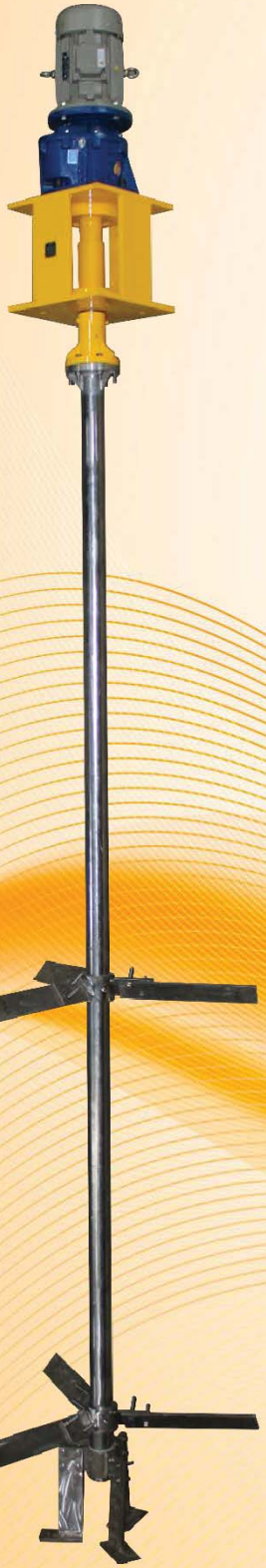
Knowledge Hub-Agitator

International Installations



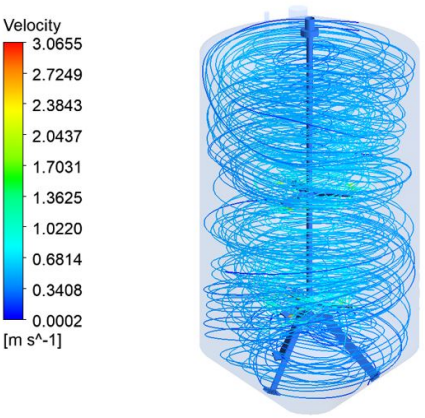
It's not just a mixing but a Technology

Verito Engineering Private Limited

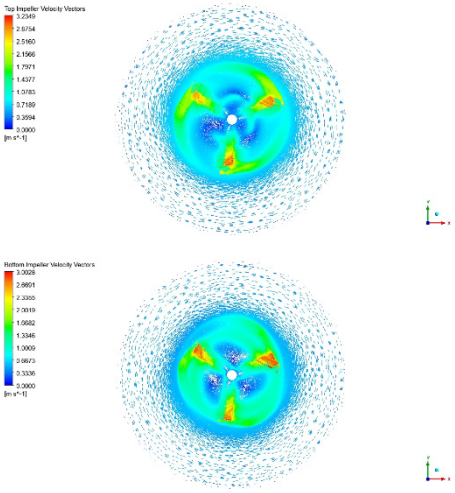
CFD in Mixing Technology

What is CFD ?

- Computational Fluid Dynamics (CFD) represents an approved approach within the realm of fluid mechanics. Its widespread application is evident in industries such as automotive, aircraft, process, and mixing.
- The primary objective of CFD is to address fluid flow-related inquiries by leveraging numerical techniques. The governing equations typically revolve around principles like Navier-Stokes, Euler, or potential-based equations.



Stream Lines (1)



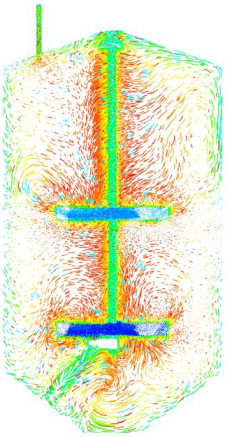
Velocity Vector (2)

Flow Simulation at Verito

- Verito leverages cutting-edge Computational Fluid Dynamics (CFD) technology, alongside laboratory experiments and field trials, to design, scale-up, enhance, or modernize agitators and mixing systems.
- Verito's engineers utilize CFD technology to gain an in-depth understanding of velocity distribution, flow patterns, areas with low velocity (referred to as dead zones, as illustrated in Figures 1, 2 & 3), as well as regions with both low and high shear rates within various mixing system configurations.
- This enables the testing of multiple system setups and tank agitator designs to achieve optimal performance. Additionally, CFD technology aids Verito in fine-tuning impeller blade designs to strike a balance between power requirements and pumping capacity.

Key Outcomes of CFD-Studies

- In-depth Information of Flow pattern.
- Areas with the potential of low mixing intensity can be pinpointed and rectified.
- Availability of crucial process parameters like shear and energy dissipation.
- Evaluation of different design options.
- Shortened project timelines for complex process mixing systems.
- Mitigation of project risks



Path Lines (3)

Applications:

Oil & Gas | Pharmaceuticals | Power | Chemicals & Fertilizers | Paper Industries | Water, Waste Water, Sewage | Petrochemicals | Food & Beverages

Verito Engineering Private Limited

Advance Impeller Technology

VERITO ENGINEERING

Pitch Blade Turbine

- Designed for axial flow, ideal for a broad range of viscosity levels (up to 5,000 cP) in processes.
- Excellently suited for tasks involving blending, solid suspension where high shear is required.
- Available in three, four or six bladed impeller design, with customized pitch angle & Single / multistage impeller arrangement.

Flat Blade Turbine

- Designed for Radial flow & High Shear (laminar regime applications)
- Excellent for low-liquid-level solids suspension applications.
- Available in three, four or six bladed impeller design, with customized pitch angle.

Propeller

- Marine style axial flow design with energy efficient.
- Ideal for small batch size
- Excellent for mixing, homogenization, and suspension applications

Hydrofoil Impeller

- Widely recognized as the industry norm for axial flow impellers.
- Offers Exceptional mixing efficiency for fluids of low to moderate viscosity.
- Well-suited for tasks involving blending, heat transfer, and suspending solids.

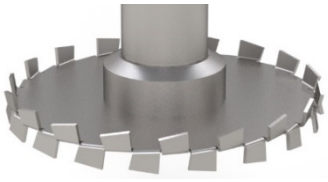
Wide Foil Impeller

- Designed for Axial flow with excellent performance
- Ideal for requirements of solid suspension, homogenization.
- Offers high efficiency and low Shear

Folding Impellers (Folding blade Turbine)

- Designed for axial flow, mixing scenarios where accessing the vessel is restricted, commonly observed with 1000 Liter or 2000 Liter IBC totes.
- Excellently suited for tasks involving blending.
- Capability are similar to the pitch blade turbine

High Shear Disc (Cowles Disc Impeller)



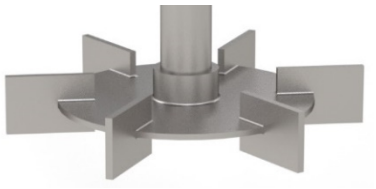
- Sawblade configuration contributes to mixing by producing high shear forces.
- Ideal for blending powders, dispersing fine solids, disintegrating agglomerations (clumps), and forming emulsions.

Applications:

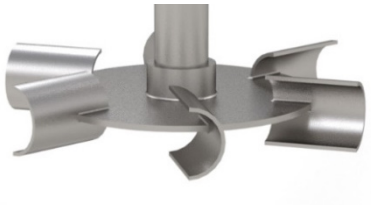
Verito Engineering Private Limited

Advance Impeller Technology

Rushton Turbine (Radial Disc Impeller)



- Traditional design produces a basic radial flow pattern.
- Ideal for requirements of Gas/liquid dispersion.
- A cost-effective design for low gas rates or concentrations of immiscible liquids



Concave Disc Turbine (Smith Impeller)

- Improved version of Rushton Turbine with improved efficiency.
- Designed to produces a strong radial flow pattern.
- Ideal for requirements of Gas/liquid dispersion.
- Gas dispersing capability over two times that of the Rushton Turbine.

Anchor Impeller

- Most economical impeller for achieving laminar flow Designed to produces a strong radial flow pattern.
- Ideal for requirements of blending and heat transfer of highly viscous liquid.
- Available with optional wall scrapers to Solve heat transfer fouling.

Helix Impeller

- Designed to produce Axial flow through helix shape.
- Ideal for requirements of blending a high viscosity, laminar flow.
- Highly effective in heat transfer.
- Capable of handling higher viscosities over 30,000 cP.
- Available with optional bottom standard anchor/sweeper.

Parabolic Impeller

- Designed for Axial flow with excellent performance through arrangement of parabolic shape.
- Ideal for requirements of High Viscosity Mixing & heat transfer.
- Capable of handling higher viscosities over 30,000 cP.
- Reduces the Mixing Time.
- Available with optional bottom standard anchor/sweeper.

Applications:

Verito Engineering Private Limited

Agitator / Mixer

Know more about mixing Technology

These mixer agitators are comes in several specifications as per the need of our customers. The offered mixer agitators are tested from our end in order to deliver a defect free range to customer's end. Our mixer agitators are developed with quality material under the direction of skilled professionals.

We ensure the highest quality & performance of our Agitators. At the same time, we have a very strong performance track record of supplying various types of agitators for various applications.

➢ Ask more to our Agitator Design Experts

- Tip Speed
- Pumping Capacity
- Detention Time
- ChemScale
- Velocity gradient
- Torque
- Specific Power
- Material of Construction

➢ Agitator Manufacturing Champions

- Accuracy of Machining
- Lathe Machine, CNC, VMC
- Qualified & Approved Welding Procedures

➢ Tests Conducted by the Verito Quality Specialties

Performance

- Run Trial
- Noise
- Vibration
- RPM
- Current

Dimensional

- Run Out
- DFT
- Dimensions
- Dynamic & Static Balancing

Chemical & Mechanical

- UT
- PMI
- DP
- PT

➢ Final Assembly

- We care about the Aesthetics of our Products

Applications:

Advance Impeller Technology

VERITO ENGINEERING

Impeller Selection Guide

Impeller	Application
Pitch Blade Turbine	Miscible/ Immiscible Fluid Blending, Dispersion, Solid Suspension
Flat Blade Turbine	Blending near Tank bottom, Low Liquid Level Solid suspension
Propeller	Small Batch Blending (Low Viscosity)
Hydrofoil Impeller	Miscible Fluid Blending, Solid Suspension, Heat Transfer
WideFoil Impeller	Solid Suspension, Three Phase Process
Folding Impellers	Blending (Recommended for Narrow Opening)
Cowles Disc	Liquid-Liquid Dispersion, Solid-Liquid Dispersion, Local Shear
Rushton Turbine	Gas Dispersion
Concave Disc Turbine	Gas Dispersion, Intermediate & High gas flow
Anchor Impeller	High Viscosity Blending, Heat Transfer in viscous media
Helix Impeller/ Parabolic Impeller	High Viscosity Mixing with rapid blend time, Heat Transfer in viscous media

Blending Intensity Level Chart for Blending (Chemscale)

Intensity (ChemScale)	Maximum S.G. Difference	Viscosity Ratio	Blending Description & Typical Applications
1-2	<0.2	<100	• Mild/minimum blending and fluid barely in motion. • Long blend time. • Storage tanks, holding tanks, feed tanks & non-critical blending operations.
3-5	<0.5	<500	• Moderate blending of miscible fluids. • surface rippling at low viscosities. • Blend tanks, make-up tanks, non-critical heat transfer & reaction tanks.
6-8	<0.8	<5,000	• Vigorous agitation for homogeneity of miscible fluids. • Surging surface, some vortexing rapid blend times & good heat transfer. • Tanks with pH feedback, critical reaction tanks & most heat transfer
9-10	<1.0	<10,000	• Violent agitation for homogeneity of miscible fluids. • Surface splashing and Vortexing, Shorter Blend Time. • Critical reaction tanks, critical heat transfer, high shear requirements.

Solid Suspension Intensity Chart

Intensity	Description
Solids Motion	Solids are allowed to settle on the vessel bottom, but remain in motion.
Solids Just Suspended	The particles that settle the fastest barely rise above the vessel bottom, while others rise higher. Fillets will appear in the corners of the vessel. When only bottom pump-out is available, or when time is not a factor, use for dissolving solids applications.
Off Bottom Suspension/ Complete Suspension	Suitable for the vast majority of storage applications. The bottom quadrant of the tank has moderate homogeneity of solids. Excellent for bottom draw-off applications. Suspension is continuous.
Uniform Suspension	Solids are distributed uniformly across the liquid volume.

Applications:

Oil & Gas | Pharmaceuticals | Power | Chemicals & Fertilizers | Paper Industries | Water, Waste Water, Sewage | Petrochemicals | Food & Beverages

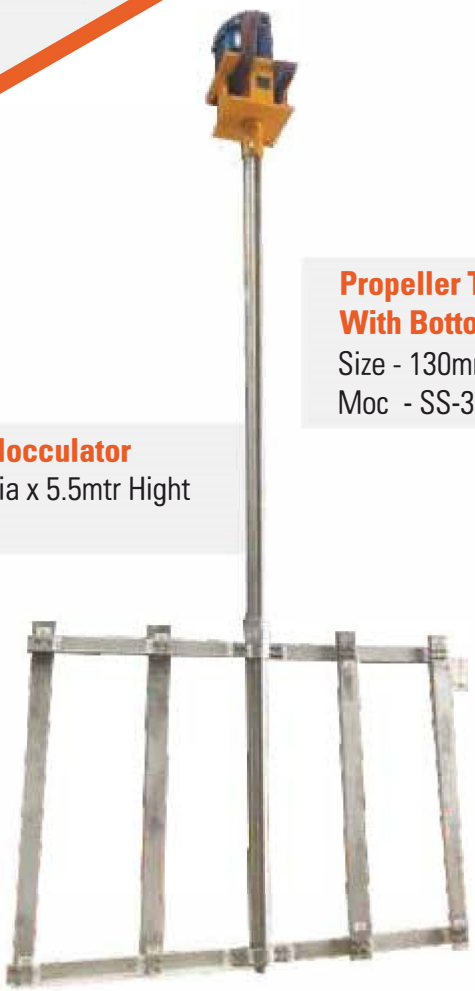
Verito Engineering Private Limited

Agitator / Mixer

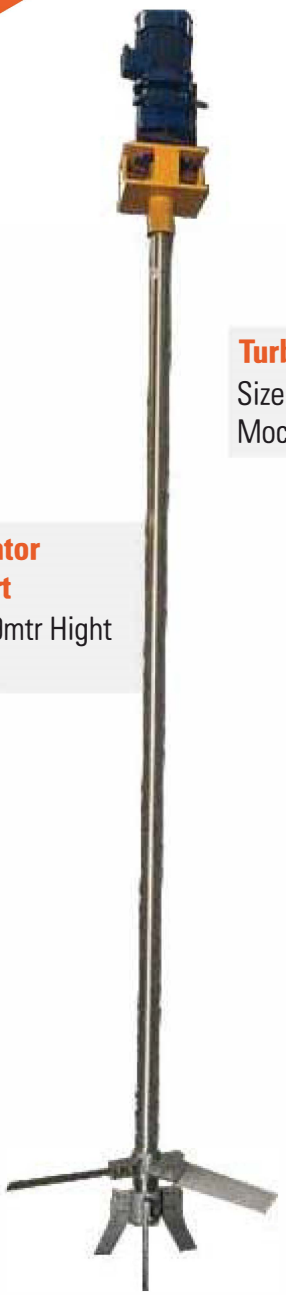
VERITO ENGINEERING

Types :

- Turbine
- Hydrofoil
- Propeller
- Paddle
- Flocculator
- Anchor
- Rusthon Turbine
- Trapecoidical
- Dispersion Turbine
- S Curve Blade Turbine
- ZETA Impeller
- Sigma Impeller
- Alpha Impeller



Paddle Type Flocculator
Size - 125mm Dia x 5.5mtr Hight
Moc - SS-316



Propeller Type Agitator With Bottom Support
Size - 130mm Dia x 5.9mtr Hight
Moc - SS-316

Turbine Type Agitator
Size - 150mm Dia x 7.3mtr Hight
Moc - MSRL

Applications:

- Oil & Gas
- Pharmaceuticals
- Power
- Chemicals & Fertilizers
- Paper Industries
- Water, Waste Water, Sewage
- Petrochemicals
- Food & Beverages

Verito Engineering Private Limited

Reactor Agitators

VERITO ENGINEERING

- The reactor agitators are the most powerful agitators compared to the others in Verito's product range.
- These Agitator are specially designed to serves the purpose of facilitating the chemical reaction, which is carried out with precise and meticulously calculated reaction times for which vigorous stirring is required.
- Since the reactors operates at high temperature and pressure for this reason, mechanical seal is often installed to maintain constant pressure or prevent the internal dangerous Liquid/gases from dispersing.

Key Technical Parameters

➢ Motor Power	-	1.5-100 kW
➢ Shaft Diameter	-	30-300 mm
➢ Operating Pressure	-	Vacuum – 200 bar
➢ Impeller Type	-	High Efficiency Impeller, Propeller, Hydrofoil, Alpha impeller
➢ Materials (Wetted Parts)	-	SS316, SS316L, CS, Nickel Base Alloy, Duplex & Super Duplex Steel, Titanium Alloy

Feature

- Robust designs of lantern support available.
- Available with different types of gearbox (Inline Helical, Planetary, Bevel)

Applications:

Oil & Gas | Pharmaceuticals | Power | Chemicals & Fertilizers | Paper Industries | Water, Waste Water, Sewage | Petrochemicals | Food & Beverages

Verito Engineering Private Limited

Heavy Duty Agitators

VERITO ENGINEERING

- Heavy Duty Agitators are designed for large volume Vessels which are reliable for most demanding heavy industrial applications, from pharmaceutical fermentation, hydrogenation, bio digesters, chemical reactors, resins, large-scale chemical processing to minerals processing and heavy sludge waste treatment.
- Radial and axial loads on the drive are completely absorbed by a separate double bearing section and the flexible coupling connecting the mixer shaft to the drive. These Heavy Duty Industrial mixer has a rigid torsion-free Bearing housing.
- This robust construction and the precision of its running characteristics guarantee the durability of the shaft.

Key Technical Parameters

➢ Motor Power	-	10-200 kW
➢ Shaft Diameter	-	60-300 mm
➢ Operating Pressure	-	0 – 50 bar
➢ Impeller Type	-	Turbine, Propeller, Hydrofoil
➢ Materials (Wetted Parts)	-	MS, EN-8, SS304, SS316, SS316L, Nickel Base Alloy, Duplex & Super Duplex Steel, (Comes with Various Lining RL, FRP, PP, PTFE)

Feature

- Robust torsion-free designs of lantern support available.
- Available with different types of gearbox (Inline Helical, Planetary, Bevel)

Applications:

Oil & Gas | Pharmaceuticals | Power | Chemicals & Fertilizers | Paper Industries | Water, Waste Water, Sewage | Petrochemicals | Food & Beverages

Verito Engineering Private Limited

Flocculators

- Flocculators provides gentle agitation by slow moving paddles. This action serves to break up the mass rotation of liquid and promote mixing.
- The specially designed flocculating paddles enhance flocculation of the feed solids. Low tip speeds create a gentle rotary mixing which promotes floc development. Increased particle contact will promote floc growth and aids faster settling.
- Low tip speeds provide gentle mixing and minimize shearing action on established floc. Flocculators of various sizes and material of construction are available as per the application.

Key Technical Parameters

➢ Motor Power	-	0.37-100 kW
➢ Shaft Diameter	-	25-200 mm
➢ Operating Pressure	-	Atmospheric
➢ Impeller Type	-	Paddle, Anchor, Rushton turbine
➢ Materials (Wetted Parts)	-	MS, EN-8, SS304, SS316, SS316L, Nickel Base Alloy, Duplex & Super Duplex Steel, (Comes with Various Lining RL, FRP, PP, PTFE)

Feature

- Robust torsion-free designs of lantern support available.
- Available with different types of gearbox (Inline Helical, Planetary, Bevel)

Applications:

Oil & Gas | Pharmaceuticals | Power | Chemicals & Fertilizers | Paper Industries | Water, Waste Water, Sewage | Petrochemicals | Food & Beverages

Verito Engineering Private Limited

Light Duty Agitator

VERITO ENGINEERING

- Light duty top entry agitators are the best fit for applications with small volume tank like Coagulation, WTP, ETP, yeast fermentation, starch storage, storage and blending of concentrated fruit juices, bitumen, paint production, sanitary or pharmaceutical applications and many more.
- This design of mixer which operates at speeds in range of 60-250 rpm is very suitable for mixing of different liquids, dissolving of solids in liquid, dispersion, Homogenous and emulsifying duties.

Key Technical Parameters

➢ Motor Power	-	0.37-100 kW
➢ Shaft Diameter	-	25-200 mm
➢ Operating Pressure	-	Atmospheric
➢ Impeller Type	-	Turbine, Propeller, Hydrofoil, Flat Blade Turbine, Sigma Impeller
➢ Materials (Wetted Parts)	-	MS, EN-8, SS304, SS316, SS316L, Duplex & Super Duplex Steel, (Comes with Various Lining RL, FRP, PP, PTFE)

Feature

- High Efficient Impellers.
- Available with different types of gearbox (Inline Helical, Planetary, Bevel)

Applications:

Oil & Gas | Pharmaceuticals | Power | Chemicals & Fertilizers | Paper Industries | Water, Waste Water, Sewage | Petrochemicals | Food & Beverages

Verito Engineering Private Limited

High Speed Agitators

- Verito's direct driven Agitator type is an innovatively designed top flange agitator for use in the food and pharmaceutical industries. It is a mixer without gearbox, so there is no oil/lubricants leakage which could contaminate your product.
- The mixer shaft is directly fitted directly into the drive, eliminating the need for an extra shaft coupling. The High-Speed Agitator are a strong and practically maintenance-free mixer which makes it a perfect solution for applications in the food and pharmaceutical industry. It is suitable for frequency converter-controlled operation.

Key Technical Parameters

➢ Motor Power	-	0.1-15 kW
➢ Shaft Diameter	-	30-300 mm
➢ Operating Pressure	-	Vacuum – 200 bar
➢ Impeller Type	-	High Efficiency Impeller, Propeller, Hydrofoil, Alpha impeller, Turbine, Cowles Disk
➢ Materials (Wetted Parts)	-	MS, EN8, SS316, SS316L, CS, Duplex & Super Duplex Steel

Feature

- Easy To install
- Maintenance Free Design

Applications:

Verito Engineering Private Limited

Heavy Duty Agitator
Slurry Application

Project: Black Mountain Mining, South Africa (Vedanta Zinc International Limited)

- Dive into the world of precision mixing with Verito's exceptional range of slurry agitators designed specifically for mining applications.
- Our Heavy-Duty Industrial Agitator is engineered for challenging task of suspending solids in liquids, preventing settling and ensuring smooth processes throughout various stages of mining.
- The Hydrofoil's streamlined profile and precision-engineered blades minimize drag and turbulence, optimizing fluid flow and enhancing mixing efficiency.

High Efficiency Hydrofoil Impeller

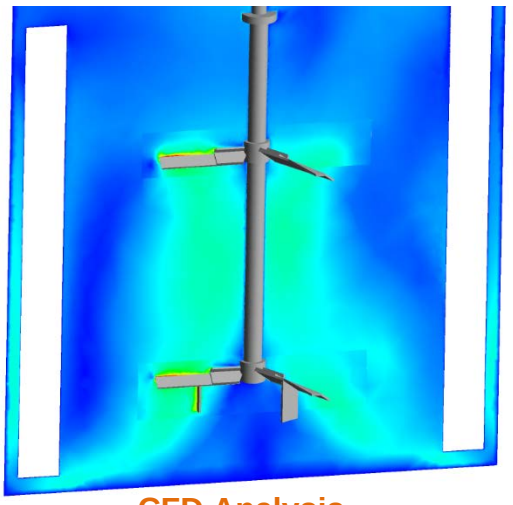
Heavy Duty Gearbox with Lantern Housing

Technical Specification:

Power Rating:	**100 HP**
Impeller Diameter:	**4 meter**
Shaft Diameter:	**12" (325 mm)**
Shaft Length:	**12 meter**
Lining:	**Rubber Lining 12mm thk.**
Gearbox:	**Heavy Duty Bevel Helical**
Bearing:	**Double Row Tapered Roller Bearings**
Robust Lantern Housing with Double Bearing	

Features:

- Engineered agitator of heavy-duty design.
- Performance was evaluated with a CFD analysis that validated the specifications.
- Smooth operation with very low vibrations.
- High Energy Efficient with accurate Hydraulic design.
- Quick, safe, and hassle-free installation, with easy maintenance and servicing.



CFD Analysis

Applications:

Oil & Gas | Pharmaceuticals | Power | Chemicals & Fertilizers | Paper Industries | Water, Waste Water, Sewage | Petrochemicals | Food & Beverages

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