



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

Annexure V

Client List

- Ajanta Pharma
- Arch Pharmalabs Limited
- BEC Chemicals Private Limited
- Camlin Fine Sciences
- Cadila Pharmaceuticals
- Centaur Pharmaceuticals Pvt Ltd
- Cipla
- Dai Ichi Karkaria Limited
- Dorf Ketal
- Fresenius Kabi
- Galaxy Surfactants Ltd
- Gharda Chemicals
- Gujarat Themis Biosyn Ltd.
- Haldia Petrochemicals
- Harman Finochem
- Indo Amines Ltd.
- Innovassynth Technologies (I) Limited
- Jindal Cocoa
- Laxmi Organic Industries
- Lupin Limited
- Mallak Specialties Pvt Ltd
- Navin Fluorine International Ltd.
- Orchid Chemicals & Pharmaceuticals
- Piramal Enterprises
- Sandoz
- Sunshield Chemicals Ltd.
- Supriya Lifescience Ltd.
- Suven Pharmaceuticals Ltd
- Unichem Laboratories
- USV Private Limited
- Watson Pharma Private ltd
- Zydus Takeda Healthcare Private Limited



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

Past Track Record

M/s Lupin Limited:

Reactor Capacities: 0.1 kl to 4 kl

Shaft Diameters (mm): Ø40 to Ø130

Power (hp): 1 hp to 20 hp

Impellers: Pitched Blade Turbines, Hydrofoil Type, Full Anchor, Semi-Anchor, **Tri-Bladed Anchor, Helix-Anchor**, Counter Current Turbine

MoC: SS 316, SS 304

Special Mentions:

- **Helix-Anchor for 4 kl Reactor (20 hp, Shaft Diameter: Ø130 mm)**

Initially Anchor being used, for heavy paste type media.

Problems faced: Frequent Jamming (followed by Motor Tripping) & Solidifying / sticking of the media on the Shell walls.

Solution: Thorough study of the process and designed an impeller combining the Helix and Anchor which not only ensures mixing near the walls but also at the centre of the vessel without any dead zones.

Outcome: No Jamming, Batch time reduced by 20 hrs.

- **Tri-Bladed Anchor in combination with Counter Current Turbine for**

- **2 kl Reactor (10 hp, Shaft Diameter: Ø110 mm)**

- **4 kl Reactor (15 hp, Shaft Diameter: Ø125 mm)**

Initially Anchor being used, for distillation reaction where the final media is powder type.

Problems faced: Frequent Jamming (followed by Motor Tripping) & the media solidifying and forming lumps in the bottom part of the vessel.

Solution: Unique Tri-Bladed Anchor design was suggested, with a combination of Counter Current Turbine. Counter Current Turbine is useful in the initial stages when the process media is still in the liquid stage and as the volume of the media reduces with percentage of solids increasing, the Tri-Bladed Anchor is useful in keeping the mass in continuous movement thereby affecting maximum distillation of the solvent and high solid purity.

Outcome: No Jamming, Batch time reduced, Higher Batch Efficiency



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

M/s Zydus Takeda Healthcare Private Limited:

Reactor Capacities: 0.5 kl to 6 kl

Shaft Diameters (mm): Ø55 to Ø120

Power (hp): 1 hp to 10 hp

Impellers: Hydrofoil Type, Semi-Anchor, Counter Current Turbine

MoC: SS 316

Special Mentions:

- **Semi-Anchor with Counter Current Turbine 6 kl Reactor (10 hp, Shaft Diameter: Ø120 mm)**
Initially Semi-Anchor with Pitched Blade Turbine being used
Problems faced: Frequent Jamming (followed by Motor Tripping), had also caused the bending of the Shaft.
Solution: Suggested design changes in the Semi-Anchor being used, Counter Current Turbine used instead of PBT.
Outcome: No Jamming
- **Hydrofoil for 5 kl (Only Impellers Replaced)**
Initially Pitched Blade Turbine being used for induction of Freon gas.
Problems faced: Low Efficiency of Impeller as well as higher batch times
Solution: Replaced PBT with Axial Flow – Hydrofoil Type impellers for the same motor-gearbox combination.
Outcome: Higher gas induction in lower time periods.



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

M/s Piramal Limited:

Reactor Capacities (kl): 3 kl, 16 kl

Shaft Diameters (mm): Ø110, Ø120

Power (hp): 15 hp, 20 hp

Impellers: **High efficiency Gas disperser with a Self-aspirating impeller**, Pitched Blade Turbines

MoC: SS 316

Special Mentions:

- **Hydrogenator: 3 kl Reactor**
(15 hp, Solid Shaft Diameter: Ø110 mm with Bottom Hollow Shaft)
Problems faced: Low mass transfer, lower gas induction at low feed rates
Solution: Hollow shaft design with new generation higher efficiency gas disperser in combination with a self aspirating impeller to make sure complete conversion of the gas.
Outcome: Batch time reduced by more than 50% with higher gas induction at higher feed rates.

M/s Mallak Specialities Pvt. Ltd.:

Reactor Capacities: 3.5 kl to 70 kl

Shaft Diameters (mm): Ø70 to Ø160

Power (hp): 5 hp to 40 hp

Impellers: Hydrofoil Type, Pitched Blade Turbine, Counter Current Turbine

MoC: SS 316, EN8 (Rubber Lined)

Special Mentions:

- **4-Stage Counter Current Turbine for 70 kl Reactor (40 hp, Shaft Diameter: Ø160 mm)**
 - Bottom Shaft, 6 mtr long, Single Piece
 - Counter Current Impellers – Welded Type
 - Running Trial carried out at Works before Rubber Lining
- **Impeller Replacement of 70 kl Reactor**
 - Removal of Old Rubber lining, Cutting of existing impellers
 - New Hydrofoil type Impellers – Welded Type
 - Rubber Lining



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

M/s Cipla Limited:

Reactor Capacities: 2 kl to 3 kl

Shaft Diameters (mm): Ø80 to Ø120

Power (hp): 7.5 hp to 12.5 hp

Impellers: Semi-Anchor, Counter Current Turbine, Tri-Bladed Anchor

MoC: SS 316

Special Mentions:

- **Tri-Bladed Anchor in combination with Counter Current Turbine for 3 kl Reactor (12.5 hp, Shaft Diameter: Ø120 mm)**
Outcome: Successful in meeting requirements
- **Semi-Anchor with Counter Current Turbine**
Initially, Tickler type Impeller + PBT being used
Problems faced: Low Efficiency of Impeller as well as higher batch times
Solution: Replaced with Semi-Anchor with Counter Current Turbine without any changes to Shaft / Motor-GB combination. n.
Outcome: Reaction efficiency increased

M/s Jindal Drugs:

Reactor Capacities: 5 kl Reactor with **Co-Axial Agitators**

Shaft Diameters (mm): Ø85 (Solid Shaft), Ø120 / Ø90 (Hollow Shaft)

Power (hp): 10 hp & 15 hp

Impellers: Pitched Blade Turbine (Solid Shaft) with Full Anchor (Hollow Shaft)

MoC: EN24

Special Mentions:

Co-Axial Agitator: Twin Shafts with PBT rotating in clockwise and Full Anchor rotating anticlockwise in the same vessel

5 kl Reactor: 10 hp & 15 hp, Shaft Diameter: Ø85 (Solid Shaft), Ø120 / Ø90 (Hollow Shaft)

Instead of using a single very low efficiency gearbox customized for Co-Axial Agitators, a combination of standard available higher efficiency Heli-Bevel Gearbox along with Inline Helical Gearbox used.



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e@gmail.com, consultshreeji@outlook.com

M/s Supriya Lifesciences Limited:

Reactor Capacities: 3 kl to 8 kl

Shaft Diameters (mm): Ø100 to Ø130

Power (hp): 12.5 hp to 25 hp

Impellers: Hydrofoil, Counter Current Turbine, Tri-Bladed Anchor, High efficiency Gas disperser with a Self-aspirating impeller

MoC: SS 316

Special Mentions:

- **Tri-Bladed Anchor in combination with Counter Current Turbine for 8 kl Reactor (20 hp, Shaft Diameter: Ø120 mm)**
Outcome: Successful in meeting requirements
- **Hydrogenator: 4 kl & 5 kl Reactors (15 hp & 25 hp, Solid Shaft for 4 kl & Solid / Hollow Shaft for 5 kl)**
Outcome: Batch time reduced with higher gas induction at higher feed rates.
Reactor Vessel (5 kl): (Design: 12 kg/cm² (g)) also fabricated by us.

M/s Unichem Limited:

Reactor Capacities: 0.5 kl to 2 kl

Shaft Diameters (mm): Ø70 to Ø90

Power (hp): 3 hp to 5 hp

Impellers: Propeller, Full Anchor

MoC: SS 316

M/s Belladona Plasters through M/s Kerone:

Reactor Capacities: 3 kl, 9 kl

Shaft Diameters (mm): Ø110, Ø180

Power (hp): 10 hp, 40 hp

Impellers: Pitched Blade Turbine, Full Anchor

MoC: SS 316



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

Other Special Mentions:

- **Tri-Bladed Anchor** for M/s Navin Fluorine Ltd. – 500 ltr Reactor
- 10 kl Reactors with **Counter Current Turbine, Hydrofoil Impellers** to M/s Suven Life Sciences Ltd.
- 7 kl Reactor with **Semi Anchor with Counter Current Turbine** to M/s Harman Finochem Ltd.
- Neutralisation Tank (Partitioned Type – **SA 516 Gr. 70 + Rubber Lined**) with **2 sets of Agitators (PBT Type Impellers)** for M/s Haldia Petrochemicals
- **5 kl Reactor with Screw Type Impeller inside Draft Tube (525 rpm)** to M/s Armaco Consultants Pvt. Ltd. – **Exported to Lagos, MoC: IS 2062**

Note:

- In all the Reactors mentioned above, in cases where the Agitator is to be installed in an existing Reactor Vessel at site, we have carried out site installation which sometimes also involves hot working (inside plant, if Agitator Pad is to be replaced).
- In such cases, our standard procedure is to procure vessel entry and take complete internal dimensions of the existing vessel irrespective of the drawings available before starting of work / drawing preparation. This is unavoidable in cases where the impellers recommended have close tolerances w.r.t. to Shell ID as well as gap between Bottom Impeller and Bottom Dish.
- We have carried out installations of Agitators all over, from Jammu to Tamilnadu.

Bought Out Items for Agitators:

- **Motor:** M/s Crompton, procured from a very reputed dealer in Ankaleshwar
- **Gearbox:** We are authorized dealers of M/s Bonfiglioli make gearboxes. While any other brand GB is procured from their respected dealers / direct company buy.
- **Mechanical Seals:** M/s Flowserve, M/s EagleBurgmann, M/s Hi-Fab, M/s Rolon Seals



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

Fabricated Equipments:

M/s Galaxy Surfactants Limited:

Reactor / Vessel / Tank Capacities: 0.1 kl to 25 kl (Works), **200 kl (On Site: Taloja)**

MoC: SS 316, SS 304, SA 516 Gr. 70, IS 2062

Special Mentions:

- **Sulphur Melter:** Rectangular Tank (MoC: IS 2062) with Multiple Partitions, with each Partition having Rectangular Coils made out of SA 106 Gr. B Pipe.
Steam passed through Coil melts the Sulphur added inside the tank through a Hopper on the Cover of one of the Partitions.
25NB Sch 40 Pipe Coils: Bending carried out in house.
The Tank insulated with LRB on all sides except Top Cover.
- **Electrostatic Precipitator (ESP):** Cylindrical Tank, Conical Top & Bottom, MoC: IS 2062, Size: Ø2100 ID x 7000 mm long Shell. The tank is to be fabricated with less than 1-2 mm distortion allowed all along the Shell Height on the inside, since there is a close tolerance Coil Bundle passing through it. The Coil Bundle is imported and assembled in to the tank at site.
- **15 kl Reactor Vessel:** MoC: SS 316 / SS 304, 16 mm / 18 mm thk.
- **200 kl Flat Bottom Conical Roof Tank:** Fabricated at site (Taloja)

We have exported a lot of equipments to M/s Galaxy Chemicals - Egypt including ESP, Sulphur Furnace (Cylindrical, Dished End on Skirt Support, ~20kl), 15 kl Reactor Vessel.

M/s Mallak Specialities Limited:

Reactor / Vessel / Tank Capacities: 0.01 kl to 15 kl

Heat Exchangers: up to 30 m² (**Pressure Ratings: up to 60 bar**)

MoC: SS 316, SS 304, IS 2062

Special Mentions:

- **16 kl RVD (Qty: 2 nos):** Half Coil Limpet Replacement of at site (Mahad).
~300 mtrs of Limpet Coil on each RVD.
RVD Weight: ~30+ tons
Job involves removal of existing limpet. Fitting and welding of new limpet.
Special Rollers fabricated in house to enable the RVD to rotate for removal, fitting & welding of coil.
Both equipments are being worked on simultaneously.
The site work is underway, Estimated date of Completion is 2021 May end.



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

Heat Exchangers:

Tube Area: 0.5 m² to 100 m²

MoC: SS 316, SS 304, SA 336 / SA 387 with T22 grade tubes

Tube Type: Bare Tubes, High Fin Tubes, Low Fin Tubes

Tube Sizes: ½” to 1” OD (12g to 16g)

M/s RCF Limited (Thal, Alibag):

Special Mentions:

- **Re-tubing of ~100 m² HE:** Involves removal of existing tubes and inserting new ones.

MoC:

- Tube: SA 213 T22
- Tubesheet: SA 336 F22 Cl. 1
- Shell: SA 387 F22 Cl. 2

Weight: ~7 tons

Hydro test Pressure: 42 kg/cm² (g)

We have till date successfully completed the work of 3 sets of Heat exchangers.

Job on one of the Heat Exchangers also involved replacing one of Tubesheets and also replacing the Baffles & Tie Rods.

It has to be specially mentioned that, during the actual operations the HE is subjected to conditions wherein the tubes become harder & brittle and therefore crack.

This also makes their removal most difficult as compared to removing a stainless steel tube. The tubes tend to break on application of force while removal, making the job critical and complicated.

These jobs have been completed under **3rd Party Inspection of M/s TUV SUD.**

- **Tube-Tubesheet Welding Contract (On-Site – Thal, Alibag):**

MoC: SS 304L (Tube / Tubesheet)

Tube Size: ¾” OD

Tube Qty: 3684 Nos

Successful completion of the contract, involved only welding of Tube-Tubesheet joints.

Total Joints: 7300+, 2 Welding runs each, Pitch less than the standard practice of 1.25 times Tube OD, making the welding complicated.

Completion Time: <6 weeks

We would like to proudly mention that we have been a preferred vendor for jobs with critical welding work involved, especially Tube-Tubesheet joints.



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

M/s Mallak Specialities Limited:

Special Mentions:

- Designed and Fabricated HE, Explosion Proof: 60 bar

M/s Zydus Takeda Healthcare Private Limited:

Special Mentions:

- **Low Fin tubes:** Corrugation Depth and Pitch as per Client requirements



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

Heat Exchangers for Specific Applications

Vacuum Traps:

Vacuum Traps have been especially developed for solvent savings.

Usage of Vacuum Pumps for maintaining Reactors under vacuum is most prevalent in all chemical companies. Conventional vacuum traps are used before vacuum pumps. These conventional traps are inefficient, so lot of energy is wasted and similarly recoverable solvents are drained out, thereby contaminating the pump oil and the system.

Vacuum Traps manufactured by us can be mounted outside the plant. Each Vacuum system will require:

- 1 nos Vacuum Trap (Sample sketch attached)
- Utility line (Chilled Water / Brine), Sizing: As per Client Requirements

Payback of this design of Vacuum Trap is less than 1 year.

Refer attached figure.

The system is connected to Vacuum Pump through the Vacuum Trap. The 'U' tube bundle consists of externally finned tubes with a Pot below the bundle to collect the recovered solvents. The Tube Bundle Area & Pot capacities can be customized to customer specifications.

Most Preferred Size being: 2.5 m² (Bare Tube Area) with a 100 ltr Partitioned Pot.

MoC: SS 316 / SS 304

Pot: With / Without Partition. Pot can also be provided with jacket on request.

Level Indicators: For solvent level indication

Partition plate between the 'U' tubes, provides direction to the Vacuum Flow, thereby providing maximum tube & fin contact area for the dissolved vapours to condense. Solvent is collected in the Pot or in the upper portion of the pot if the same is partitioned.

Advantage of providing a Partitioned Pot: The solvent recovered in the top partition can be transferred to the lower partition (keeping the bottom drain valve closed). Post transfer, now keeping the partition valve closed, the solvent could be drained from the bottom partition either by gravity or by applying N₂ (Nozzle provided). This transfer procedure can now work, even if the vacuum system under use.



Shreeji Engineers & Consultants

Office: C/19, Jai Santoshi Maa CHS, L. T. Road, Borivali (West), Mumbai - 400 092

Works: J-54, Additional MIDC, Kudavali, Taluka – Murbad, District Thane - 421401

Tele: +91 9869422084 / 022 - 28413181

Email: shreeji.e.c@gmail.com, consultshreeji@outlook.com

Example:

- Toluene: Using a 100 ltr Pot, if ~86 kg of Toluene is recovered in 10 batches.
At a price Rs. 60/kg, the recovery would be ~Rs. 5, 000/-.
For 300 batches, the savings would be greater than Rs. 1, 50, 000/-
While the equipment, would be available for lifetime, thus ensuring quick payback and also reducing Vacuum Pump maintenance.

Some of the Clients using the above design Vacuum Traps:

- M/s Lupin Limited (Tarapur / Ankaleshwar / Mandideep)
- M/s Galaxy Surfactants Ltd
- M/s Cadila Healthcare Ltd.
- M/s Harman Finchem Limited

Over Qty: 500 nos sold in various customizable sizes.