Manufacturer and Supplier of
TURNKEY SUGAR PLANTS

Shrijee has supplied sugar machinery to more than 25 countries world-wide
SHRIJEE GLOBAL CLIENTELE

SHRIJEE’S PRESTIGIOUS CLIENT LIST:

- Bajaj Hindustan (India)
- Balrampur Chini Mills (India)
- Bannari Amman Sugars (India)
- Thiru Arooran Sugars (India)
- Renuka Sugars (India)
- Kaset Thai Sugars (Thailand)
- KSL Group (Thailand)
- PTPG Gorantalo (Indonesia)
- Thang Thang Cong (TTC Group) (Vietnam)
- Sugar Corporation of Uganda (Uganda)
- Mitr Phol Sugars (Thailand)
- PT Dharmapala Usaha (Indonesia)
- Nagarjuna International (Vietnam)
- Tuy Hoa, Son La, Tra Vinh, Kon Tum (Vietnam)
- Quang Ngai (Vietnam)
- Fiji Sugar Corporation (Fiji)
- Fincha Sugar (Ethiopia)
- West Kenya Sugar Mill (Kenya)
- Kinyara Sugars (Uganda)

AND MANY MORE ............
Shrijee Sugar Projects is the primary and largest activity of Shrijee Group. Shrijee was established in 1976 as a manufacturer of process house equipment of sugar industry and has today supplied its equipment world wide. The corporate headquarters are in Mumbai (India) and the regional offices are in Delhi, Ahmednagar and Chennai. To cater to numerous national and international clients, there are four fully equipped manufacturing facilities located in the western and southern parts of India. These four facilities are supported by a centralized and fully equipped design office.

Today Shrijee has executed more than thirty process house projects and achieved the rare distinction of manufacturing India’s largest process house (15,000 TCD). Shrijee has pioneered technologically advanced process house equipment by launching products such as the continuous vacuum pan and upgraded process through change over from batch to continuous operation. Shrijee is built with a world-class team of dedicated technologists, experts, consultants and an ever innovating R&D team that is constantly seeking greater challenges. The Shrijee team is today fully capable of setting up an entire sugar plant on Turnkey basis within stipulated time.

**Shrijee’s Core Strength:**
- In depth expertise in basic engineering and process equipment for a wide spectrum of turn-key sugar projects.
- State of the art manufacturing technology with largest designs of equipments systems.
- High energy efficiency sugar plants with steam consumption achieved up to 30%.
- Experienced Project Management team with highly skilled professionals ensure timely completion of projects to customer satisfaction.

Shrijee has successful sugar projects in almost every Indian state and in more than 25 countries across the world. The company has been honoured with several prestigious international and national awards in the field of sugar equipment and export.
As a sugar machinery supplier, Shrijee enjoys a unique position in that is capable of designing, fabricating, erecting and commissioning a complete sugar process house on its own. Over the years, Shrijee has created a world class network around the globe dedicated to continuous innovations in sugar industry. And today with over 35 years experience, Shrijee’s expert team of engineers, technologists and consultants is fully equipped to supply, erect and commission a complete sugar plant ranging from 2,500 TCD to 15,000 TCD capacity. Shrijee also undertakes expansion projects, rehabilitation and modernization of factories.

**Boiler:** Capacity range from 25 tons/hour-100 tons/hour and pressure 45kg/cm²-87kg/cm²

**Boiling House:** Technologically superior boiling house in falling film evaporator, continuous vacuum pans, centrifugal and steam economy measures to give high efficiency of boiling house with steam consumption not exceeding 32% on cane.

**Sugar Refinery:** Complete equipment range from melt clarification and boiling to refined sugar bagging, giving sugar quality of less than 25 ICUMSA.

**Co-Generation:** Shrijee’s execution of suitable boiler-turbine setup leads to maximizing the use of available bagasse for electric power generation of up to 50MW.

**Distillery:** Alcohol plant including ethanol production of up to 200,000 litres/day.

**Mill House:** Shrijee is fully equipped to supply all cane handling/preparation equipment such as cane un-loaders, feeder table, cane kicker, cane cutting knives, fibrizer and cane carrier with VFD Drive system. The milling plant can be supplied with 3 rollers, 5 rollers and 6 rollers mill with planetary gear drive systems.
More than 75 units supplied world-wide

**DIRECT CONTACT HEATERS (DCH)**

DCH is an alternative heat exchanger to plate and tubular heaters. DCH will work with counter current heat exchange principle. DCH has high heat transfer co-efficient. In the DCH latent heat and part of sensible heat will be utilized for heating duty. DCH will work with an approach temperature of 0-2°C, whereas tubular heaters and plate heat exchangers will work 5-7°C approach temperature.

**Advantages:**
- Counter current operation and high heat transfer co-efficient.
- Can be run with bled vapours and saving of exhaust steam.
- Effective utilization of the latent heat and part of the sensible heat.
- Suitable for heating with low pressure and temperature vapours.
- No condensate extraction system is required.
- Low head juice pumps and less power consumption.
- 0-2°C approach temperature.
- Suitable for complete automation.
- Can be operated at pressure and vacuum.

**Shrijee’s speciality equipment & vapour bleeding system brings steam consumption below 32% on cane**
DUPLEX HEAT EXCHANGERS (DHE)

DHE are tubular heat exchanger to heat or cool the liquids. DHE are an assembly of multiple small heat exchangers having single or double pass. DHE shall work with high heat transfer coefficient. DHE are suitable for sugar industry as well as chemical and paper industry.

Advantages:
• Liquid to liquid counter current heat exchange.
• High heat transfer co-efficient.
• Can be utilized for waste heat recovery, hence steam saving of 1% on cane.
• Suitable for heating and cooling of liquids and wide range of applications.
• Easy to install and requires less space.
• Easy cleaning of tube and less maintenance.
• Lesser cost of installation.
To reduce the inversion losses in Clarifier, Shrijee introduced the Short Retention Time Clarifier which effectively reduces sugar losses by bringing down retention time from approximately three hours to nearby forty-five minutes for clarification of sugarcane juice. The process also facilitates better removal of non-sugar.

It is manufactured as per client’s requirement in various ranges of factory capacity and the required automation is provided to achieve maximum efficiency.

**Features:**
- Low retention time for juice (40-45 minutes).
- Better settling rates because of reduced effects of turbulence and entrapped air.
- Less risk of destruction of Sucrose and hence minimum sugar loss.
- Optimised settling rate.
- High capacity handling with low holding volume.
- Easy controls with flexibility of operation.
- Low Space requirement by up to 30%.
- Low maintenance cost.
- Easy mud level control and mud withdrawal.
- Substantial saving in foundation cost.
Shrijee has supplied and installed more than 40 units ranging in capacity 1,500 sq.mt to 6,500 sq.mt heating surface.

The falling film evaporator is a crucial equipment of the plant as it is highly useful for reducing the steam consumption. No extra energy is required to pass the juice through FFE, as the juice fed from the top descends over the heating surface in a thin film.

Shrijee manufactures falling film evaporator ranging in heating surface from 1500m² to 6500m² having tube length 10-12 meters. Additionally, Shrijee uses the poly-baffle arrestor wherein vapors are separated from the juice droplets, giving juice free vapors to be condensed in the subsequent bodies to provide sugar-free condensate to the boiler. Shrijee F.F.E are in operation successfully in India, Indonesia, Kenya & Vietnam.

Features:
- Tubes are secured with baffles to avoid vibrations
- Negligible retention time
- No boiling point elevation
- Option of capacity flexibility
- High evaporation rate
- Maximum steam economy
- Unique design of juice distributor in S.S. construction gives even distribution of juice across the tubes

Advantages:
- Higher heat transfer co-efficient
- Less floor space
- No structure is required
- Efficient entrainment separation with Shrijee’s specially designed Poly Baffle Arrestor

Shrijee has manufactured India’s Biggest Falling Film Evaporator of 6500m² heating surface.
Double Pass Evaporators are rising film evaporators with tube length of 2-3 meters. Double pass evaporators are suitable to operate with varying capacity, operational at 50% capacity as well, no stoppage required during lower crushing capacity.

**Advantages:**
- Flexibility to operate at lower capacity at lower crushing rates
- No faster scaling even at 50% capacity utilization
- High rate of evaporation
- High heat transfer
- Easy to install and less maintenance
- Easy to operate without any special attention

Radial flow evaporation is an improved design to achieve higher evaporation rate due to high heat transfer coefficient compared to normal Robert evaporators. The Radial Flow Evaporators ensure perfect distribution of steam radially throughout the calendria and efficient removal of condensate as well as non-condensable gasses. Improves juice circulation and less scale formation because of more juice re-circulation area.

**Advantages:**
- Efficient steam distribution
- High heat transfer coefficient
- High evaporation rate (5kg/M²/hr) is higher than normal body
- More vapour generation
- Efficient juice circulation and lesser scale formation, more run duration
- Easy installation and low maintenance
- Easy to operate and minimum supervision required

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**DOUBLE PASS EVAPORATOR**

**RADIAL FLOW EVAPORATOR**
CONDENSATE FLASH HEAT RECOVERY SYSTEM

- Condensate flash vessels will be installed to recover the thermal energy from the condensate in terms of flash vapor.
- Shrijee flash vessel was designed with multiple compartments suitable for multiple flash heat recovery from various condensate stream of the process. It is a horizontal vessel having compartments working at different designed pressures.

Advantages:
- Eliminates individual section condensate pumps, sealing tanks & piping.
- Saving of power at condensate extraction.
- Maximum steam economy due to multiple flash heat recovery.
- Saving of steam up to 2-2.5% on cane.
Filtrate coming from vacuum filter is very low in purity, rich in gums and non-sugars. This filtrate is directed towards the mixed juice, and it will have adverse effect in processing. Thus a new system has been developed by Shrijee to clarify the filtrate in separate stream suitable to produce clear filtrate equivalent to clear juice.

Advantages:
• Rise in boiling house recovery
• Rise in filtrate juice purity by 2-4 units
• Increase in clarification house capacity by 5-10%
• Improvement in performance and capacity of vacuum filter
• Reduction in colour
• Increase in clear juice transmittance 5-7%
• Reduction of scale in sulphited juice heaters

Syrup clarification is useful for producing higher quality plantation white or direct consumption sugar with lower IU colour and lower residual sulphur dioxide levels. National standards for residual sulphur dioxide and colour have been lowered to reflect the growing demand for improved quality and concerns for health risks.

Advantages:
• Reduction of turbidity up to 90%
• Removal of maximum Bagacillo and suspended solid
• Reduction of ICUMSA colour up to 25%
• Reduction of viscosity of syrup and further process material
• Faster crystallization, higher exhaustion and less final molasses purity
• High quality sugar with less sulphur content
• Lower IU colour sugar
In early 90s, Shrijee introduced the Continuous Vacuum Pan in India, and today Shrijee is one of the largest suppliers of continuous Pans in the world. Modernizing the Pan house in sugar industry involved meeting the requirement of economy in processing by way of increased throughput, improving process efficiencies, economy of steam, energy and manpower. Shrijee in close co-operation with the industry has designed the Continuous Vacuum Pan. The capacity range is from 25 tons/hour to 100 tons/hour for low-grade massecuite and high-grade massecuite.

Features:
- Heart-shaped profile of Pan to enhance natural circulation
- Operator friendly and fully automated
- Ensures uniform throughput and product quality
- Saves space and energy
- Low temperature vapor boiling
- Maximized exhaustion of mother liquor
- Equipped with multi-baffle entrainment arrestor in SS construction
- Single largest capacity (225m³) continuous Pan supplied to KSL (Thailand)
- Complete automation and control system
- Shrijee has successfully increased the capacity of existing Continuous Vacuum Pan by adding new compartments with mechanical circulators

More than 200 units supplied world-wide
DUAL CONTINUOUS PANS

Dual continuous pan can be operated for two different grades of massecuite simultaneously. The Dual continuous pan shall have only one condenser. Heating steam shall be admitted on both ends of the pan and easy to control the steam for the respective massecuite as per the requirement. This pan is having the provision to stop any one of the massecuite boiling without affecting the other massecuite boiling. The calendria will have vertical tubes with peripheral down take. The calendria shall be divided into multiple equal sized compartments to ensure closer approach to plug flow. This Design can ensure better exhaustion of feed molasses.

Advantages of Dual Continuous Pan:
- Simultaneous boiling of two different grades of massecuite.
- Lesser initial investment compared to individual pans for two different grades for the same output of massecuite.
- Lesser space is required than the individual pans.
- Only one condenser, hence water and power saving.
- Only one condensate extraction system with one pump. Hence saving of power and maintenance cost.
- Suitable for 100% automation and man power saving.
- Less steam consumption.
- High exhaustion due to improved massecuite circulation.
- Flexibility to run any one massecuite.
- More exhaustion and high sugar recovery.

SPLIT CONTINUOUS PAN

The split continuous pan shall have one condenser or double condensers as per the size of the pan. Heating steam shall be admitted on both ends of the pan and easy to control the steam as per the requirement. This pan is having the provision to stop either side of 50% for water boiling or to operate at 50% capacity. The calendria will have vertical tubes with peripheral down take and shall be divided into multiple equal sized compartments to ensure closer approach to plug flow. This Design can ensure better exhaustion of feed molasses.

Advantages of Split Continuous Pan:
- Pan can be operated at full capacity or at 50% capacity without effect on performance.
- Less initial investment compared to individual pans of different capacity.
- Lesser space is required than the individual pans.
- One/two condenser as per requirement.
- Either side of 50% pan can be stopped for water boiling or at 50% Plant crushing capacity.
- No need of crushing stoppage for water boiling of the continuous pan.
- Pan can be operated with two different vapour, hence steam saving.
- Less steam consumption.
- High exhaustion due to improved massecuite circulation and recovery increase.
- Suitable for 100% automation.
"Continuous Vertical Vacuum Pan" has multiple chambers with top mounted mechanical circulators. The feed, steam, vacuum, level and brix shall be controlled with respective automation. This pan design permits to boil with low temperature vapour to get the required output of Massecuite to save the steam.

At initial start up Seed/Grain/Magma and liquor shall be fed to the top chamber. Partly boiled Massecuite shall flow to the next down ward chamber by gravity with reference to the level in the first chamber. This process shall continue and the Massecuite shall flow in sequential order to the below chambers. Magma shall be continuously fed to the first chamber with reference to the ratio between magma and liquor. And liquor shall be fed to all working chambers with reference to the brix in the respective chambers. Final product (Massecuite) shall be taken out from the bottom chamber/final chamber.

Different pressure vapour for different chambers can be used from the evaporators so as to achieve the steam economy. Top mounted mechanical circulators shall improve the circulation, rate of crystallization and crystal yield.

Entrainment catchers shall be provided at the vapor outlet of each chamber. Modular compartment facilitates cleaning of any chamber, when the pan is in continuous operation. There shall be one single common condenser for all the chambers. The pan shall be provided with complete automation either with PLC or with DCS.

**Salient feature of Continuous Vertical Vacuum Pan (CVVP)**
- Continuous Operation with provision for sequential cleaning of all chambers
- Can be operated with 4th effect vapours.
- Less steam consumption.
- Ensures natural circulation and mechanical circulation.
- Single common condenser for all chambers.
- Complete automation and uniform output.
- Top mounted mechanical circulator to improve the circulation.
- High rate of evaporation and crystallization.
- Steam saving due to use of low pressure & temperature vapours from the evaporators.
- Can be installed outdoors and no roofing is required.
- Better exhaustion.
- Uniform sugar crystals.
- High throughput.
Direct contact molasses conditioners are cost effective and designed to work with low pressure and temperature vapors with complete automation. The DCH molasses conditioners shall work on counter current heat exchange principle and ensure adequate conditioning of molasses.

Advantages of DCH Molasses Conditioner:
- Can work with 3rd/4th body vapour. Hence steam saving.
- Complete automation and consistency of molasses to pans.
- No stirrer. Hence power saving.
- Lesser operation temperature, hence no sugar loss.
- Better exhaustion and high sugar recovery.
- Improved sugar colour.
- Lesser space to install.
- Lesser cost.

Multi down take batch pan is Rapid boiling pan. The pan shall have specially designed multi down takes to provide shortest circulation path for the massecuite so as to ensure higher heat transfer with low temperature and pressure bled vapors. This pan ensures 100% activated zones because of good massecuite circulation and avoids sugar loss due to localized high temperature.

Advantages of multi down take Pan:
- Suitable for boiling with low pressure and temperature bled vapors. Steam saving.
- Better circulation and high exhaustion up to 65% and high sugar recovery.
- Rapid boiling and saving of time up to 0.25-0.5hrs per strike.
- Higher throughput than the normal pan of same capacity. Increase in pan floor capacity.
- Less boiling point elevation.
- No sugar loss due to high massecuite boiling temperature.
- Suitable for complete automation.
Shrijee in association with reputed manufacturers brings world-class Batch Type Centrifugal Machines and Continuous Centrifugal machines.

**Batch Type M/C – Fully automatic:**
- Basket is manufactured out of AISI 316L provided with S.S. HOOD operated with Pneumatic Cylinder. Ample drainage area is provided for faster draining of the molasses.
- Robust design Bearing Assembly with Rubber Buffer is provided with forgés shaft Break Assembly.
- Coupling is provided with Poly Urethene Star, Couples Motor with machine
- D.C. Motor with Panel or A.C. Motor with VFD Drive being supplied
- In order to run the machine fully automatically pneumatic cylinders are operated through Solenoid valve for which operating signal is provided with proximately switch through Control panel.

**Continuous Type:**
- Basket is manufactured out of S.S. ASI-316L provided with ample drainage area for fast drainage of molasses which helps for better curing and better capacity.
- Basket dia 1100mm / 1500 mm
- Screening area 14500 cm²/23200 cm²
- Recommended speed 1800 rpm for “B” & “C” after worker and 2000 rpm for “C” Massecuite
- Required Rubber Buffers are provided for proper dampening effect.
- Water spray pipe provided with water sprays nozzles.

*More than 100 Nos. Centrifugal machines (Batch & Continuous) supplied in India, Indonesia, Fiji, Vietnam, Uganda & Algeria*
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
As the standard of living goes up the demand for Refined Sugar also increases, not only due to reasons of fancy, but also because it is now being considered a health food as it is sulphur free.

Shrijee has been in the forefront of meeting the manufacturing requirement for sugar refiners. Shrijee has produced and supplied equipment starting from melt clarification to refined sugar bagging, and today it has emerged as a turn-key supplier of refined sugar plants ranging in capacity from 200 tons/day to 2500 tons/day.

Shrijee has manufactured & supplied major sugar refinery equipment to leading producers and also executed several turn-key refined sugar projects.

**Features:**
- Use of rotary sugar drier as well as fluidized bed sugar drier depending on the requirement
- Sugar quality upto 25 ICUMSA
- Material of construction can be carbon steel, SS 409 or SS 304
- Polarization – 99.7%
- S% - 0.009

**Turnkey Sugar Refinery Projects Executed By Shrijee:**
- Nagarjuna International (Vietnam)
- Kamdhenu Venture (Cambodia)
- Thiru Arooran Sugars (India)
- Bannari Amman Sugars (India)
- Dharani Sugars (India)
- SNJ Sugars (India)

**Shrijee Sugar Refinery Equipment Client List:**
- NATL (Vietnam)
- Hexa Thailand (Thailand)
- Kaset Thai Sugars (Thailand)
- Mitr Phol Sugars (Thailand)
- Renuka Sugars (India)
- Mawana Sugars (India)
- Bannari Amman Sugars (India)
- D.S.M. Sugars (India)
- Natural Sugars (India)
- Titawi Sugars (India)
- PT Sugar Labinta (Indonesia)
- Guangxi East Asia Funan Sugar Refinery (China)
- SPA Sorasucrre (Algeria)
- PT Dharmapala (Indonesia)
SUGAR DRYING SYSTEM

**ROTARY DRYERS**

Rotary Dryers represent the oldest continuous and undoubtedly the most common high volume dryer in industry and it has evolved more adaptations of the technology than any other dryer classification.

With the rotary movement of the Dryer, solids are picked up by the specially designed flights to a certain distance around the drum and showered through the air in a cascading curtain. Most of the drying occurs at this time, as the solid are in close contact with the hot air. Flight action is also partly responsible for the movement of solids through the drum.

**Advantages:**
- Reduced crystal damage and dust formation due to short fall
- Low space requirement to achieve both drying and cooling
- The use of counter current drying and cooling in a single unit
- Low drive power consumption due to the balanced load of the product around the axis of rotation
- Lower maintenance cost due to fewer items of ancillary equipment
- Moisture reduction from 1.5% to 0.02 - 0.03%
- Dust free environment and avoids the material loss due to no dust emission

More than 30 units supplied to India, Kenya, Uganda, Thailand, Vietnam, Indonesia, Algeria & Peru

**FLUIDIZED BED DRYER**

Fluid bed dryer are found throughout all industries, from heavy mining to food, fine chemicals and pharmaceuticals and sugar industry. It is stationary equipment, provided with FD and ID pans, with various capacities from 15T/hr to 50T/hr along with dust catching system. They provide an effective method of drying relatively free flowing particles with a reasonably narrow particle size distribution. In general, fluid bed dryers operate on a through-the-bed flow pattern with the hot air passing through the product perpendicular to the direction of travel. The dry product is discharged from the same section.

**Advantages:**
- High rate of heat transfer is achieved with almost instant evaporation
- Batch / continuous flow material is possible
- Moisture reduction from 1.5% to 0.02 - 0.03 %
- In fluid bed drying, the heat and mass transfer rates are faster by a magnitude of one
- Sugar temperature should be close to wet bulb temperature of air. This allows gentle drying without caramelisation of sugar
- The gentle drying and cooling process brings with it an excellent product quality, especially with regards to brightness of the product
- The enlarged cross-section above the fluid bed reduces dust discharge
- Stationary type / No hopper movement reduces crystal breakage
- Lower maintenance due to absence of moving parts

More than 32 units supplied to India, Kenya, Uganda, Thailand, Vietnam, Indonesia, Ethiopia, Laos & China
SHRIJEE
PRODUCTS AND SERVICES

- Turnkey Sugar Plants - Mill, Boiler, Turbine, Boiling House, Co-Generation, Alcohol Plant, Sugar refinery
- 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
- Rooftop Wind-Powered Ventilator

An ISO 9001:2008 COMPANY

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