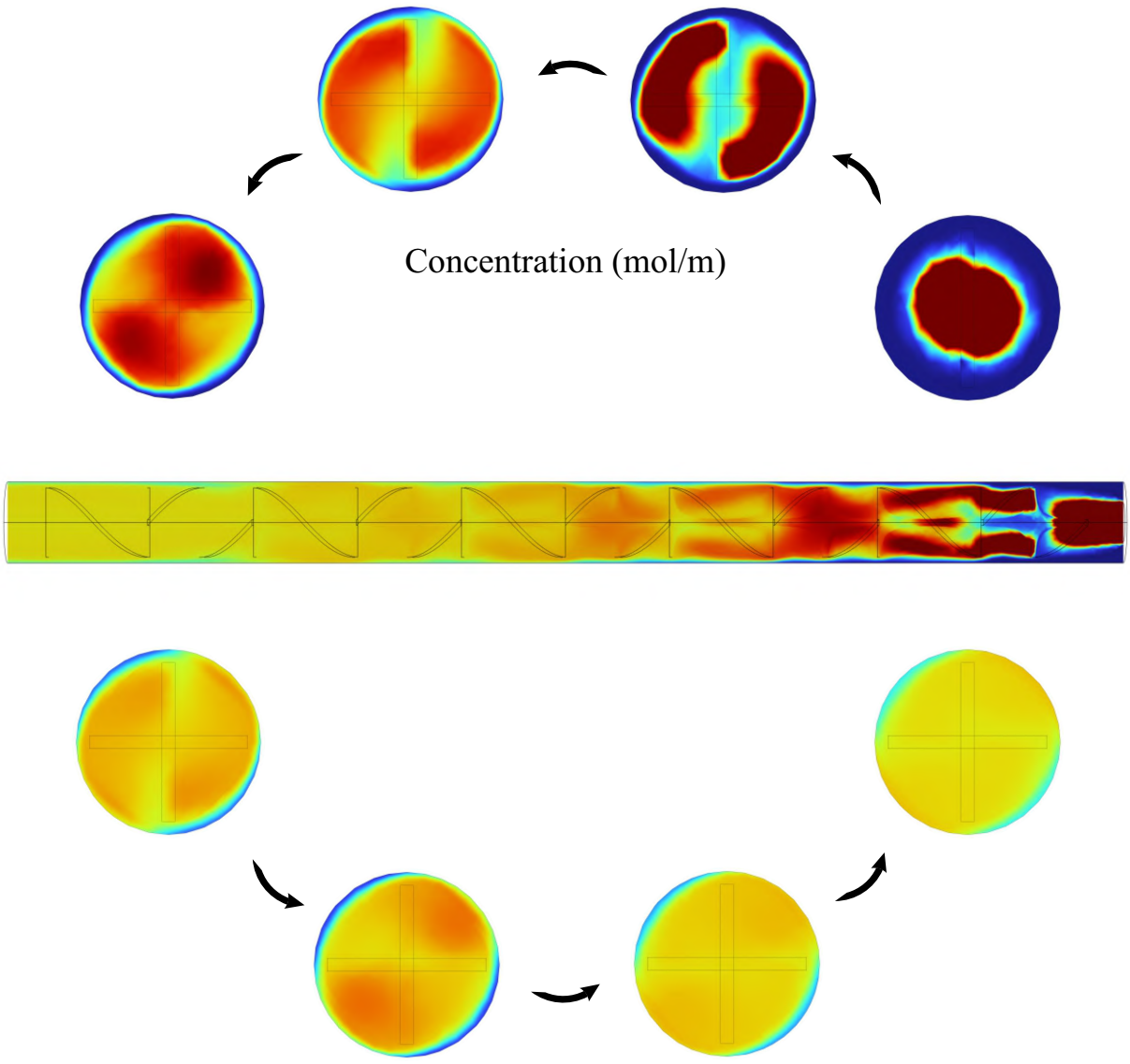
Mechanical Housing Design

Designing the bearing configuration is of the most critical parts of fluctuation mixer that should be designed most carefully. This housing should control all radial and axial loads and work for years without maintenance.

Paddle wheel mixer advantages

- Producing big Flocs
- High safety factor
- Low corrosion and abrasion
- Few annual maintenance
- Defected parts can be replaced easily
- Can be made from stainless steel
- Designed for continuous and heavy duty operation

Static Mixer

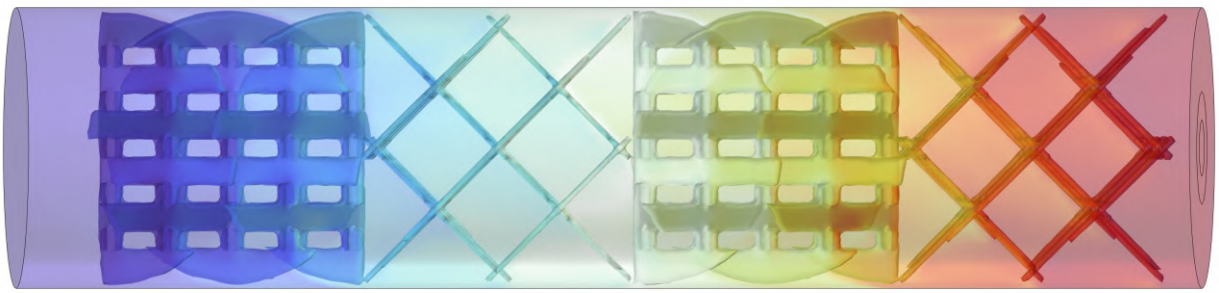


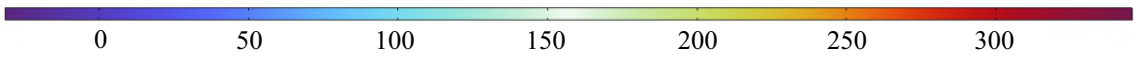
PAKZIST MODERN

Static Mixers

In industry, the concept of static or stationary is used as the opposite point of dynamic or dynamism.

In the context of the mixing industry, 'static' refers to mixers where the mixing elements remain stationary. The mixing operation is performed by the fluid passing through these fixed elements, propelled by its own kinetic energy, which results in the homogenization process. The energy needed for the mixing operation is supplied through the pressure drop along the static mixer's length. This pressure drop can range from a few millibars (mBar) to tens of bars (Bar).





Pressure (mbar)

While mixing typically occurs in vessels, reactors, and tanks, certain mixtures and reactions can take place in pipes. Under specific conditions, pipes can even function as reactors. In many cases, pipelines equipped with static mixers provide a cost-effective method for conducting chemical processes.

This approach is particularly beneficial in industrial processes where quick mixing and minimized residence time are crucial. This is especially true for molten polymers, which can exhibit changes in behavior over time.

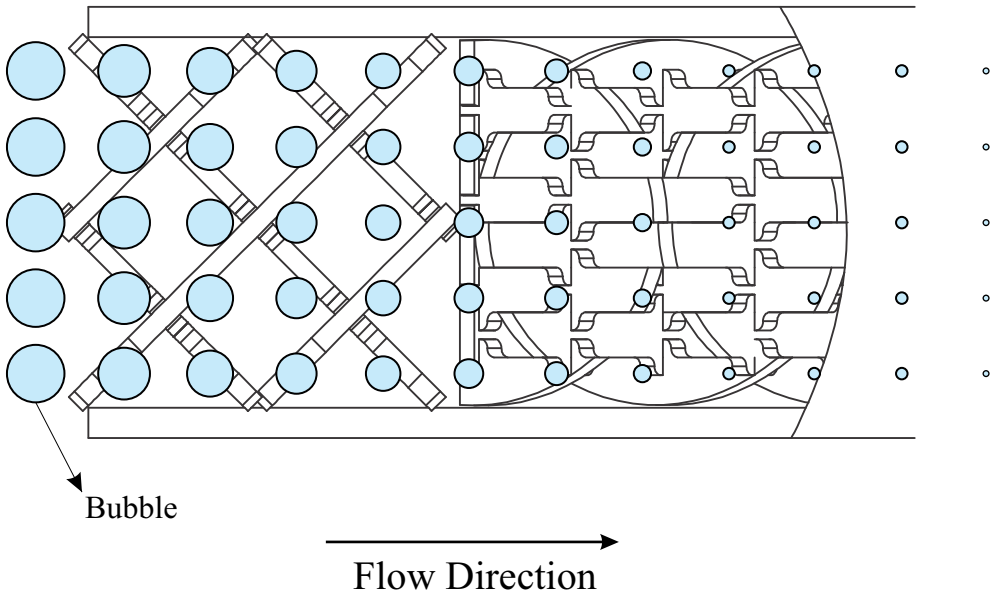
Major Applications Of Static Mixers Include:

- **Continuous processes.** An example is the mixing of water with chlorine gas. In this process, water and chlorine enter the static mixer and deliver a homogeneous solution at the outlet.

- **Processes that must be carried out under vacuum.** This is applicable in the production of various types of paints and adhesives where the mixing of different materials must occur in the absence of oxygen or any other gas.

- **Creation of plug flow in processes to avoid back mixing.** In heat transfer processes for fluids with high viscosity, the use of a static mixer can reduce the time for temperature homogenization by up to five times.

- **Chemical processes involving a gaseous phase.** An example is the production of carbonated beverages where the beverage solution is combined with carbon dioxide gas in a static mixer.

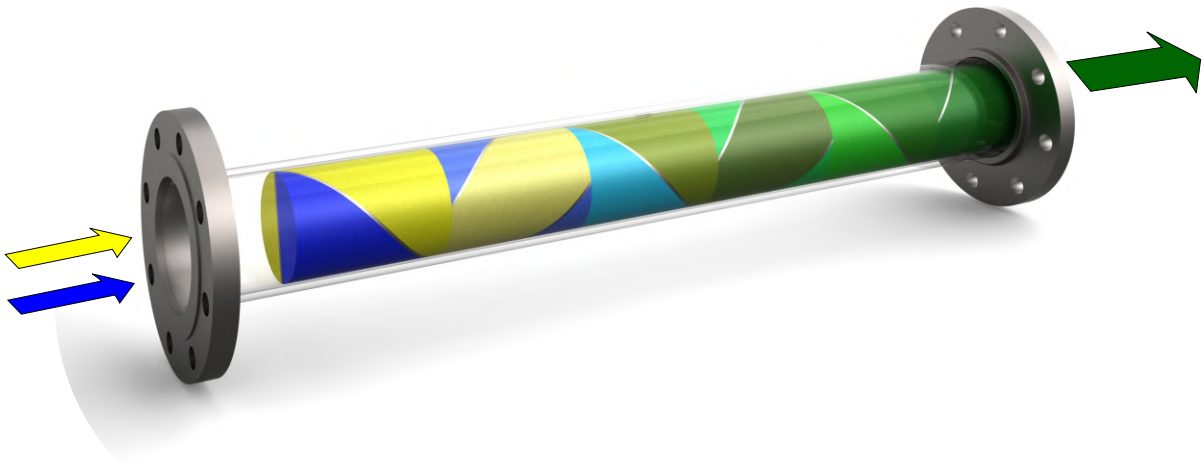


Major Applications Of Static Mixers Include:

- **High-pressure processes.** This is seen in the mixing process of various polyethylene grades in the polyethylene pipe manufacturing industry, where the operating pressure is several hundred bars.

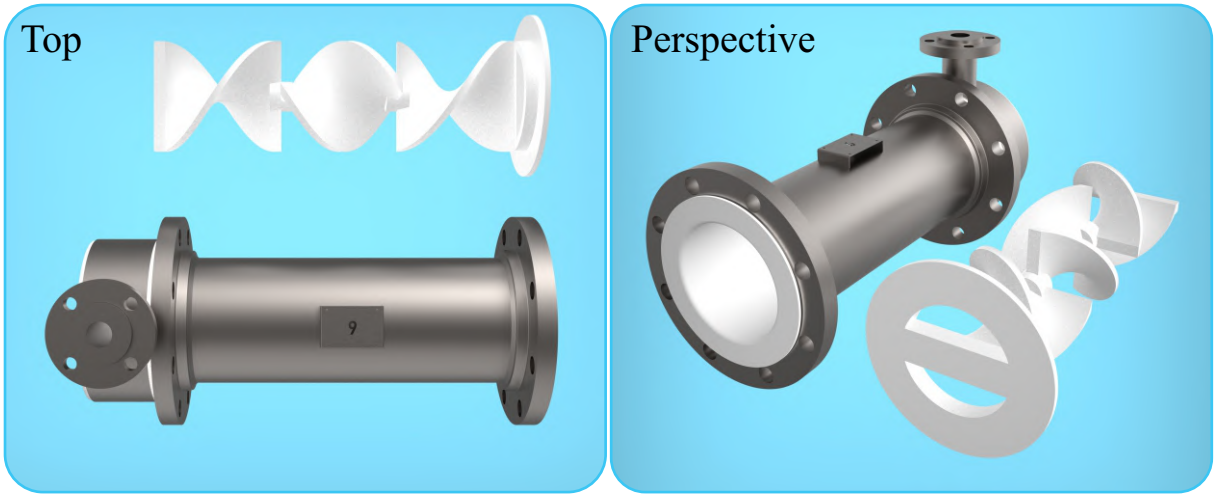
- **Processes where space is a constraint.** In the desulfurization process of crude oil (oil sweetening), crude oil and sulfuric acid are mixed in pipes, which takes up significantly less space than if the mixing were done inside tanks.

- **Processes where the rate of metal oxidation is high.** For instance, in the production of sulfuric acid, the high temperature of the acid increases the rate of corrosion. Static mixers made of polymers can be used to perform mixing processes without corrosion.



Helical Static Mixer

This type of mixer is used in a wide range of industries. Helical mixers are highly suitable for fluids with medium viscosity and density. The working principles of these mixers are based on division for laminar flows with Reynolds numbers less than 2300, and on division, conversion, and inversion for turbulent flows with Reynolds numbers greater than 4000.



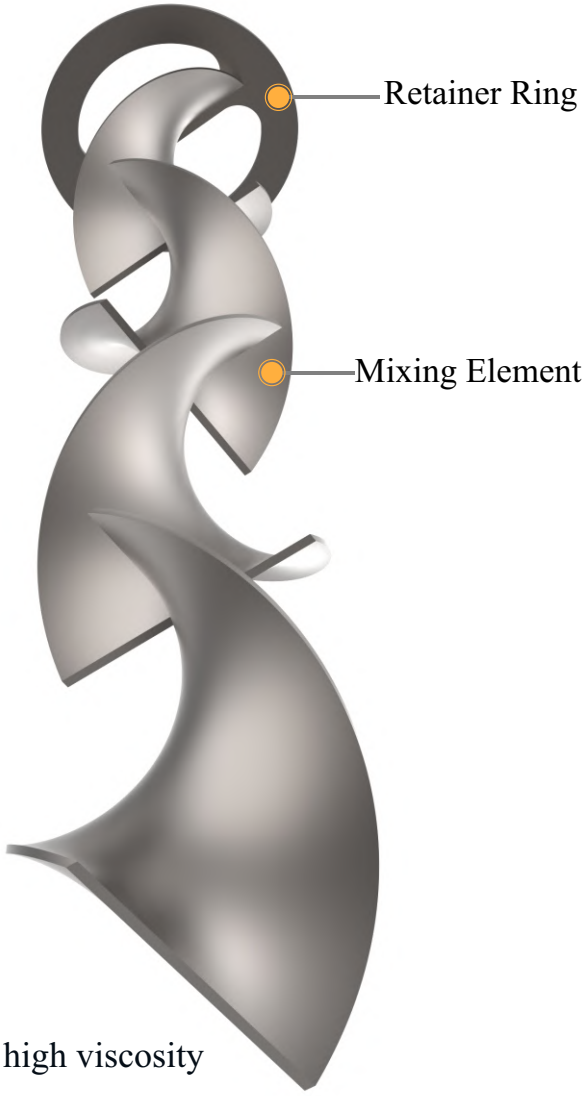
1. Division: As the fluid passes through the mixer, each element divides the fluid into two distinct layers. The total number of divisions after passing through 'n' elements is calculated by the formula 'x = 2^n'. Therefore, with 18 elements in the mixer, the fluid is divided into 262,144 layers.

2. Conversion: The fluid moves along the elements due to pressure. The helical wall of the elements guides the fluid in the center towards the wall, and the fluid near the wall towards the center. This movement creates a velocity difference among the fluid molecules, causing the fluid to be sheared.

3. Inversion: The direction of the fluid flow changes by 90 degrees from one element to the next. This inversion of the flow direction induces turbulence in the fluid, thereby enhancing the mixing power.

Main Applications

- Water and wastewater treatment
- Mixing gas with liquid and liquid with liquid
- Producing oil-in-water emulsions
- Producing biodiesel fuel
- Blending antioxidants with other additives
- Injecting coagulants into the main stream
- Viscosity modification
- PH control
- Homogenizing lines for sampling
- Mixing two or more liquid resins
- Carrying out chemical reactions with low and high viscosity



Construction Material Include

Options

- Element construction: Fixed, Removable
- Element material: Virgin PTFE
- Element coating: PE and FEP types
- Installation of injection Quills before mixer

Construction materials include

- Housing material
  - None Metal: GRP, GRE, HDPE, UPVC
  - Metal:CS,304 SS, 316 SS,Duplex SS, Super Duplex SS
- Flange Standard: ASME, DIN, JIS
- Flange Type: Welding Neck, Slip On

Identity Code of HSM Mixers

Mixer Selection

HSM Helical Static Mixers

Mixer Version Indicator

V2 Version 2

Wet Parts Material

S4	SS 304
S6	SS 316L
S4	TITANIUM
S10	HASTELLOY C-276

Mixer Size

A	1/2″	E	2″	I	6″
B	3/4″	F	3″		
C	1″	G	4″		
D	1 1/2″	H	5″		

Mixer Element Type

A	Fixed
B	Removable

Number Of Element

2	4
6	8
10	12

Housing Scheoule

TI	Scheoule 10
TH	Scheoule 40
TV	Scheoule 80

Connection Type

0	NPT
1	ANSI 150 LBS FLANGES
2	ANSI 300 LBS FLANGES
3	Pn16, Flange (DIN2501)
4	Pn40, Flange (DIN2501)

Element Coat

A	N/A
B	PE Coating
C	ETFE Coating
D	FEP Coating

Housing Lining

1	W/O
2	Hard Rubber
3	PTFE

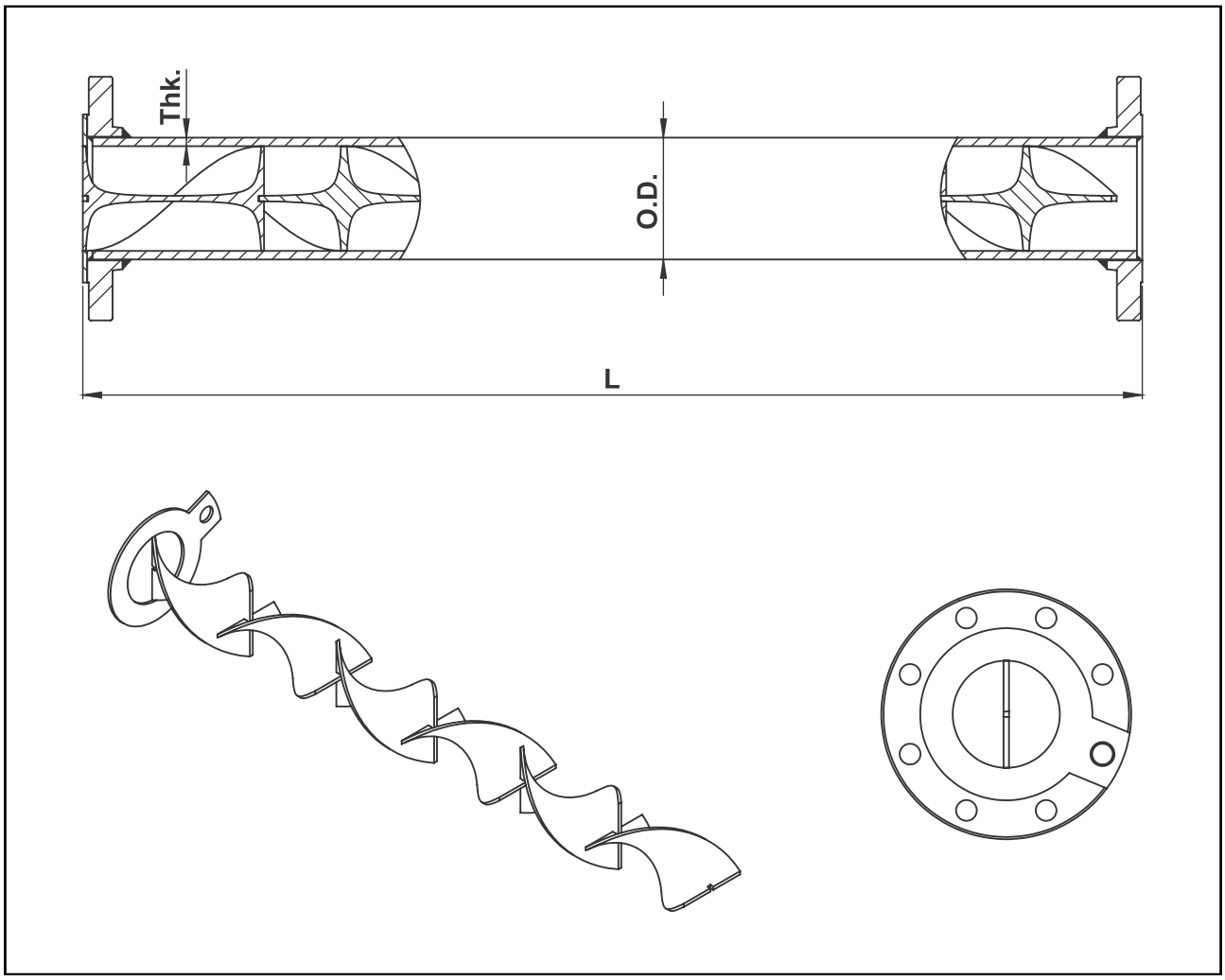
Number Of Injection Points

CO	W/O
C1	1
C2	2
C3	3

Additional Test

T1	W/O
T2	Mat. Certificate
T3	Welding TEST
T4	Pressure TEST
T5	All TEST

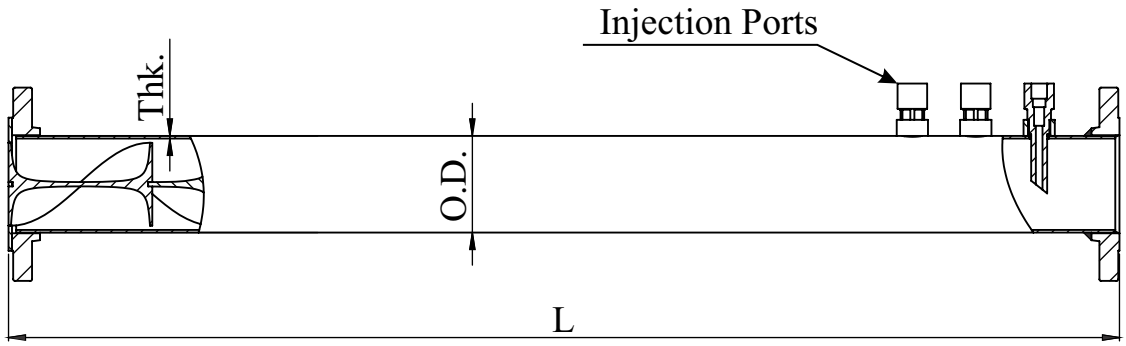
Dimensional Drawing of Helical Static With Slip On Flange



Normal Size (inch)			1/2	3/4	1	1 1/2	2	3	4	5	6
OD(mm)			21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3
HOUSING THICKNESS Thk (mm)	SCH 10		2.11	2.11	2.77	2.77	2.77	3.05	3.05	3.4	3.4
	SCH 40		2.77	2.87	3.38	3.68	3.91	5.49	6.02	6.55	7.11
	SCH 80		3.73	3.91	4.55	5.08	5.54	7.62	8.56	9.53	10.97
TOTAL LENGTH L (mm)	Element Number	2	65	85	115	155	205	295	400	430	525
		4	115	150	195	280	365	525	675	820	990
		6	160	210	275	400	520	760	980	1200	1450
		8	210	275	355	525	680	995	1290	1585	-
		10	255	335	435	645	835	1230	1595	-	-
		12	305	400	515	770	995	1460	-	-	-

- The Tolerance Of Overall Length is ± 5mm

Helical Static Mixer With Slip On Flange & Injection Quills

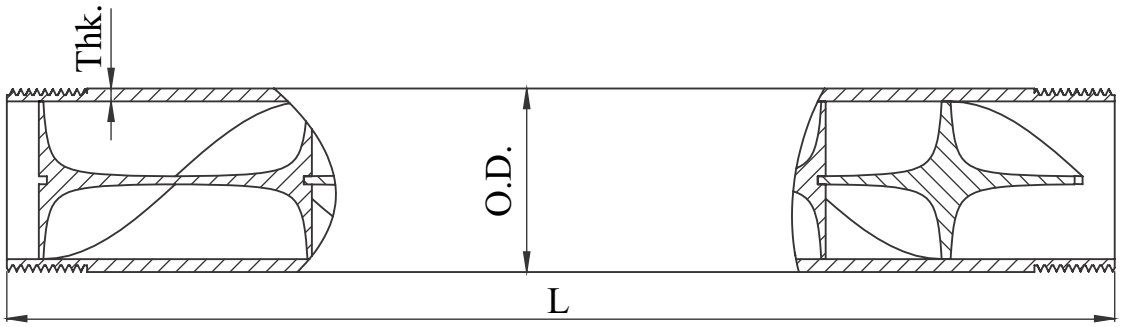


Normal Size (inch)				1/2	3/4	1	1 1/2	2	3	4	5	6
OD(mm)				21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3
Coupling Size (inch)				1.2	1.2	1.2	1.2	1.2	3.4	3.4	3.4	3.4
TOTAL LENGTH L (mm)	Element Number	2	1	165	185	215	255	305	395	500	530	625
			2	265	285	315	355	405	495	600	630	725
			3	365	385	415	455	505	595	700	730	825
		4	1	215	250	295	380	465	625	775	920	1090
			2	315	350	395	480	565	725	875	1020	1190
			3	415	450	495	580	665	825	975	1120	1290
		6	1	260	310	375	500	620	860	1080	1300	1550
			2	360	410	475	600	720	960	1180	1400	1650
			3	460	510	575	700	820	1060	1280	1500	1750
		8	1	310	375	455	625	780	1095	1390	1685	-
			2	410	475	655	725	880	1195	1490	1785	-
			3	510	575	755	825	980	1295	1590	1885	-

Injection Ports Numbers

- The Tolerance Of Overall Length is ± 5mm

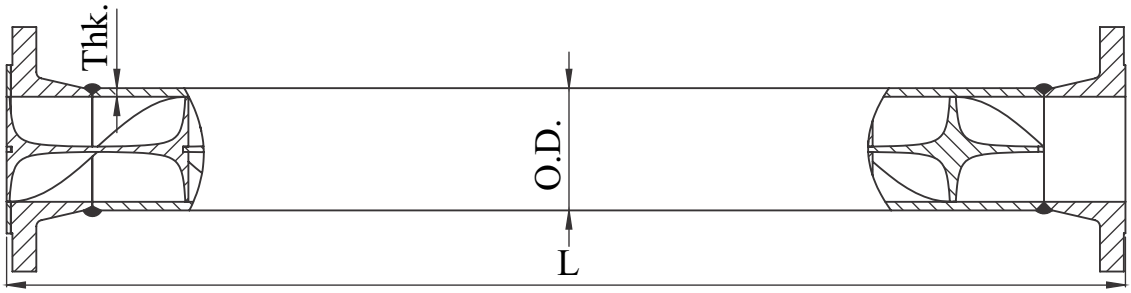
Helical Static Mixer With NPT Thread



Normal Size (inch)			1/2	3/4	1	1 1/2	2	3	4
OD(mm)			21.3	26.7	33.4	48.3	60.3	88.9	114.3
HOUSING THICKNESS Thk (mm)	SCH 10		2.11	2.11	2.77	2.77	2.77	3.05	3.05
	SCH 40		2.77	2.87	3.38	3.68	3.91	5.49	6.02
	SCH 80		3.73	3.91	4.55	5.08	5.54	7.62	8.56
TOTAL LENGTH L (mm)	Element Number	2	52	70	85	135	170	242	315
		4	100	130	165	252	325	475	622
		6	145	195	245	375	480	710	930
		8	192	258	325	498	638	945	1235
		10	240	320	405	620	795	1175	1542
		12	285	380	485	745	952	1410	1850

- The Tolerance Of Overall Length is ± 5mm

Helical Static Mixer With Welding Neck Flange



Normal Size (inch)			1/2	3/4	1	1 1/2	2	3	4	5	6
OD(mm)			21.3	26.7	33.4	48.3	60.3	88.9	114.3	141.3	168.3
HOUSING THICKNESS Thk (mm)	SCH 10		2.11	2.11	2.77	2.77	2.77	3.05	3.05	3.4	3.4
	SCH 40		2.77	2.87	3.38	3.68	3.91	5.49	6.02	6.55	7.11
	SCH 80		3.73	3.91	4.55	5.08	5.54	7.62	8.56	9.53	10.97
TOTAL LENGTH L (mm)	Element Number	2	130	160	190	235	280	375	285	535	625
		4	180	225	270	360	440	605	760	925	1100
		6	225	285	350	480	595	840	1070	1305	1550
		8	275	350	430	605	755	1075	1375	1690	-
		10	320	410	510	725	910	1310	1680	-	-
		12	370	475	590	850	1070	1540	-	-	-

- The Tolerance Of Overall Length is ± 5mm

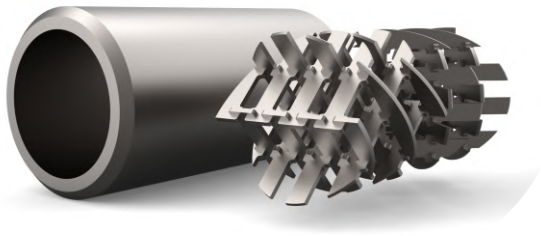
Cross Element Static Mixer

The most challenging mixing processes in the industry are characterized by substantial disparities in the physical properties of the fluids involved. These differences can be categorized into three main groups:

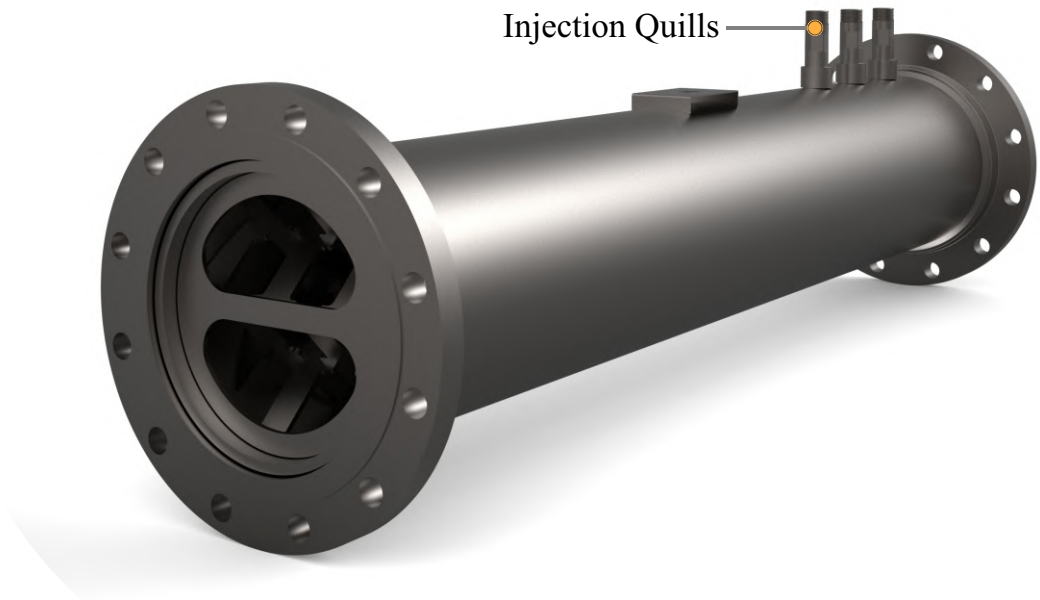
1- Large differences in flow rates

2- Significant variations in densities

3- Considerable discrepancies in viscosities

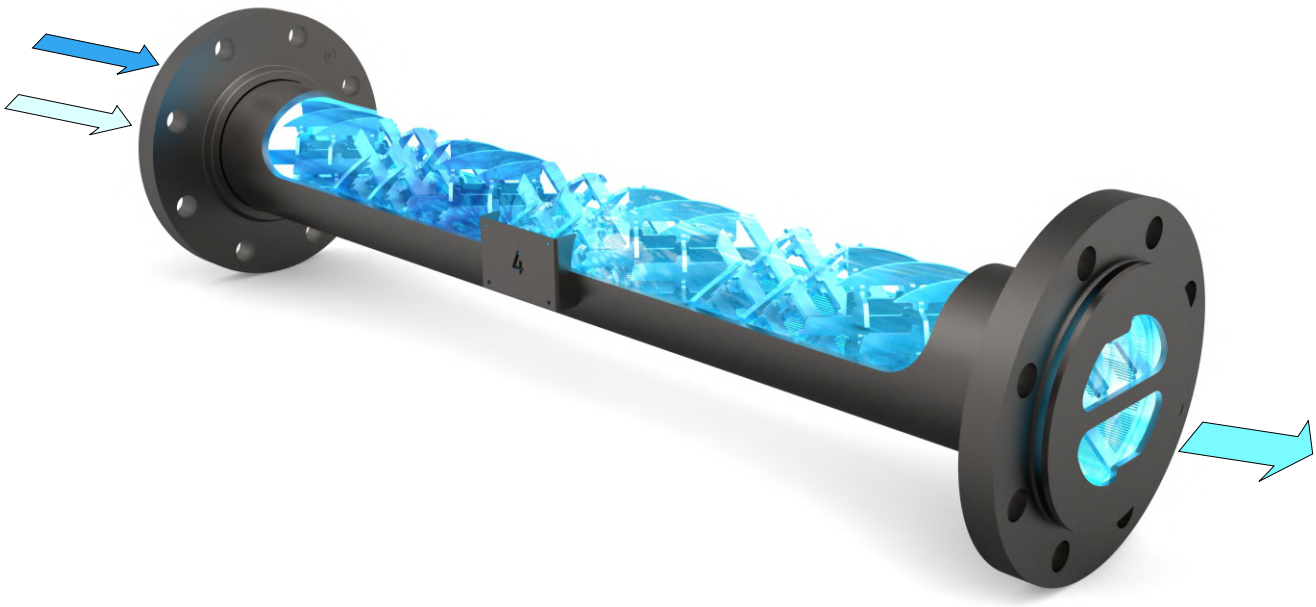


In simpler terms, it is easier to mix two substances with high viscosities compared to mixing materials with significantly different viscosities. When it comes to such fluids, the cross-element mixers offered by this company are considered to be one of the top choices.



Cross Element Static Mixer

The operating mechanism of these mixers involves generating successive subdivisions in multiple directions and creating continuous intersecting flows. This process ensures that the fluids are mixed in the shortest possible time and distance



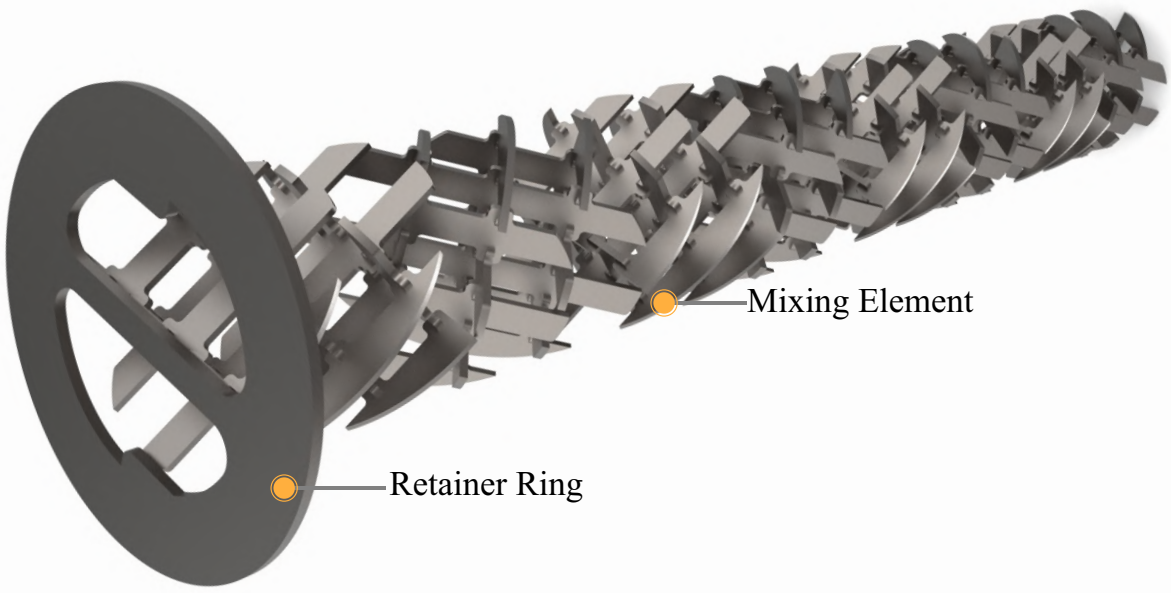
The operating mechanism of these mixers involves generating successive subdivisions in multiple directions and creating continuous intersecting flows. This process ensures that the fluids are mixed in the shortest possible time and distance

The highly specialized and precise design of this mixer significantly reduces the Residence Time Distribution (RTD). Moreover, the agitator's mechanical robustness is exceptionally high, thanks to its multiple connections.

These mixers can be manufactured using a wide range of materials, including stainless steels and Hastelloys. The elements of these agitators are available in two models: welded and removable, allowing for flexibility in ordering.

Here are Key Features Of These Mixers

- They offer the highest mixing intensity among static mixers.
- They are suitable for fluids with low to very high viscosities.
- They have the shortest mixer length compared to other static mixers.
- They are capable of mixing fluids with viscosity differences of up to 1,000,000 times.
- They can mix fluids with volume differences of up to 1,000,000 times.
- They are suitable for mixing very hot polymers.
- They are available in sizes up to 48 inches



Identity Code of CESM Mixers

Mixer Selection

CESM Cross Element Static Mixer For Low Viscosities 18 Blades

Mixer Version Indicator

V2 Version 2

Housing Material

S4	SS 304	S11	HDPE
S6	SS 316L	S12	UPVC
S7	Duplex SS	S13	CS
S8	Super Duplex SS		

Mixer Size

A	1/2″	G	3″	M	12″
B	3/4″	H	4″	N	14″
C	1″	I	5″	O	16″
D	1 1/4″	J	6″	P	18″
E	1 1.2″	K	8″	Q	20″
F	2″	L	10″	R	24″

Mixer Element Type

A Fixed
B Removable

Number Of Element

2 4
6 8
10 12

Housing Scheoule

TI Scheoule 10
TH Scheoule 40
TV Scheoule 80

Connection Type

0 NPT
1 ANSI 150 LBS FLANGES
2 ANSI 300 LBS FLANGES
3 Pn6, Flange (DIN2501)
4 Pn10, Flange (DIN2501)
5 Pn16, Flange (DIN2501)
6 Pn40, Flange (DIN2501)

Element Coat

A N/A
B PE Coating
C ETFE Coating
D FEP Coating

Housing Linin

1 W/O
2 Hard Rubber
3 PTFE

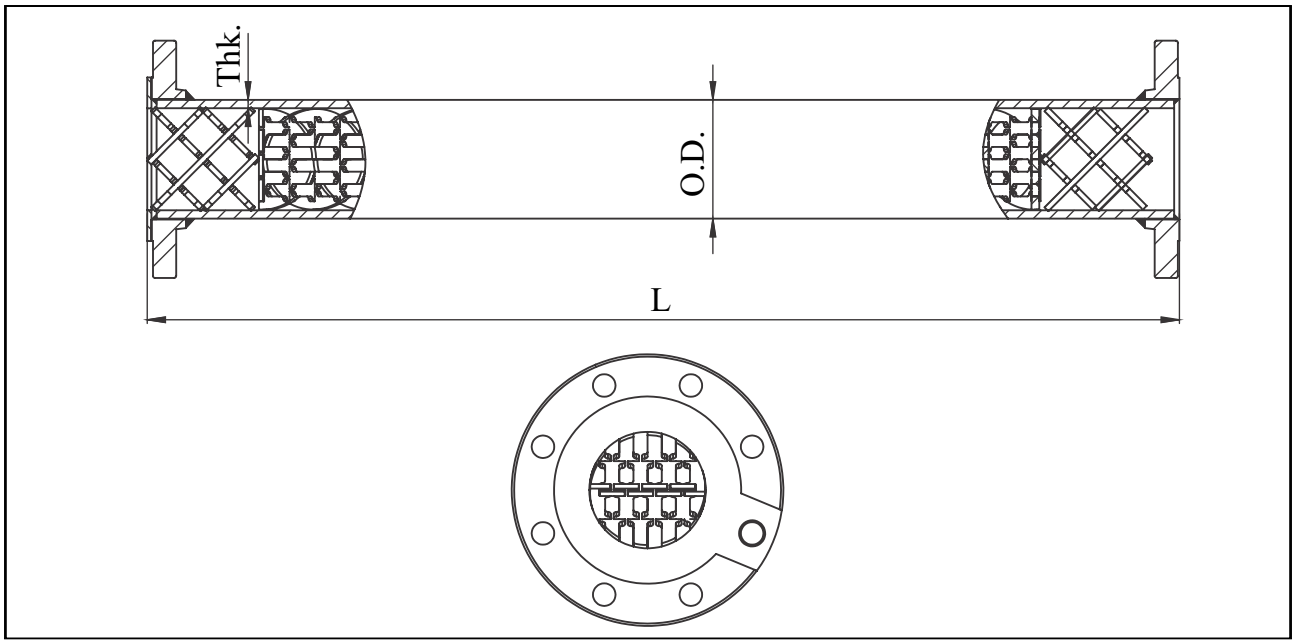
Number Of Injection Points

CO W/O
C1 1
C2 2
C3 3

Additional Test

T1 W/O
T2 Mat. Certificate
T3 Welding TEST
T4 Pressure TEST
T5 All TEST

Dimensional Drawing of CESM Static Mixer With Slip On Flange

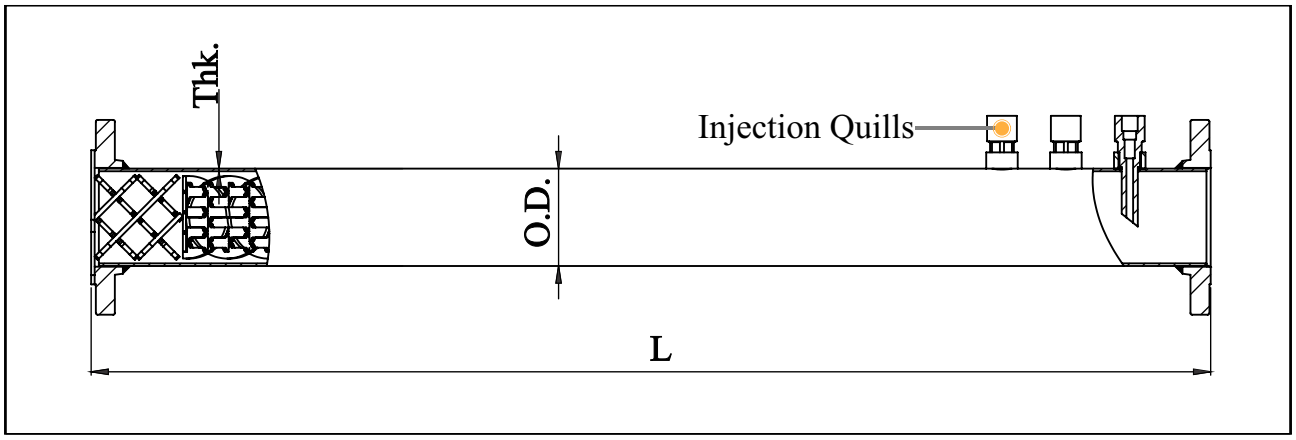


Normal Size (inch)	OD(mm)	HOUSING THICKNESS Thk (mm)			TOTAL LENGTH L (mm)					
		SCH 10/10S	SCH 40/40S	SCH 80/80S	2	4	6	8	10	12
1/2	21.3	2.11	2.77	3.73	80	80	105	135	160	195
3/4	26.7	2.11	2.87	3.91	80	95	130	175	210	250
1	33.4	2.77	3.38	4.55	80	115	165	220	270	320
1 1/2	48.3	2.77	3.68	5.08	105	180	255	335	410	500
2	60.3	2.77	3.91	5.54	120	230	330	435	425	640
3	88.9	3.05	5.49	7.62	180	330	485	640	800	950
4	114.3	3.05	6.02	8.56	230	430	650	840	1080	1300
5	141.3	3.4	6.55	9.53	285	540	820	1080	1350	1600
6	168.3	3.4	7.11	10.97	330	650	1000	1300	1650	1950
8	219.1	3.76	8.18	12.7	435	850	1300	1700	2120	2550
10	273.1	4.19	9.27	12.7	540	1080	1600	2150	2680	3200
12	323.9	4.57	9.53	12.7	635	1280	1920	2550	3200	-
14	355.6	4.78	9.53	12.7	720	1420	2150	2850	3520	-
16	406.4	4.78	9.53	12.7	820	1630	2450	3250	-	-
18	457.2	4.78	9.53	12.7	1000	1850	2750	-	-	-
20	508	5.54	9.53	12.7	1050	2050	3080	-	-	-
24	609.6	6.35	9.53	12.7	1250	2500	3700	-	-	-

Element Number

- The Tolerance Of Overall Length is ± 5mm

CESM Static Mixer With Slip On Flange & Injection Quills

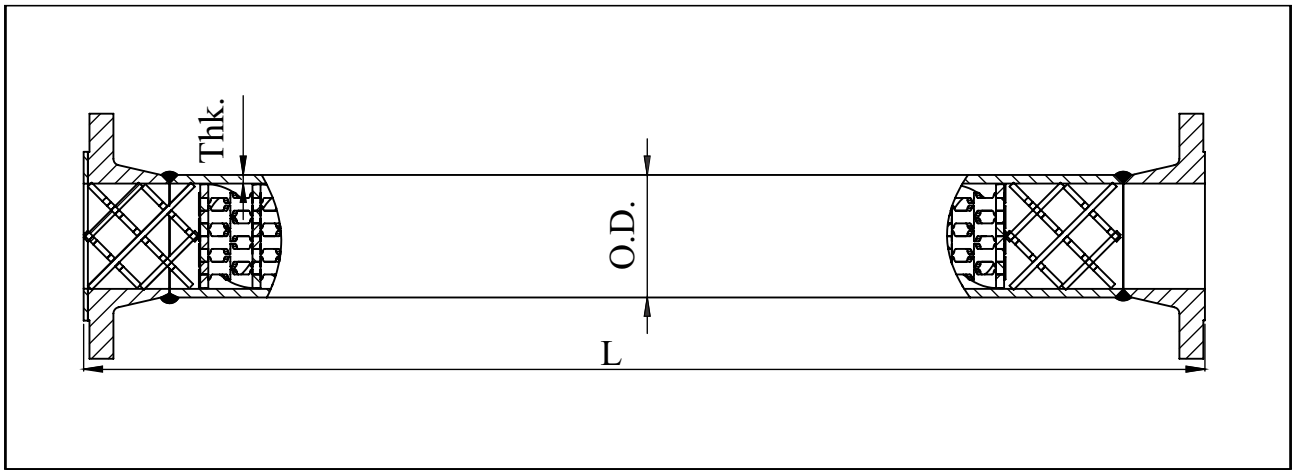


Element Number

Normal Size (inch)	OD(mm)	Coupling Size (Inch)	TOTAL LENGTH L (mm)																	
			2			4			6			8			10			12		
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1/2	21.3	1.2	180	280	380	180	280	380	205	305	405	235	335	435	260	360	460	295	395	495
3/4	26.7	1.2	180	280	380	195	295	395	230	330	430	275	375	475	310	410	510	350	450	550
1	33.4	1.2	180	280	380	215	315	415	265	365	465	320	420	520	370	470	570	420	520	620
1 1/2	48.3	1.2	205	305	405	280	380	480	355	455	555	435	535	635	510	610	710	600	700	800
2	60.3	1.2	220	320	420	330	430	530	430	530	630	535	635	735	525	625	725	740	840	940
3	88.9	1.2	280	380	480	430	530	630	585	685	785	740	840	940	900	1000	1100	1050	1150	1250
4	114.3	3.4	330	430	530	530	630	730	750	850	950	960	1060	1160	1180	1280	1380	1400	1500	1600
5	141.3	3.4	385	485	585	640	740	840	920	1020	1120	1180	1280	1380	1450	1550	1650	1700	1800	1900
6	168.3	3.4	430	530	630	750	850	950	1100	1200	1300	1400	1500	1600	1750	1850	1950	2050	2150	2250
8	219.1	3.4	535	635	735	950	1050	1150	1400	1500	1600	1800	1900	2000	2220	2320	2420	2650	2750	2850
10	273.1	3.4	640	740	840	1180	1280	1380	1700	1800	1900	2250	2350	2450	2780	2880	2980	3300	3400	3500
12	323.9	3.4	735	835	935	1380	1480	1580	2020	2120	2220	2650	2750	2850	3300	3400	3500	-	-	-
14	355.6	3.4	820	920	1020	1520	1620	1720	2250	2350	2450	2950	3050	3150	3620	3720	3820	-	-	-
16	406.4	3.4	920	1020	1120	1730	1830	1930	2550	2650	2750	3350	3450	3550	-	-	-	-	-	-
18	457.2	3.4	1100	1200	1300	1950	2050	2150	2850	2950	3050	-	-	-	-	-	-	-	-	-
20	508	3.4	1150	1250	1350	2150	2250	2350	3180	3280	3380	-	-	-	-	-	-	-	-	-
24	609.6	3.4	1350	1450	1550	2600	2700	2800	3800	3900	4000	-	-	-	-	-	-	-	-	-

- The Tolerance Of Overall Length is ± 5mm

CESM Static Mixer With Welding Neck Flange

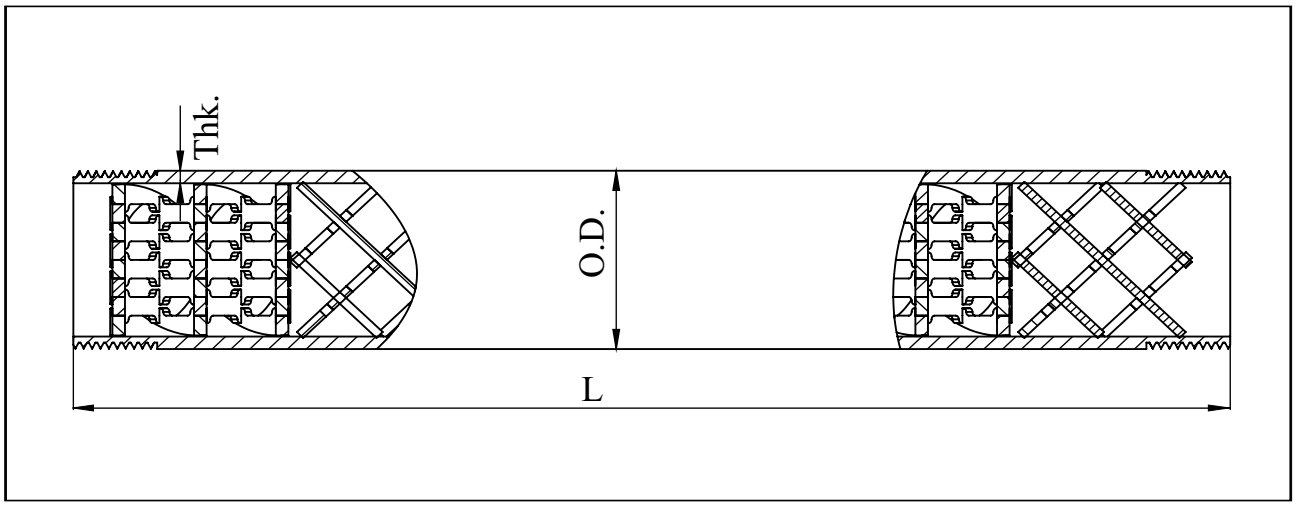


Element Number

Normal Size (inch)	OD(mm)	HOUSING THICKNESS Thk (mm)			TOTAL LENGTH L (mm)					
		SCH 10/10S	SCH 40/40S	SCH 80/80S	2	4	6	8	10	12
1/2	21.3	2.11	2.77	3.73	145	145	170	200	225	260
3/4	26.7	2.11	2.87	3.91	155	170	205	250	285	325
1	33.4	2.77	3.38	4.55	155	190	240	295	345	395
1 1/2	48.3	2.77	3.68	5.08	185	260	335	415	490	580
2	60.3	2.77	3.91	5.54	200	310	410	515	505	720
3	88.9	3.05	5.49	7.62	260	410	565	720	880	1030
4	114.3	3.05	6.02	8.56	315	515	735	945	1165	1385
5	141.3	3.4	6.55	9.53	390	645	925	1185	1455	1705
6	168.3	3.4	7.11	10.97	430	750	1100	1400	1750	2050
8	219.1	3.76	8.18	12.7	550	965	1415	1815	2235	2665
10	273.1	4.19	9.27	12.7	645	1185	1705	2255	2785	3305
12	323.9	4.57	9.53	12.7	755	1400	2040	2670	3320	-
14	355.6	4.78	9.53	12.7	860	1560	2290	2990	3660	-
16	406.4	4.78	9.53	12.7	950	1760	2580	3380	-	-
18	457.2	4.78	9.53	12.7	1150	2000	2900	-	-	-
20	508	5.54	9.53	12.7	1195	2195	3225	-	-	-
24	609.6	6.35	9.53	12.7	1390	2640	3840	-	-	-

- The Tolerance Of Overall Length is ± 5mm

CESM Static Mixer With NPT Thread



Element Number

Normal Size (inch)	OD(mm)	HOUSING THICKNESS Thk (mm)			TOTAL LENGTH L (mm)					
		SCH 10/10S	SCH 40/40S	SCH 80/80S	2	4	6	8	10	12
1/2	21.3	2.11	2.77	3.73	40	65	90	125	155	180
3/4	26.7	2.11	2.87	3.91	45	90	200	160	200	245
1	33.4	2.77	3.38	4.55	65	105	155	205	255	305
1 1/4	42.2	2.77	3.56	4.85	70	140	205	270	345	410
1 1/2	48.3	2.77	3.68	5.08	90	168	245	320	395	480
2	60.3	2.77	3.91	5.54	110	210	315	415	515	618

- The Tolerance Of Overall Length is ± 5mm