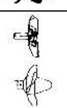
IMPELLER SELECTION GUIDE

Table 1 : Impeller and flow patterns

Impeller	Flow Pattern	Name and Description	Applications
		High Efficiency Impeller Narrow-blade	Blending, Turbulent heat transfer, Solid suspension, Upper impeller for gasdispersion, N_p = 0.27, N_q = 0.5 (turbulent)
		PBT Pitched-blade turbine	Blending, Dispersion, Solid suspension, Heat transfer, Surface motion, N_p = 1.25, N_q = 0.7 (turbulent)
		Straight-blade turbine	Local liquid motion for blending, Dispersion, keeping outlets clear from solids, N_p = 3.0
		Transition flow impeller Wide-blade, high-efficiency impeller	Blending, Transitional flow, Simultaneous gas dispersion and solid suspension (like mining), N_p and N_q vary with tip angle and number of blades
		ChemShear	Liquid-liquid dispersion, Solid-liquid dispersion, Local shear
		D-6 Flat-blade disc turbine (Rushton turbine)	Gas dispersion, low and intermediate gas flows, Liquid-liquid dispersion, N_p = 5.5, N_q = 0.75
		Gas dispersion turbine	Gas dispersion, intermediate and high gas flows
		Helical ribbon (Double flight shown)	Blending and heat transfer in viscous media (m > 50 Pa-s or N_{Re} < 100) -N_q = 350 / N_{Re} < 100
		Anchor	Heat transfer in viscous media N_p = 400 / N_{Re} < 100
		Gas dispersion turbine / High efficiency impeller	Gas dispersion and blending for tall reactors Fermentations (food products, pharmaceuticals)
		Gas dispersion turbine / High efficiency impeller / PBT	Combined gas-dispersion, blending and material drawdown (corn wet milling)
		Side-entering wide blade impeller (HR3-S or Mark II)	Oil storage, Paper pulp, Wasterwater circulation, Flue gas desulfurisation

SPECIAL APPLICATIONS

GMM Pfaudler can provide special multipurpose mixing systems for the Pharmaceuticals and API Industries conforming to cGMP requirement in stainless steel construction. We can supply agitators with Electropolished components.

Mixing system for highly viscous polymer application can be supplied for better heat transfer.

Optimum mixing system for fermentation application for better mass transfer.

FEATURES

GMM Pfaudler can supply complete mixing system including gearbox, motor, shaft sealing in material of constructions like Carbon Steel, Stainless Steel.

AFTER SALES SERVICE

GMM Pfaudler can offer customers a comprehensive line of spares and efficient after sales service with service engineers located near most chemical zones in India.

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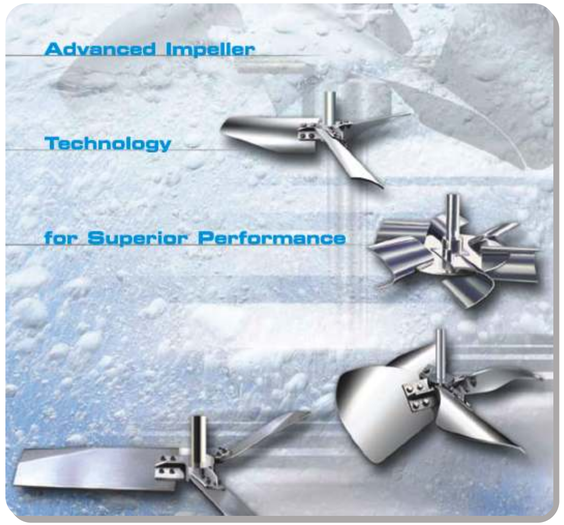
ECONOMIX MIXING SYSTEMS



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ADVANCED DESIGNS

Economix Mixing Systems is the leading supplier of mixing solutions and products to customers in India. Economix is a division of GMM Pfaudler Limited dedicated to the marketing, designing and manufacturing of specialized mixing systems for Stainless and Alloy Steel Reactors.

Our team of highly trained engineers will design an optimal mixing solution for your specific mixing requirement. Using a process design software to simulate the performance of your existing agitator systems, we can recommend a complete solution with specifically designed agitators which will reduce batch time and dramatically reduce power consumption to improve your mixing process and product quality.

We design and manufacture Mixing systems for various applications:

- Liquid-Liquid Blending
- Solid Suspension/Solid Dissolution
- Gas dispersion like Chlorination / Hydrogenation / Fermentation

The systems recommended by us, offer the following benefits:

- Reduction in Power Consumption without compromising the mixing requirement
- Improvement in mixing performance like Heat Transfer, Mass Transfer, Blending or Solid Suspension, Blend time.
- Small and compact system. Easy Maintenance

The agitators offered by us are guaranteed for the stated Mixing performance. If the specified performance is not achieved the agitator will be modified or replaced at our cost.

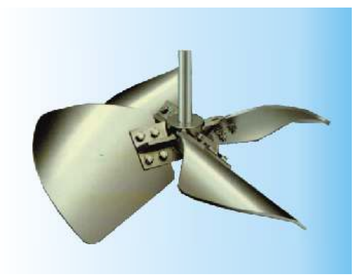
ADVANCED IMPELLER TECHNOLOGY

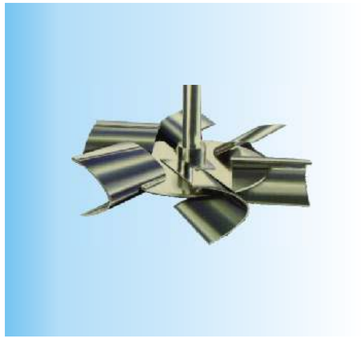
HIGH EFFICIENCY IMPELLER (TURBOFOIL)

- An established industry standard for axial flow impellers
- Extremely efficient: creates greater fluid motion with less energy
- Ideal for blending, heat transfer and solids suspension

TRANSITION FLOW TURBINE (TFT)

- Excellent performer in abrasive solids suspension, liquid-solid-gas and boiling or near-boiling applications
- High-solidity blade design translates into higher gas rates and viscosity values over other high efficiency designs





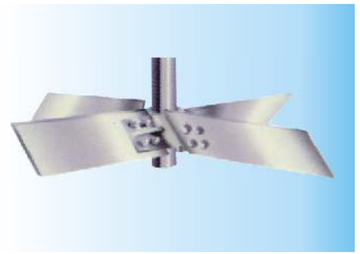
GAS DISPERSION TURBINE (GST)

Concave Disc

- Most advanced design
- Highest gas dispersing capability at nearly six times the D-6 (Rushton) turbine
- Reduced unloading
- Relatively insensitive to viscosity

PITCHED BLADE TURBINE (PBT)

- Axial flow design suitable for wide changes in process viscosity
- Good for blending and solids suspension where elevated shear is needed
- Able to handle higher gas rates over high efficiency designs

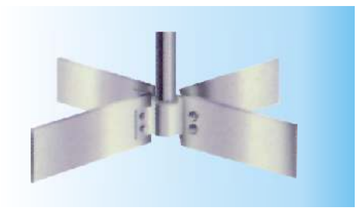


PROPELLER

- Marine style energy efficient design
- Ideal for small batches
- Handles higher viscosities than hydrofoil designs

STRAIGHT BLADE TURBINE (SBT)

- Close clearance design for operation near the tank bottom
- Excellent for low-liquid-level solids suspension applications
- Designed for use in laminar regime (Reynolds number < 50) applications

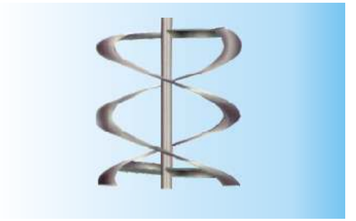


CHEMSHEAR

- Customize levels of shear to suit your process
- Proper fluid turnover minimizes the need for auxiliary pumping impellers
- Small particles possible: 2 microns achieved in processes such as micro-encapsulation
- Traditional dispersion blades can also be used in high shear applications

DOUBLE HELICAL RIBBON

- Proven the best high viscosity, laminar flow impeller
- Highly effective in heat transfer
- Efficiently incorporates surface liquids and solids
- For viscosities over 30,000 Mpa



ANCHOR

- Most economical laminar flow impeller available
- Horizontal flow well suited for low-liquid-level geometries
- Solve heat transfer fouling problems with optional wall scrapers

SCREW (AUGER)

- Ideal for shear sensitive, uniform blending applications (polymers)
- Excellent top-to-bottom turnover flow characteristics
- Use in mildly pseudoplastic applications with power law indexes as low as 0.5