



Est. 1976

Manufacturer & Supplier of
REFINED SUGAR PLANTS
SULPHUR-FREE SUGAR PLANTS



Shrijee Refined Sugar Plants

Shrijee was established in 1976 at Mumbai (India) as a Sugar Machinery manufacturer and since then through continuous research and innovation Shrijee today has successful sugar projects in several Indian states and in more than 40 countries world-wide. Shrijee has been at the forefront of meeting the manufacturing requirement for Sugar Refineries. Shrijee has produced and supplied equipment starting from melt clarification to refined sugar bagging and has today emerged as a turn-key supplier of refined sugar plants ranging in capacity from 100 tons/day to 2500 tons/day.

TURNKEY SUGAR REFINERY PROJECTS EXECUTED BY SHRIJEE:

- Nagarjuna International (Vietnam)
- Kamadhenu Ventures (Cambodia)
- Thiru Arooran Sugars (India)
- Bannari Amman Sugars (India)
- Dharani Sugars (India)
- SNJ Sugars (India)
- Sora Sucre (Algeria)

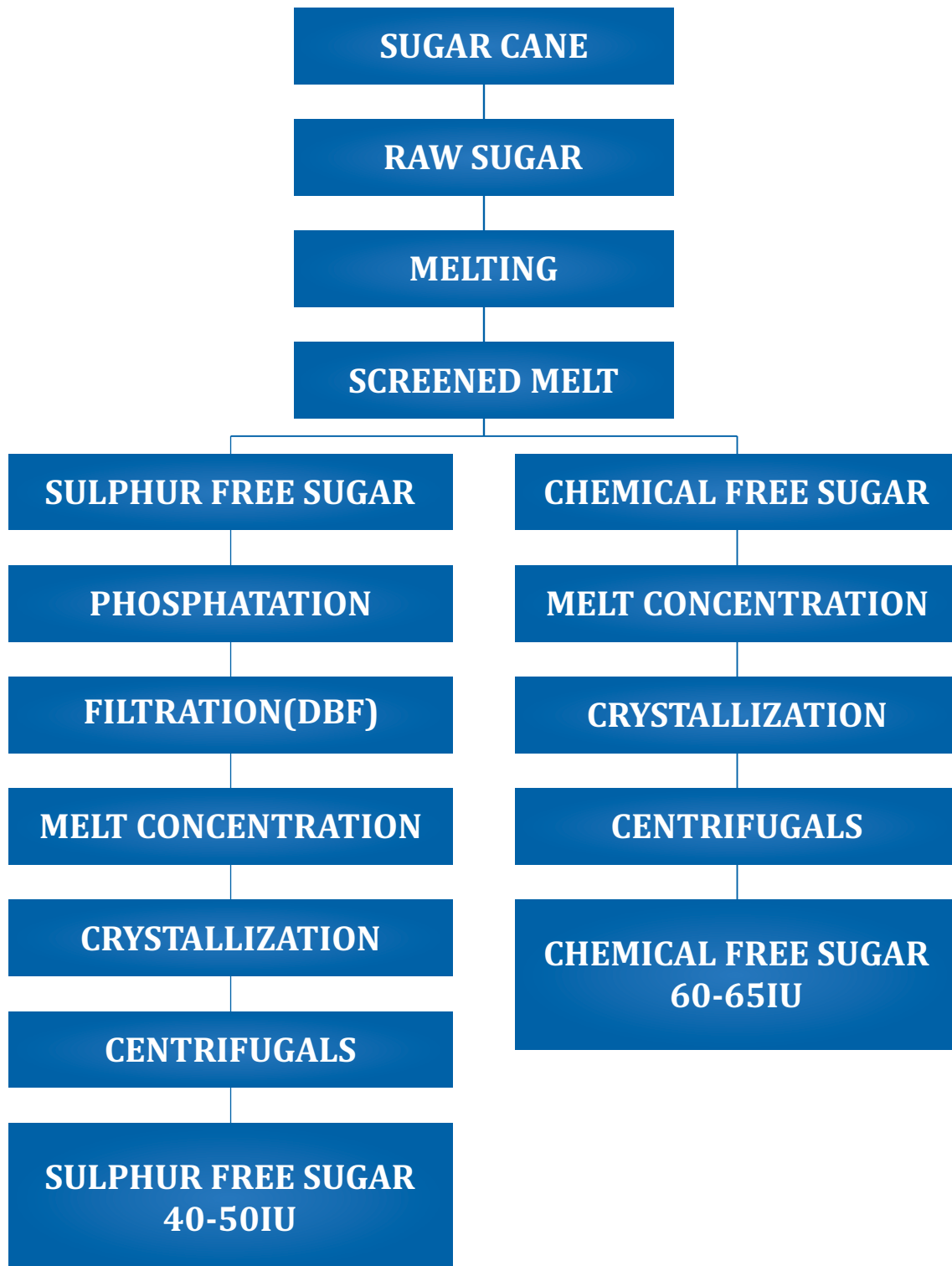
IMPORTANCE OF REFINED SUGAR:

- Demand for food products that contain minimum chemicals (as per FDA norms) is increasing worldwide.
- Present method of sugar manufacture involves double sulphitation and sugar produced by this process contains 30-50ppm of sulphur whereas refined sugar is sulphur-free white sugar.
- Consumer is health conscious and does not want sugar with sulphur dioxide.
- Refined sugar is ultra-pure white sugar and maintains quality for long storage time.
- Manufactured as per European Union standard.
- The sugar produced by the phosphatation technique is free from sulphur, low in ash and has a better keeping quality.

ADVANTAGES OF SULPHUR FREE /CHEMICAL FREE SUGAR:

- 100% saving in sulphur cost and 35% saving in lime cost.
- Increase in sugar recovery.
- Scale reduction in heat exchangers and evaporators. Hence saving of investment on de-scaling.
- Soft scale and easily removable.
- Reduction of corrosion of equipments and pipe lines. Hence reduction of maintenance cost.
- No PH drop of injection water, hence no addition of lime to injection water and no sludge generation in spray ponds/cooling towers.
- Superior quality of final sugar with negligible Sulphur content.
- Better keeping quality.
- Steam consumption shall be less than 35% on cane.
- Power consumption shall be less than 12kWh/Ton cane.
- Good quality of final molasses and high yielding at distilleries.

Sulphur Free / Chemical Free Sugar Process



FEATURES OF SHRIJEE REFINED SUGAR PLANTS

- Sugar quality upto 25 ICUMSA
- Material of construction can be carbon steel, S.S 409 or S.S 304
- Polarization – 99.7%
- S% - 0.009
- Moisture- 0.03% – 0.04%

PROCESS FOR REFINED SUGAR PRODUCTION

For producing EU grade refined sugar with 25 ICUMSA color value, de-colorization process to be adopted as follows:

1. Melt clarification with phosphotation followed by Ion Exchange de-colorization.
2. Melt clarification with phosphotation followed by Power Activated Carbon treatment (PAC) and filtration.
3. Melt clarification with phosphotation followed by de-colorization with Granulated Activated Carbon (GAC).
4. Carbonation followed by filtration and Ion Exchange de-colorization.

RAW SUGAR MELTING & SCREENING

The raw sugar from silo shall be weighed through the Duplex weighing machine before going for melting in continuous horizontal melter with multiple compartments.

MELT CLARIFICATION

Melt Clarification System with Phosphotation is where approximately 40% of the colorants are removed. The Phosphotation involves addition of lime sucrate and phosphoric acid to the melt liquor which results in formation of a calcium phosphate precipitate. The treated melt shall be sent to the melt clarifier through the Dissolved Air Floatation system (DAF) in which micro air bubbles shall occlude in the calcium phosphate and the flocks become lighter density. The clarified melt will be sent to Deep Bed Filter (DBF).



MELT CLARIFICATION

SCUM DE-SWEETENING

This is optional for back-end refinery, but is required for stand-alone refinery. In case of standalone refinery, the scum from scum tank at melt clarification system is sent to the 1st stage scum mixing tank of 3rd stage scum de-sweetening system, where it is mixed with sweet water from 2nd stage scum clarifier. Lime sucrate will also be added to control the pH of the sweet water and scum during the process.

MELT FILTRATION (MULTI BED FILTRATION/DEEP BED FILTER)

The clarified liquor from the melt clarification system contains suspended solids which will plug the interstitial spaces and blind the pores of de-colorization resin. Deep bed multimedia filters are used to produce the filtered liquor which will flow through the ion exchange columns without any pressure build up.

The static bed filter of deep bed filtration system removes suspended solids from clarified melt by passing through a carefully selected filter media. As the melt passes through the media the suspended solids get trapped. Periodically the trapped solids are flushed out to clean the filter media.



MELT DE-COLORIZATION ION EXCHANGE PROCESS

To produce only sulphur free sugar with 45-50 ICUMSA colour (with back end refinery) Ion Exchange Resin (IER) is not required. Whereas, to produce refined sugar equivalent to EEC1 & EEC2 grade sugar IER is required.

Filtered melt from the melt filtration system (DBF) are fed to the Ion exchange columns for further colour removal of up to 65% - 70% of input colour to the IER-

- The ion exchange process in the refinery is a continuous process whereby sugar liquor is passed through a resin bed & colour is trapped within the bed. However bed of resin becomes saturated with colour after some time. At this time the current bed in production is terminated & a new bed is brought on line.
- The lead resin bed always takes the major colour impact. The trail bed always takes a lighter load.
- The beds are then washed with water to remove any traces of the caustic brine.
- The bed is sweetened on again in preparation for the next production run.



MELT CLARIFICATION WITH PHOSPHOTATION FOLLOWED BY POWDER ACTIVATED CARBON TREATMENT (PAC) AND FILTRATION

As mentioned in the melt clarification with phosphotation followed by IER, the process steps from melt clarification to melt filtration with DBF are common. After that the filtered melt shall be treated with powder activated carbon and is sent to the filters for further filtration and de-colorization. After getting the clear melt from the filter the remaining process from melt concentration onwards is common as explained in IER process. This process can also be done with granulated activated carbon.



CANDLE FILTER USED FOR POWDER ACTIVATED CARBON PROCESS

CANDLE FILTERS APPLICATION:

Candle filters are standard equipment in the sugar industry for various material filtrations. These filters are being used successfully in cane and beet sugar factories as well as in sugar refineries. This low pressure filter system is particularly suitable for filtration of various materials such as:

- For filtration of carbonated juice after the first and the second carbonation.
- As safety filters for thin juice.
- For fine filtration of syrups with the addition of filter aids.
- In refineries:
 - a) For filtration of carbonated melt.
 - b) For filtration of melt with powder activated carbon for decolourization.

ADVANTAGES OF CANDLE FILTERS:

- Programmable logical control system ensures fully automated operation.
- No additional energy required for cleaning.
- Durable equipment, well-built filter elements.
- High specific throughput rate.
- Faster exchange of complete candle/filter cloth.
- Flexibility to run at lower capacity as per material availability.

CARBONATION FOLLOWED BY FILTRATION AND ION EXCHANGE DE-COLORIZATION

- In this process the raw melt is treated with milk of lime and sent to the carbonators in which carbon dioxide from boiler flue gas is injected. The CO₂ level in the flue gas from these boilers will be 10-15%.
- This process is suitable for the standalone refineries associated with gas fired boilers or Gas turbines followed by HRSG (Heat Recovery and Steam Generator). Quality of flue gas from these boilers is good and purification process is not required. It can be directly injected to the carbonators.
- The carbonated melt is fed to the pressure filters such as rotary leaf filters or cricket filters for filtration.
- The filtered melt is sent to the IER for further de-colourization as explained earlier.

CRYSTALLIZATION

Concentrated liquor is boiled in R1 pan and massecuite produced is cured in fully automatic PLC based batch-type centrifugals. The super heated wash water is used for quality washing & lower sugar dissolution to give bright & dried sugar. R1 run-off is sent to R2 boiling to recover its sugar. Similarly for R3 boiling as well.

The sugar from R1, R2, R3 massecuite curing is sent for further drying. The dried sugar is sent to respective sugar silos. The R3 run-off is sent to raw house pan floor for further boiling. In recovery house three massecuite boiling is adopted and the final molasses is sent out for storage (Recovery house is required for standalone refinery).



BATCH PANS WITH MECHANICAL CIRCULATOR

REFINED SUGAR DRYING & BAGGING

The refined sugar from the batch centrifugals is sent to rotary sugar drier or FBD to reduce the moisture level by less than 0.04%. The dried sugar is fed to the sugar sizer to remove lumps and powder before going to silo. The sugar is automatically packed in 50 kg net bags using high speed stitching machines.



FLUIDIZED BED SUGAR DRIER



ROTARY SUGAR DRIER



SUGAR WEIGHING, STITCHING AND CONVEYING

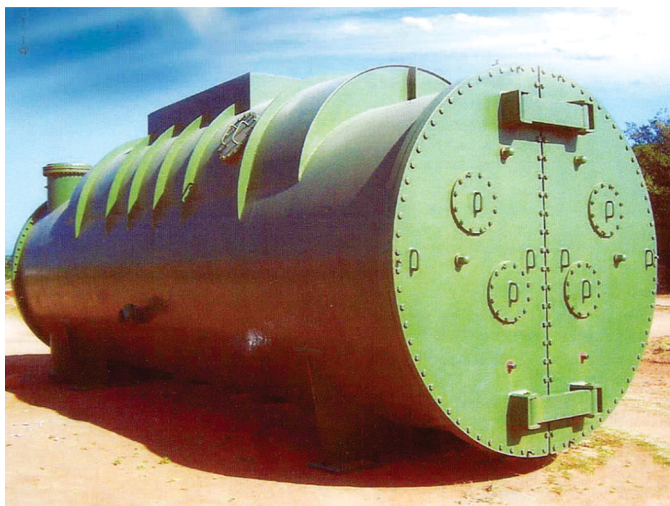
STEAM TRANSFORMER



Steam transformer is tubular rising film/falling film evaporator designed for vapour generation from the hot condensate available from the refinery pans and surface condensers. The steam transformer can generate required vapours for the entire standalone refinery house. Exhaust from the turbine shall be used in the steam transformer calandria and hot water will be used inside the tubes to generate vapour. The purpose of this equipment is to supply the pure exhaust condensate to boiler without sugar contamination, to reduce the high pressure steam consumption in the refinery process house which will avoid the high colour development during the refining process.

Advantages:

- Generates more vapour required for refinery house
- Isolates the exhaust cycle from the refinery house
- Avoids the contamination of exhaust condensate
- Steam saving



SURFACE CONDENSER

Our special design of shell and tubes type Surface Condensers are engineered and designed for condensing of exhaust steam from back pressure turbine as well as for condensing turbine. Not only that, our surface condensers can be used in the standalone sugar refineries for condensing the vapour from the melt concentrators & pans and to create the vacuum in those equipments. These condensers are multi-pass and high velocity shell and tubular heat exchangers. The advantage of these condensers are, it can avoid the mixing of cooling water with the pure condensate water. Surface condensers can reduce the DM water consumption in the standalone refinery. These condensers are being utilized in various industries such as, standalone sugar refineries, co generation plants etc.



Surface Condenser Package and Accessories:

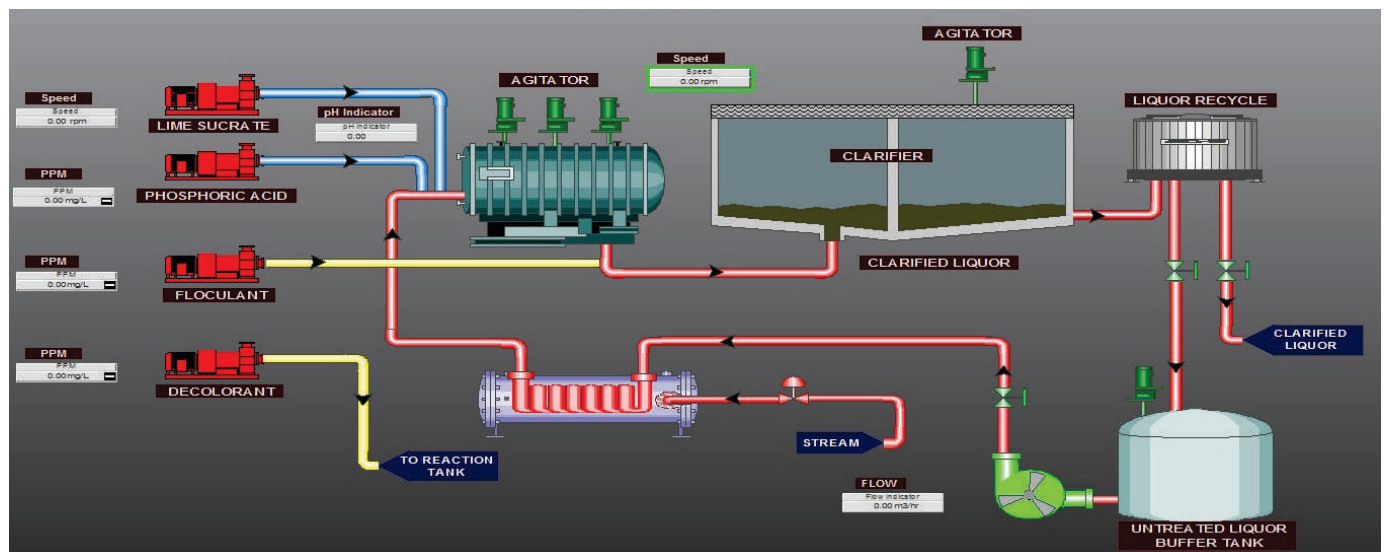
- Steam Jet Ejector /Water Ejector/ Liquid Ring Vacuum Pump for NCG removal
- Hot well & Condensate Extraction Pumps (CEP)
- Atmospheric Relief Valve over-pressure protection for the steam
- Central control panel
- High Level and low level switches for hot well
- Overall Dimensions and M.O.C. shall be as per system requirement
- Compact Design

Material of construction:

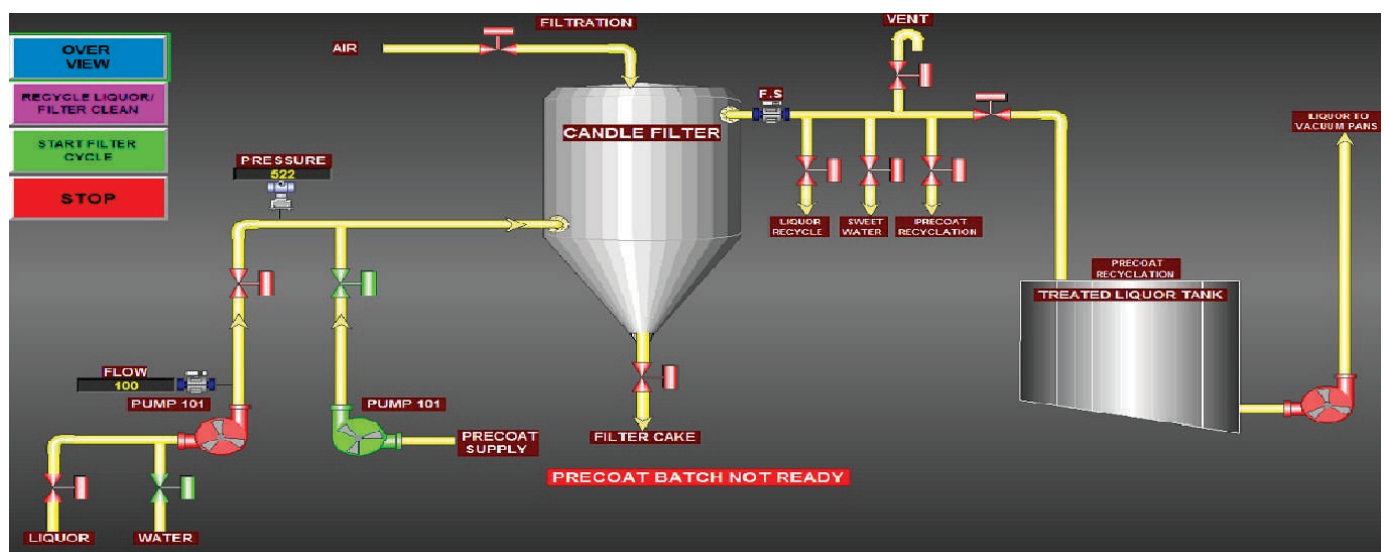
- Shell/Tube Sheet - Carbon steel IS 2062 Grade B /S.S 409M
- Tubes- ASTM A 249 TP 304

AUTOMATION FOR SUGAR REFINERY PROCESS

- Raw sugar flow rate is controlled and melter is provided with control system for Brix and temperature.
- In continuous clarification, scum is removed and PH of the clarified melt is controlled by chemical addition.
- The clarified liquor is sent to Ion Exchange System for de-colorization using automatic sequence operation of process from PLC.
- In refinery vacuum pans, using various sequences of logic for process by controlling the flow of feed liquors based on the brix set point.
- Level controls are maintained through automation in crystallizers and pug mill.
- Sugar drier rotary type or fluidized bed drier is provided with full automatic control system to control sugar temperature and brix control system in dust collecting system.



Continuous Clarification



Filtration

Photo Gallery

**Clarification
(NIVL, Vietnam)**



**Filtration Section
(Bannari Aman Sugars, India)**



**Candle Filter
(SPA Sora Sucre, Algeria)**



**IER Column
(SPA Sora Sucre, Algeria)**



Direct Contact Heater



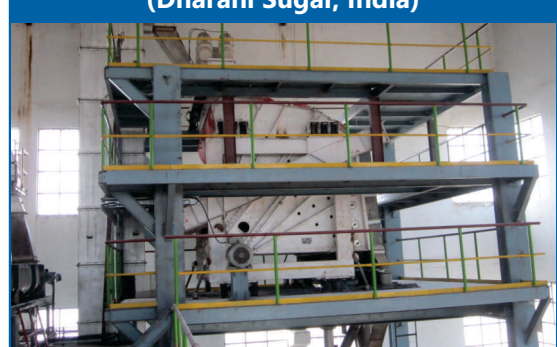
**Falling Film Evaporator
(PT PG Gorontalo, Indonesia)**



Conditioner DCH Type Molasses

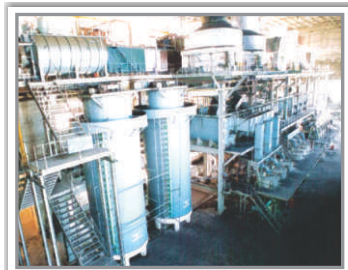


**SUGAR SIZER
(Dharani Sugar, India)**



SHRIJEE PRODUCTS & SERVICE

- Turnkey Sugar Plants, Sugar Refinery, Ethanol Plants, Biogas Plants
- Steam Saving Equipment (Below 32%) - Falling Film Evaporator, Continuous vacuum Pan, Duplex heater, Direct Contact Heater, Effective Vapour Bleeding System, Flash Heat Recovery System
- One-Stop Shop for all Engineering Items & Spares for Sugar Industry
- Sugarcane Farming Equipment-Sugarcane Loader, Sugarcane Loader (rotating arm), Infielder for cane hauling



Turnkey Sugar Plants



Turnkey Sugar Refineries

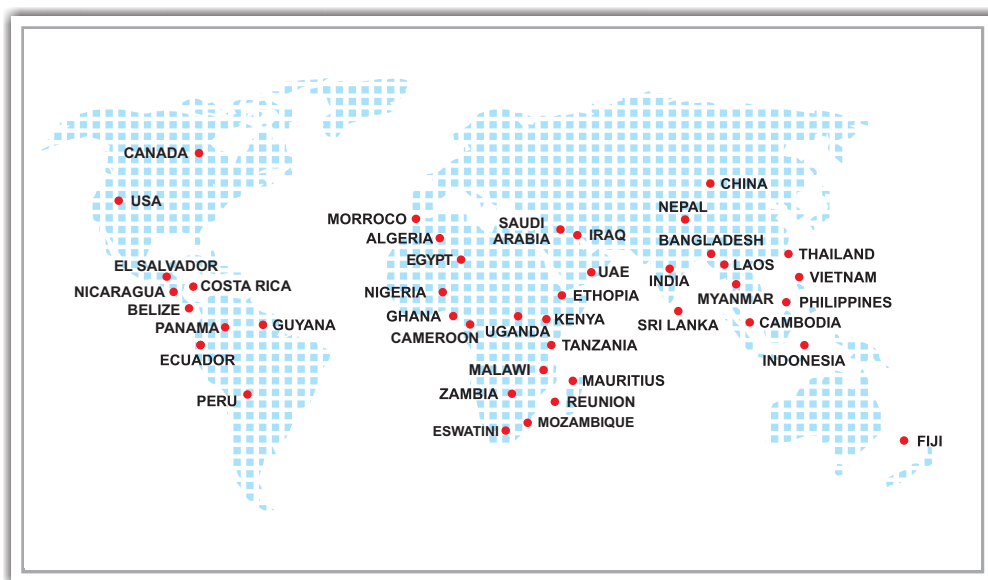


Biogas Plants



Sugarcane Crop Solutions

SHRIJEE GLOBAL CLIENTELE



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