FLXR ENGINEERING

MAGNETIC STIR BAR FOR COMPLEX LIQUIDS

Impeller-like Mixing without Overhead Mixer

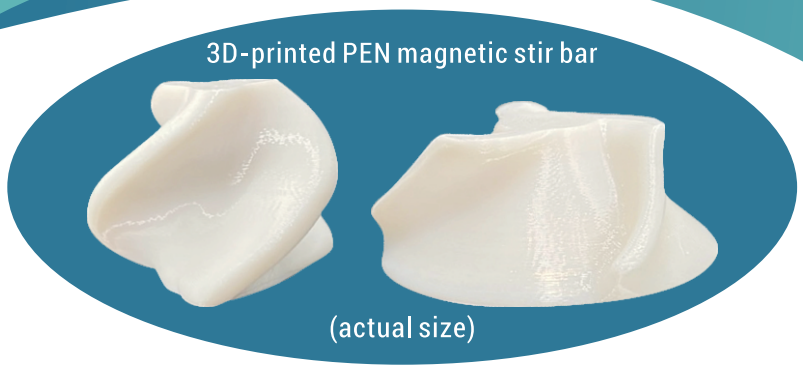
US Patented MiXR Technology

SRS-02:pigment in glycerol, 848 cP

Problem

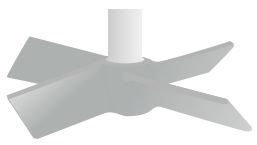
Solution

Raising chemical costs	›››	Scale-down with magnetic stirring
Stir bar decoupling	›››	4x stronger SmCo magnet
Poor efficiency handling Suspensions & emulsions	›››	CFD-optimized design
PTFE cannot undergo gamma radiation	›››	PEN supports gamma, steam, and EtO sterilization
PTFE waste harmful to environment	›››	PEN can be recycled with PET



High Turnover Design

Reference impeller :
Pitched - blade paddle



SRS

Flow movement	Hybrid axial/radial
Flow direction	Up/Down
Weight	6.20 ± 0.25 g
Viscosity range	1-1500 cP
RPM range	100-1100 RPM
Preferred vessel	

02
Ø 28 mm
H 19 mm

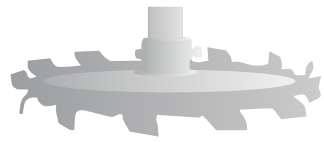
SPP

01
Ø 9 mm
H 25 mm

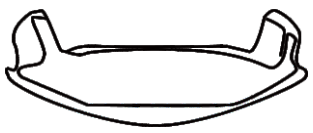
Flow movement	Hybrid axial/radial
Flow direction	Up/Down
Weight	1.30 ± 0.25 g
Viscosity range	1-1500 cP
RPM range	100-1100 RPM
Preferred vessel	

High Shear Design

Reference Impeller :
Cowl disk



SAN



01		**02**	
L	40 mm	L	55 mm
W	13 mm	W	13 mm
H	15 mm	H	15 mm
31		**32**	
L	39 mm	L	57 mm
W	13 mm	W	13 mm
H	9 mm	H	9 mm

Flow movement		Hybrid axial/radial
Flow direction		Down
Weight	• **01**	8.00 ± 0.25 g
	• **02**	8.10 ± 0.25 g
	• **31**	6.90 ± 0.25 g
	• **32**	12.40 ± 0.25 g
Viscosity range		1-200 cP
RPM range		200-1400 RPM
Preferred vessel		

SDA

01		**02**	
Ø	17 mm	Ø	40 mm
H	12 mm	H	16 mm

Flow movement		Hybrid axial/radial
Flow direction		Down
Weight	• **01**	4.90 ± 0.25 g
	• **02**	11.70 ± 0.25 g
Viscosity range		1-200 cP
RPM range		100-1100 RPM
Preferred vessel		

››› Applications include suspension of:
- Solid catalysts
- Powder in resins, paints, and creams
- Powdered flocculants

››› Utilized in emulsion and dispersion processes of:
- Emulsion and suspension polymerization
- Cosmetic creams, ceramic slurries, and polishing compounds
- Conductive inks and nanoparticle suspensions

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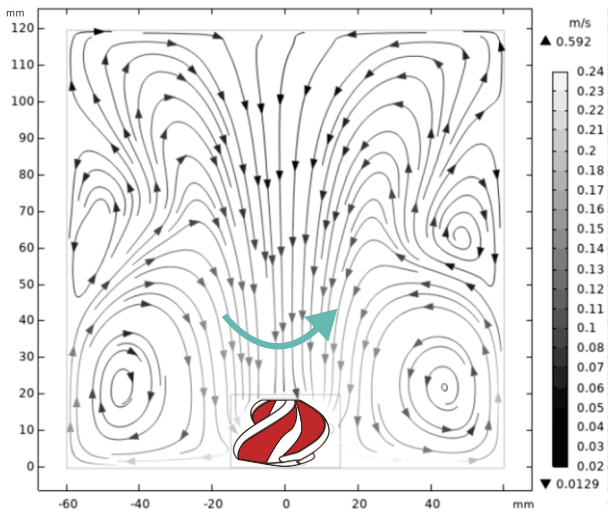
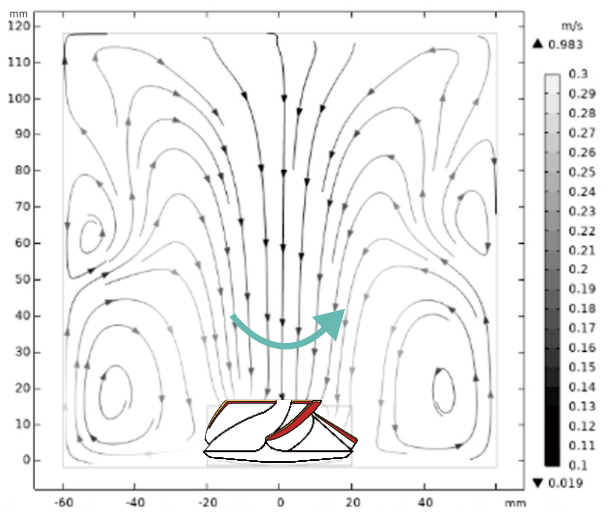
https://www.flxr.engineering

CFD Clip Plane

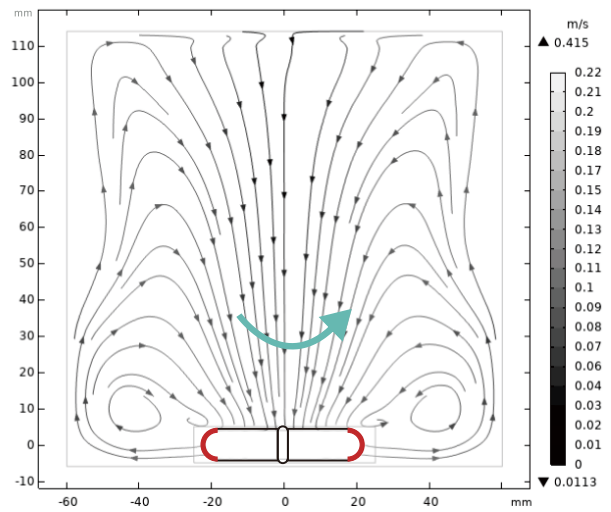
High Turnover Design (SRS)



High Shear Design (SDA)



Conventional Rod



CFD-optimized HIGH-TURNOVER :

- Higher vorticity and power number
- Fluid adaptive hybrid radial/axial flow
- Bi-directional design for diverse viscosity (1-1,400 cP)

CFD-optimized HIGH-SHEAR:

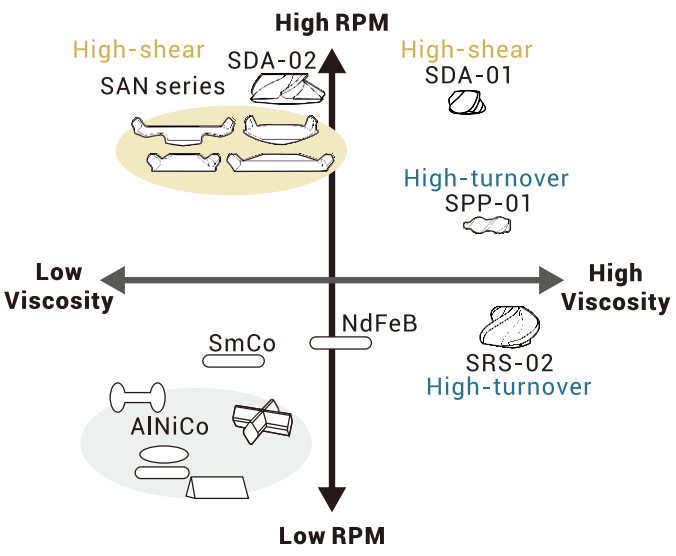
- Engineered to achieve higher shear rates
- Generates large velocity gradients between fluid layers
- Able to achieve droplet size of 40 to 60 μm

CFD of Conventional Rod:

- Radial only flow pattern
- Works well for low-viscosity fluids
- Emulates straight paddle impeller

Selection Matrix

Type of magnetic stir bars categorized by performance toward various speed and viscosities.



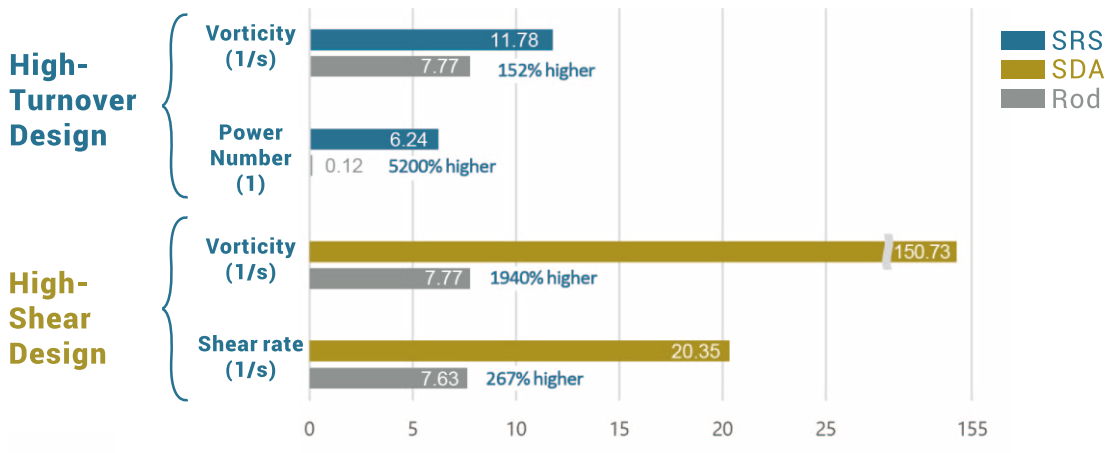
Our Passion:

We're a group of scientists and engineers who absolutely love science and 3D-printing.

Our Mission:

We believe that scientific progress and environmental responsibility can (and should) go hand-in-hand.

CFD Analysis Result



Chemical Resistance Chart

	PEN	PVDF	PTFE
Acetic acid (10%)	A	A	A
Acetic acid (40%)	A	A	A
Acetone	B	D	A
Ammonium chloride (25%)	A	A	A
Benzene	B	A	A
Chloroform	C	A	A
Cyclohexane	A	A	A
Cyclohexanol	A	A	A
Calcium chloride (10%)	A	A	A
Chromic acid (10%)	A	A	A
Citric acid	A	A	A
Diethyl ether	A	A	A
Dimethyl sulfoxide (DMSO)	C	C	A
Hydrobromic acid (47%)	A	A	A
Hydrochloric acid (10%)	A	A	A
Hydrochloric acid (37%)	A	A	A
Hydrofluoric acid (5%)	A	A	A
Hydrofluoric acid (50%)	D	B	A
Hydrogen peroxide (30%)	A	A	A
Isopropyl alcohol (IPA)	A	A	A
Methanol	A	A	A
Methyl ethyl ketone (MEK)	A	D	A
Nitric acid (10%)	A	A	A
Nitric acid (20%)	A	A	A
Nitric acid (67%)	D	B	A
Phosporic acid (10%)	A	A	A
Tetrahydrofuran (THF)	B	B	A
Toluene	A	A	A
Triethanolamine	C	A	A
Vinyl chloride (monomer)	A	A	A
Xylene	A	A	A

	PEN	PVDF	PTFE
Dimethyl formamide (DMF)	C	D	A
Ethanol	A	A	A
Ethyl acetate	A	D	A
Ethylene diamine	C	B	A
Ethylene glycol	A	A	A
Formaldehyde (40%)	A	A	A
Formic acid (10%)	A	A	A
Formic acid (30%)	C	B	A
Gasoline	A	A	A
Glycerol	A	A	A
Heptane	A	A	A
Hexane	A	A	A
Hydrobromic acid (10%)	A	A	A
Phosphoric acid (85%)	D	B	A
Potassium hydroxide (10%)	A	A	A
Potassium hydroxide (30%)	B	A	A
Sulfuric acid (10%)	A	A	A
Sulfuric acid (30%)	C	A	A
Sulfuric acid (>80%)	D	A	A
Sodium acetate (40%) sol.	A	A	A
Sodium chloride (sat.) (32%)	A	A	A
Sodium bicarbonate (sat.)	A	A	A
Sodium hydroxide (10%) sol.	A	A	A
Sodium hydroxide (30%) sol.	A	C	A
Sodium hypochlorite	A	A	A
Styrene (monomer)	A	A	A

Resistance at 23°C, immersed for 30 days
Ranking definition:
A: weight change <1%, tensile > 95%
B: weight change between 1~10%, tensile > 75%
C: weight change >10%, tensile <75%
D: dissolved or swelled

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