

## Artificial Sand Plant

### e-7 M-60 Sand Plant

#### Artificial Sand - A Viable Alternative

##### An Alternate to River Sand in Concrete and Construction Industry

#### Introduction

The Artificial Sand Produced by Proper Machines Can Be a Better Substitute to River Sand. The Sand Should Be Sharp, Clean and Course. The Grains Should Be of Durable Material. The Grain Sizes Must Be Such That It Should Give Minimum Voids. The Presence of Clay and Silt Retards the Setting of the Cement and Makes the Mortar Weaker and the Walls or the Slab Leaks and Holds Dampness.

The Sand in the Mortar Does Not Add Any Strength but It Is Used as an Adulterant for Economy and With the Same It Prevents the Shrinkage and Cracking of Mortar in Setting. The Sand Must Be of Proper Gradation (It Should Have Particles From 150 Microns to 4.75 Mm in Proper Proportion) When Fine Particles Are in Proper Proportion, the Sand Will Have Less Voids. The Cement Required Will Be Less When There Will Be Less Void in Sand. Such Sand Will Be More Economical.

#### Manufactured or Artificial Sand V/s Natural or River Sand

The Civil Engineers, Architects, Builders, and Contractors Agree That the River Sand, Which Is Available Today, Is Deficient in Many Respect. It Does Content Very High Silt Fine Particles (as in Case of Filter Sand).

- Presence of Other Impurities Such as Coal, Bones, Shells, Mica and Silt Etc Makes It Inferior for the Use in Cement Concrete.
- The Decay of These Materials, Due to Weathering Effect, Shortens the Life of the Concrete.
- Now-a-days, the Government Have Put Ban on Lifting Sand from River Bed.
- Transportation of Sand Damages the Roads.
- Removing Sand from River Bed Impact the Environment, as Water Table Goes Deeper & Ultimately Dry.
- General Requirements of Manufactured Sand/artificial Sand
- All the Sand Particles Should Have Higher Crushing Strength.
- The Surface Texture of the Particles Should Be Smooth.
- The Edges of the Particles Should Be Grounded.
- The Ratio of Fines Below 600 Microns in Sand Should Not Be Less Than 30%.

There Should Not Be Any Organic Impurities Silt in Sand Should Not Be More Than 2%, for Crushed Sand. In Manufactured Sand the Permissible Limit of Fines Below 75 Microns Shall Not Exceed 15%.

Sand Is a Naturally Occurring Granular Material Composed of Finely Divided Rock and Mineral Particles. The Composition of Sand Is Highly Variable, Depending on the Local Rock Sources and Conditions, but the Most Common Constituent of Sand in Inland Continental Settings and Non Tropical

Coastal Settings Is Silica (Silicon Dioxide, or  $\text{SiO}_2$ ), Usually in the Form of Quartz. Sand Is Generally Mixed With Cement and Water Form Concrete. These Sand Particles Should Be Hard and Inert With Respect to Cement. In the Construction Industry Commonly Used Artificial Sand to Compound Concrete.

Use of Artificial Sand Concrete Density, Anti Permeability, Antifreeze Performance Is Good, Other Physical and Mechanical Performance and Long Term Durability All Can Reach the Design Requirements of Operation. Artificial Sand Preparation Is Especially Suitable for High Strength Grade of Concrete, the High Performance Concrete and Pumping Concrete.

## Applications

Sand Has Its Applications in Various Fields. In Agriculture Sandy Soils Are Ideal for Crops Such as Watermelons, Peaches, and Peanuts and Their Excellent Drainage Characteristics Make Them Suitable for Intensive Dairy Farming. In Aquaria It Makes a Low Cost Aquarium Base Material Which Some Believe Is Better Than Gravel for Home Use. Manufacturing Plants Add Sand to a Mixture of Clay and Other Materials for Manufacturing Bricks. Coarse Sand Makes Up as Much as 75% of Cob. Sand Is Mixed With Cement and Sometimes Lime to Be Used in Masonry Construction.

Sand Is Often a Principal Component of This Critical Construction Material. Sand Is the Principal Component in Common Glass. Mixing Sand With Paint Produces a Textured Finish for Walls and Ceilings or Non Slip Floor Surfaces. Sand Is Also Used as Sand Bags, These Protect Against Floods and Gunfire. Media Filters Use Sand for Filtering Water.

## Global Demand

Due to the Increase of Population & Living Standards, the Demand for This Product Is Multiplying in Every Year. Present Supply of Production Is Meeting Only About 20% of the Demand if All the Crusher Units of the State Start Manufacturing Machine Made Sand as an Additional Venture Then Also It Could Meet Only About 50- 60% of the Requirement. At Present the Existing Sand Manufacturers Are Producing Sand Like Materials Form Granite Stone and People Are Facing Difficulties While Plastering Work.

The Demand of River Sand Will Roll and Will Bring Back the Smiles on the Faces of Both the Environmentalists and the Industries. Because There Is Abundant of Natural Sand Because of the Heavy Demand in the Growing Construction Activities in Nowadays Society, the Artificial Sand Production Line the Sand Produce Field Has a Popular and a Welcome Position.

The Demand of Sand in the Market Is Immense and Therefore Its Market Position Is Splendid. Hence It Is an Excellent Field to Venture.

## DRY SAND PLANT MODEL M-60

Fully Automated Plant

Customized Product Quality From Feed Size Up To 10 MM To 12 MM

### 1. Engineering The Future of Sand Manufacturing

- Integrated & Fully Automated Sand Manufacturing Solution
- Modular Contraction Easier For Erection & Dismantling

- Minimum Footprint
- Can Feed Coarser Material Up To 10 To 12 MM
- Customized Engineered Sand Product
- Shaping, Grading & Classification For Precise Fineness Modulus

## 2. Precise Production of Plaster/Mortar Sand At Low Cost

- Better Finish of Plaster Lesser Recoiling - Improved Coverage Area Mechanized Plastering Reduced Consumption of Cement

## 3. Superior Air Classifier

- Modular Construction- Easy To Erect % Dismantle
- Unique Design With Simultaneous Air Blowing And Suction For Whirlwind Effect
- Precise Cleaning Even At High Moisture

## 4. Ideal For Variety Of Application







- Plastering/Dry Mix Mortar /High Strength Concrete/Tile Adhesive/Brick Jointing
- Saving Of Cement % Admixture
- Can Economically Handle Granite/basalt/limestone Material

## System Operation

1	Crusher dust (0-10mm - Basalt) @ 60 TPH is received in Feed Hopper 40CuM capacity. Conveyor, BC-1 from feed hopper fed to a Bucket Elevator.
2	The feed material from the Bucket Elevator is received in conveyor, BC-2 which feeds it to VSI-60 for Crushing, Shaping and grading of sand particles.
3	Crushed material from VSI is received in feed conveyor and fed to a diffusion feeder.
4	Feed material is evenly distributed across width of Air Screen with the help of diffusion feeder.
5	Dispersion system at feed ensures uniform dispersion across volume of the chamber for superior classification.
6	The high efficiency blower helps forced dispersion of feed material, thereby separating finer material from coarser feed.
7	The dust collector fan creates the suction for extracting filler material towards bag filter.

<b>8</b>	The filler material is drawn into the dust collector due to the negative pressure created inside the chamber. The filler is collected into a hopper of 30 M3 for disposal through dump trucks. (Alternatively, a conveyor below bag filter can be provided for stockpiling of Ultra fines.)
<b>9</b>	An optional Pre-Cleaner can be installed between the Dust Collector & Air Classifier to reclaim additional classified sand from the filler dust.
<b>10</b>	The mechanical screen mesh of air screen (with options of cut size of e.g. 2.8, 3.2 mm etc.) recalculates all oversize material back to VSI thru a Belt Conveyor, BC-3 & bucket elevator. Mechanical screen arrangement provided on lower part of Air Screen helps controlling the top size requirement 2.5 -3.0 mm or as desired.
<b>11</b>	11. To control the percent of filler to be retained in the end product, the air volumes are adjusted suitably.
<b>12</b>	Final shaped, graded & classified sand is gravitated through the bottom of Air Screen chute on to a Water Adding Mixer (which adds a certain calculated amount water homogenously to the sand to make it easily transportable). Transfer Belt conveyor (BC-4), and Swivel Conveyor Stockpiles sand.
<b>13</b>	Complete system is automated with PLC operations to control the sand quality –its shape, gradation & filler content.

Shape Comparison of Raw Material and Product of e7 Sand Plant

	2.5-1.2 mm	1.2-0.6 mm	0.6-0.3 mm
<b>Raw Material</b>			
<b>Product</b>			

Particle size distribution of typical feed & various products							
Feed Sand							
Screen Size	Sample Confirming	Passing %	P-1-FM2.3	P-2-FM 2.5	P-3-FM 2.7	P-4-FM 2.9	P-5-FM 3.1
10 MM	100	100	100	100	100	100	100
4.75 MM	90-100	77-60	100	100	100	100	99.8
2.36 MM	75-100	49.6	96.6	96.9	96.3	89.9	78.8
1.18 MM	55-90	33.5	83.22	77	74.04	60.9	57
600 Mic	35-59	20.5	52.1	40.1	34.11	35.7	29.7
300 Mic	Aug-30	15	26.12	25	18.65	15.3	18.1
150 Mic	0-10	10.7	10	10.1	7.65	7.4	8.4
Comment	Std Limit %	Coares Feed FM-4	PRODUCTS FINES TO COARSE SAND				

### Optional Apparatus in the Circuit to improve system yield

#### Pre-Duster:

Recirculation of part of useful filler material back to product – e7 sand

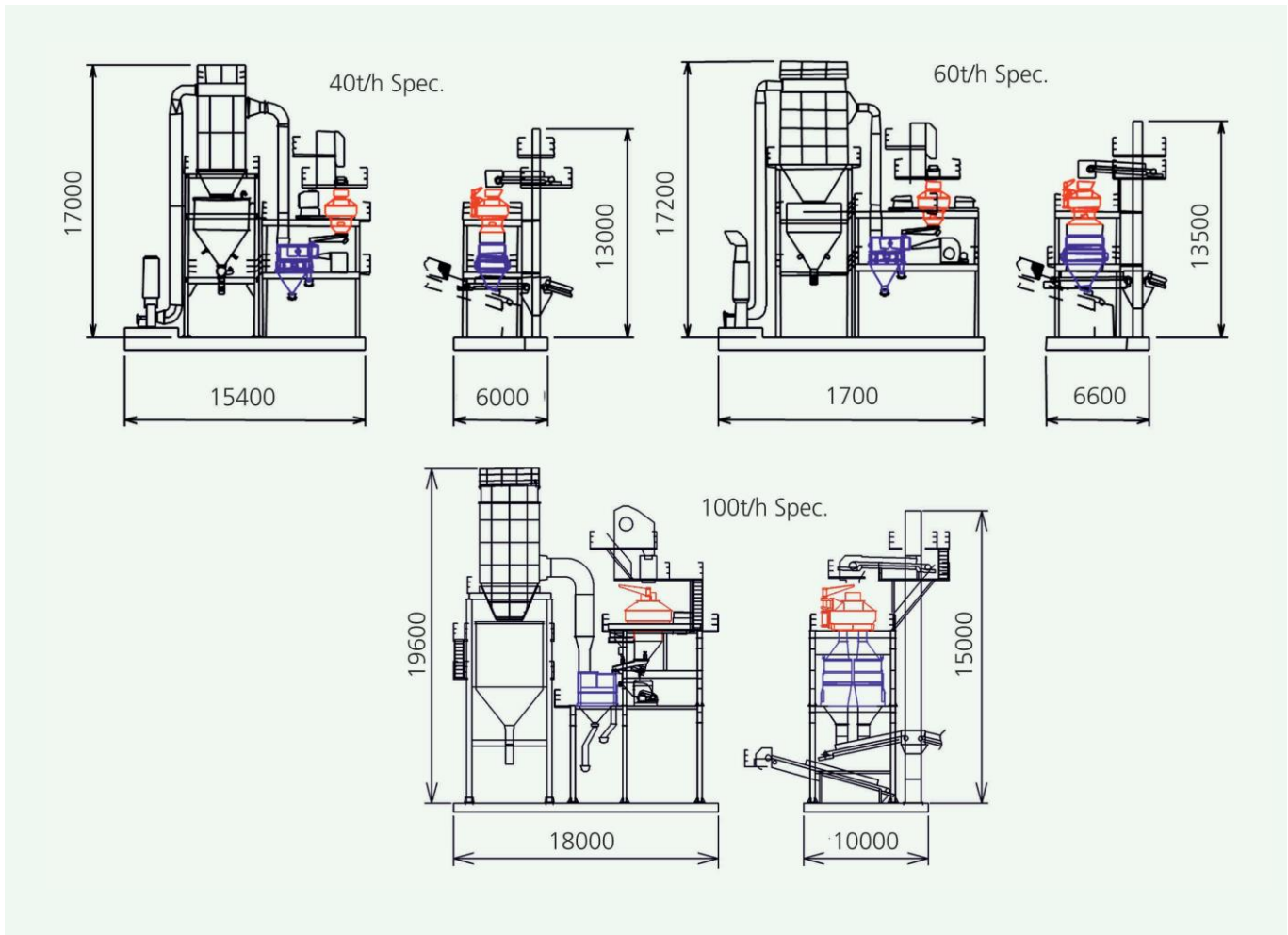
The Pre-duster, after the Air screen, to recover the coarser particle up to 300µm that are otherwise lost to Bag filter. This addition has meant that sand size particle and larger sub 63 µm can be returned to the product, improving the sand characteristics as well increasing recovery. Collected filler by dust Collector can be refined.

#### Water Adding Mixture

The Finished sand is conditioned with small percentage of water (2-3%), in a drum mixer, to prevent segregation and maintain consistency.

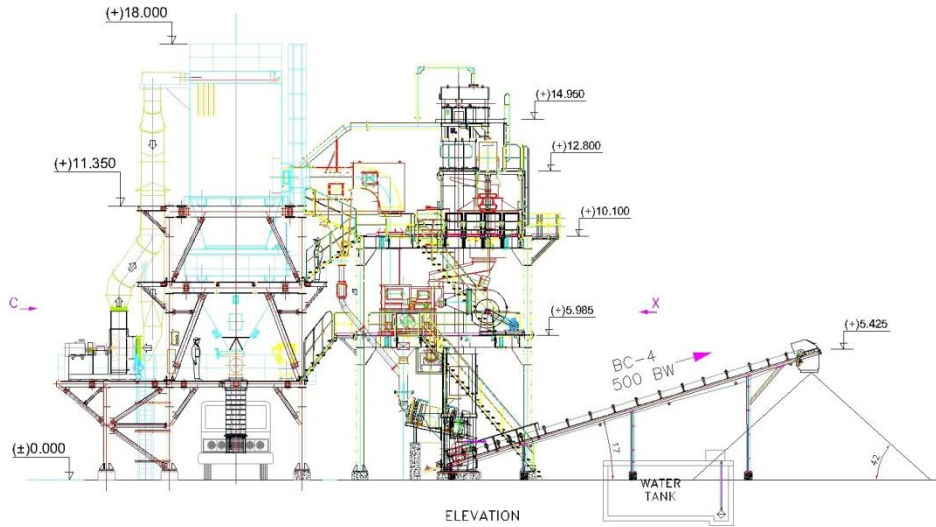
	e 7-M-60
Capacity of Feed Material	Maximum 60 TPH
Capacity of Final Material 2.7 to 3 MM	53 to 56 TPH
Connected Load	430 KW





Total Power requirement : 450 KW

Area Requirement : 36 m x 20 m



## Difference In Crushed Sand And Natural Sand

	Crushed Sand	Natural Sand
<b>Source</b>	Manufactured Sand	River Sand
	Manufactured Fine Aggregate	
	Quarry	Naturally available
	Crushing Rocks, Quarry Stones or Larger aggregate Pieces into Sand size particles	Excavated from river beds or river bank by digging
<b>Wastage</b>	No Wastage	
	Already sieved in the required size i.e. below 4.75 mm	wastage is More
<b>Settling Time</b>	Comparatively faster	Normal
<b>Shape</b>	Cubical & Angular & has a Rough Texture	Spherical & has a Smooth Surface
<b>Silt Content</b>	Does not contain silt	Contains Silt
	manufactured by crushing aggregates	Due to erosion of soil in its catchment area Needs washing on site
<b>Moisture Content</b>	No Moisture content	Moisture is generally present in between the particles
<b>Compressive Strength &amp; Flexural Strength</b>	Higher	Lower
<b>Workability</b>	Lesser	More
<b>Permeability</b>	Very Poor	Less Poor
<b>Over Sized Materials</b>	Artificially Manufactured	Oversized materials are expected
	No Over sized Materials	Need screening on site
<b>Water Absorption</b>	2 to 4 %	1.5 to 3 %
<b>Slump</b>	Less	More

<b>marine Products</b>	Does not contain any Marine Products	May Contain Marine Products such as grass, algae, clay lumps, bones, shells, mica etc
<b>Bulk Density</b>	1.75 gm/cm <sup>3</sup>	1.44 gm/cm <sup>3</sup>
<b>Specify Gravity</b>	2.5 to 2.9	2.3 to 2.7
	Depends on parent rock	Depends on rocks in catchment area
<b>Bulk age</b>	No Need to bulk age correction during mix design	Bulk age correction during mix design
<b>Ability to hold surface moisture</b>	Up to 10%	Upto 7%
<b>Adulteration</b>		
<b>Action of making something poorer in quality by the addition of another substance</b>	Less Adulteration	High probability of adult ration because of acute shortage River sand adult ration with saline sea sand is common in coastal areas
<b>Harmful to the environment</b>	Less damage	Harmful to environment Reduces ground water level & River water gets dried up
<b>Quality</b>	Better quality	Quality differs
<b>Arability</b>	Can be Produced in areas closer to construction sites	The Facility is not available
<b>Application</b>	Highly recommended for RCC work, brick work & block works	Recommended for RCC, plastering, Brick work & Block works
<b>Cost</b>	Cheaper	
	Approx Rs.1000/Cum	Approx Rs.3000/Cum
<b>Except Plaster work &amp; Waterproofing work</b>		
<b>Bedding under the stones for hands cape work, 50% Crushed sand &amp; 50% river sand should be used</b>		

Parameters	M Sand	River Sand
<b>Process</b>	Manufactured in a factory.	Naturally available on river banks.
<b>Shape</b>	Angular and has a rougher texture. Angular aggregates demand more water. Water demand can be compensated with cement content.	Smoother texture with better shape. Demands less water.
<b>Moisture Content</b>	Moisture is available only in water washed M Sand.	Moisture is trapped in between the particles which are good for concrete purposes.
<b>Concrete Strength</b>	Higher concrete strength com-	Lesser concrete compared to M Sand



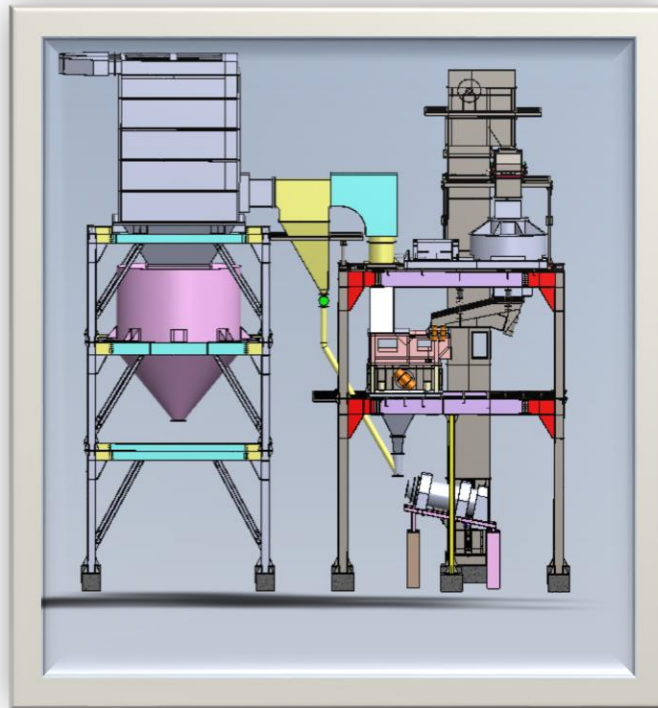
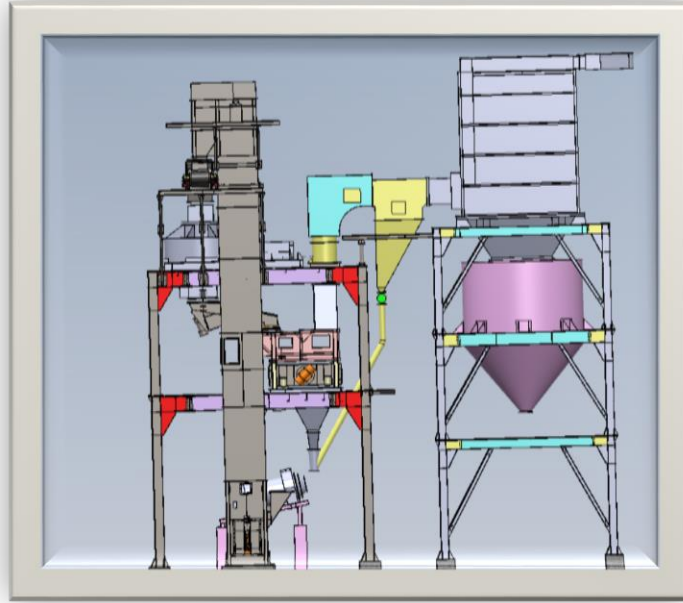
	pared to river sand used for concreting.	
<b>Silt Content</b>	Zero silt	Minimum permissible silt content is 3%. Anything more than 3% is harmful to the concrete durability. We can expect 5 - 20% slit content in medium quality river sand.
<b>Over Sized Materials</b>	0%. Since it is artificially manufactured.	1 - 6% of minimum oversized materials can be expected. Like pebble stones.
<b>Marine Products</b>	0%	1 - 2% like sea shells, tree barks etc
<b>Eco-Friendly</b>	Though M Sand uses natural coarse aggregates to form, it causes less damage to the environment as compared to river sand.	Harmful to the environment. Eco imbalances, reduce groundwater level and rivers water gets dried up.
<b>Price</b>	M Sand price ranges from Rs.35 - Rs.45 per cubic feet in Bangalore.	River sand price ranges from Rs 60 - 80 per cubic feet in Bangalore.
<b>Adulteration</b>	The probability of adulteration is less.	High probability of adulteration since filtered sand (a type of pre-washed sand which contains high silt contents) are mixed together. As a rule, supply shortage always brings adulterer products to the market.
<b>Applications</b>	Highly recommended for RCC purposes and brick/ block works.	Recommended for RCC, plastering and brick/ block work.
<b>Quality</b>	Better quality control since manufactured in a controlled environment.	No control over quality since it is naturally occurring. Same river bed sand can have differences in silt contents.
<b>Particle passing 75 micron</b>	Up to 15% (IS: 383 - 1970)	Up to 3% (IS:383 - 1970)

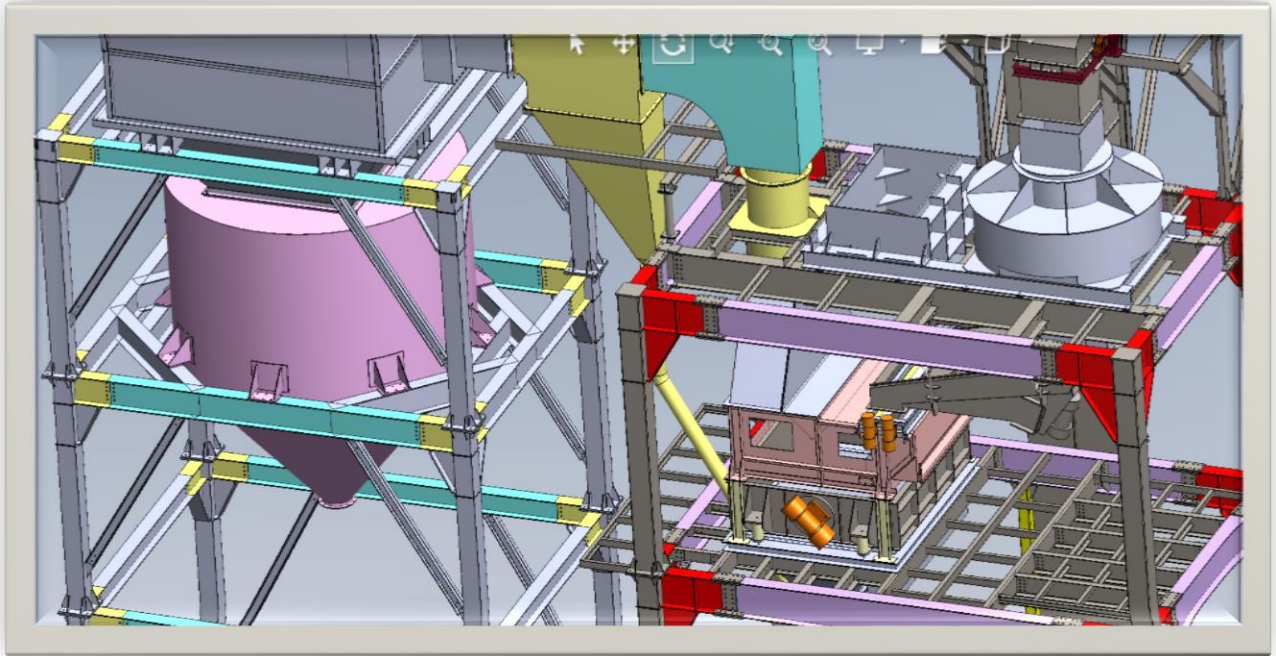
IS Sieve	River Sand % Age Passing	M-Sand % Age Passing	% Age passing for single sized
			Aggregates of Normal Sand
			115 383 – 19701 Zone II
<b>4.75 mm</b>	99.25	99.75	90 to 100
<b>2.36 mm</b>	93.5	78.25	75 to 100
<b>1.18 mm</b>	48	52	55 to 90
<b>600 Microns</b>	21	38	35 to 59

<b>300 Microns</b>	4	21	08 to 30
<b>150 Microns</b>	0.05	5	0 to 10
<b>Comparison of Impurities – River Sand Vs M-Sand</b>			
	<b>River Sand</b>	<b>M-Sand</b>	
<b>Marine Products.</b>	2 – 4 %	Nil	
<b>Oversized Materials</b>	6 – 10%	Nil	
<b>Clay &amp; Silt</b>	5 – 20%	Nil	

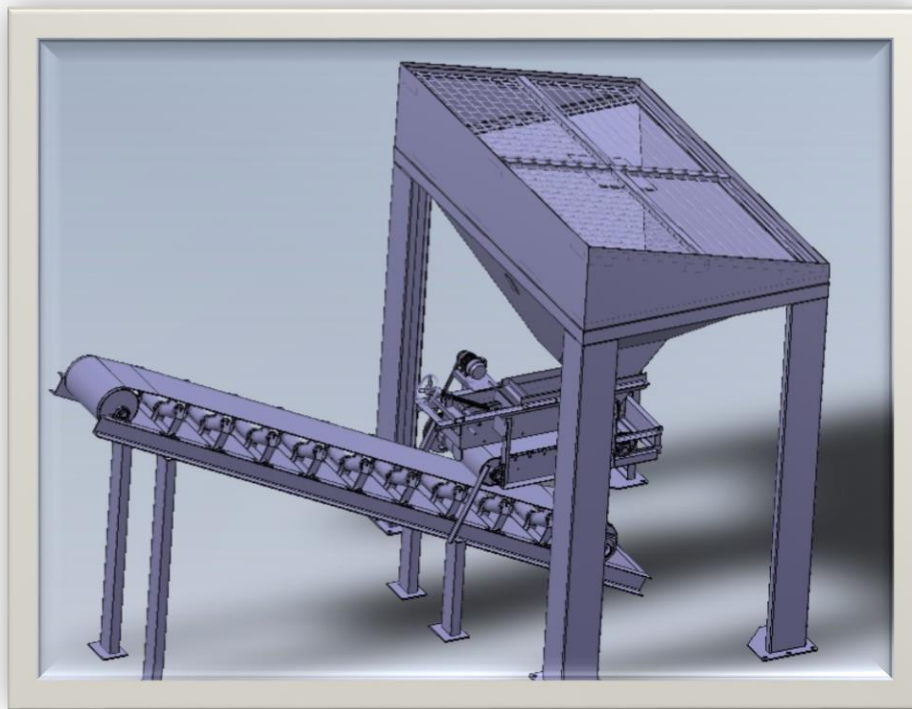
## **M-SAND-60 PLANT MAIN PLANT EQUIPMENT**

Main Plant

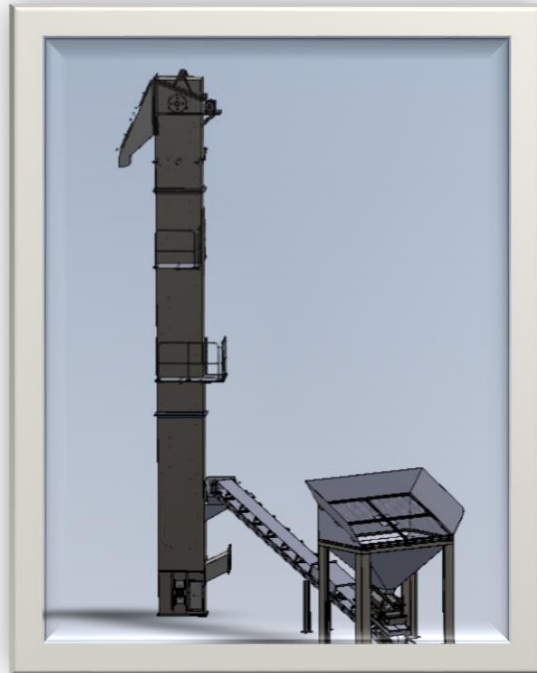




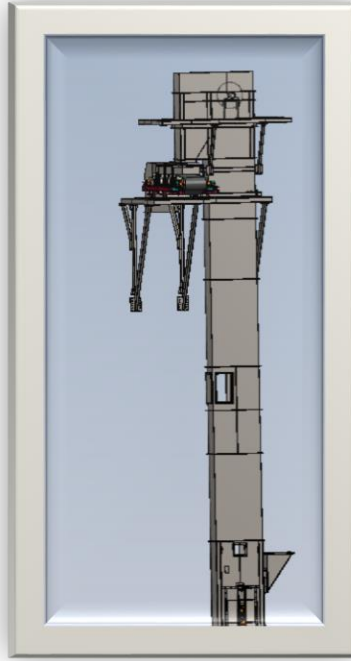
1) STORAGE HOPPER AND FEEDING CONVEYER



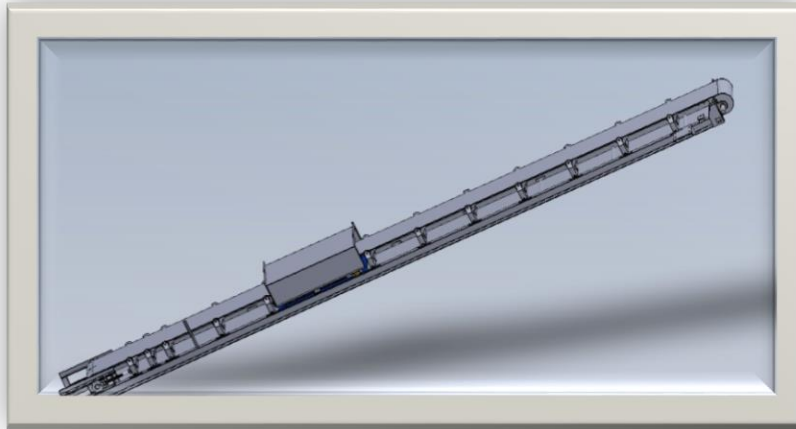
**2) ELEVATOR**



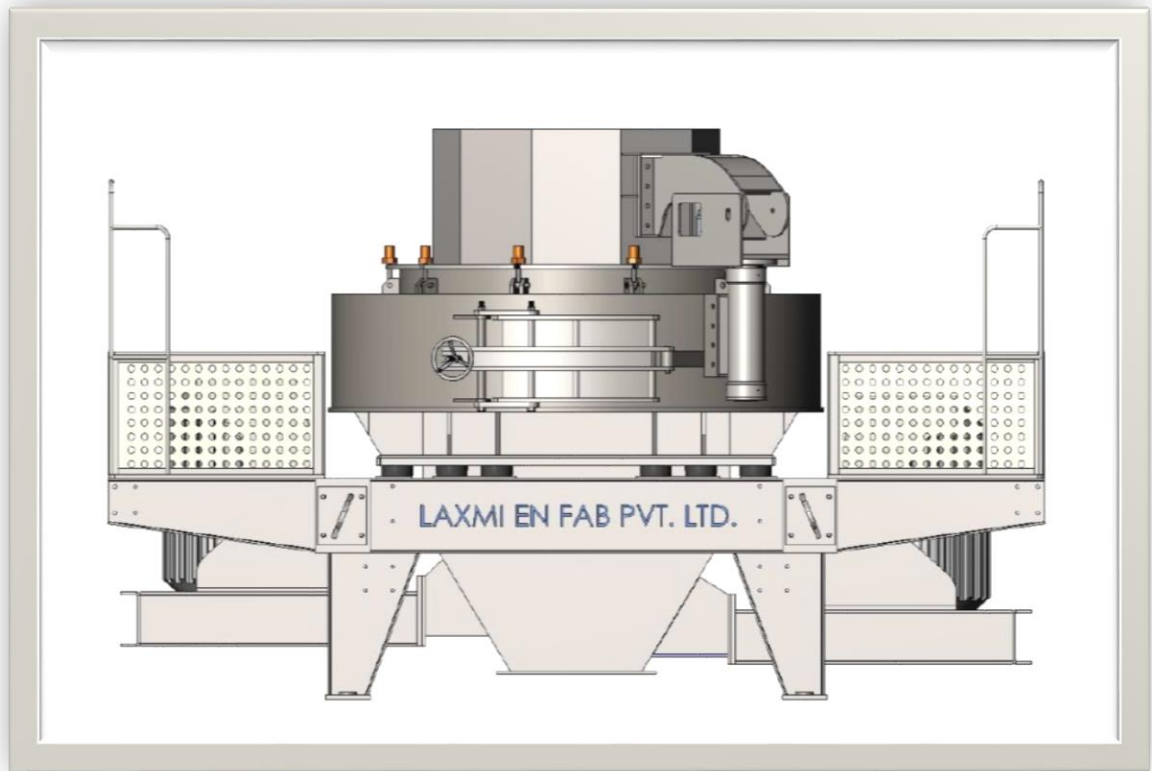
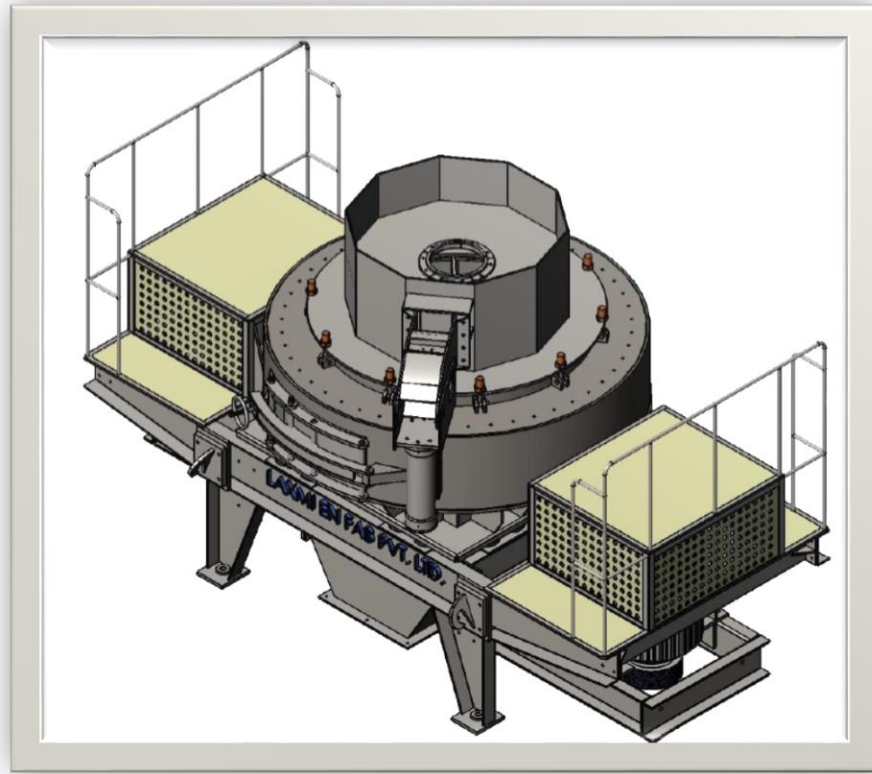




3) ELEVATOR CONVEYER



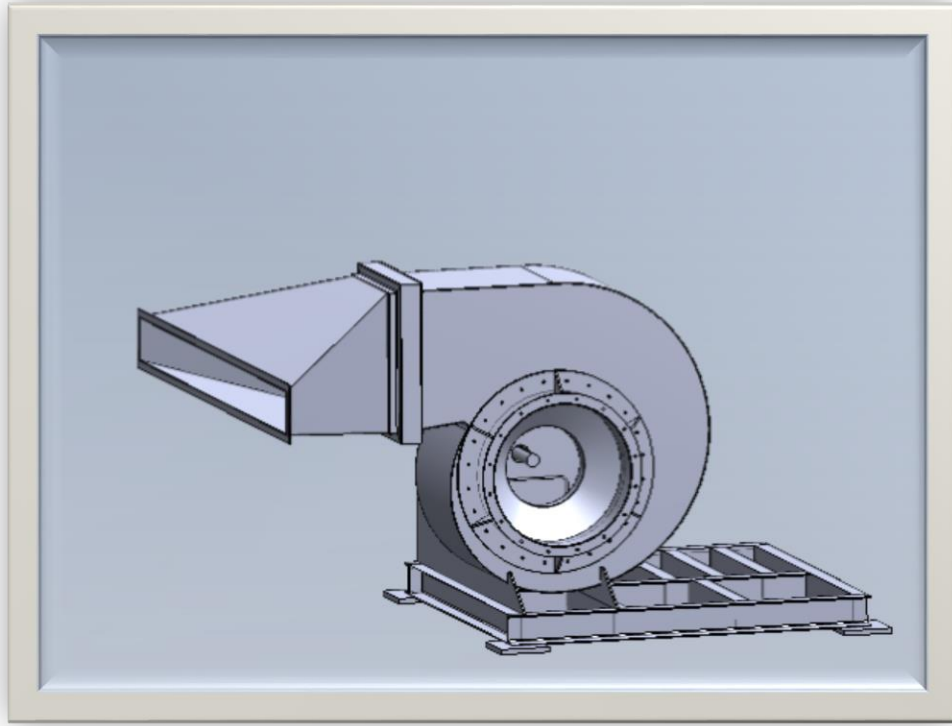
4) VSI



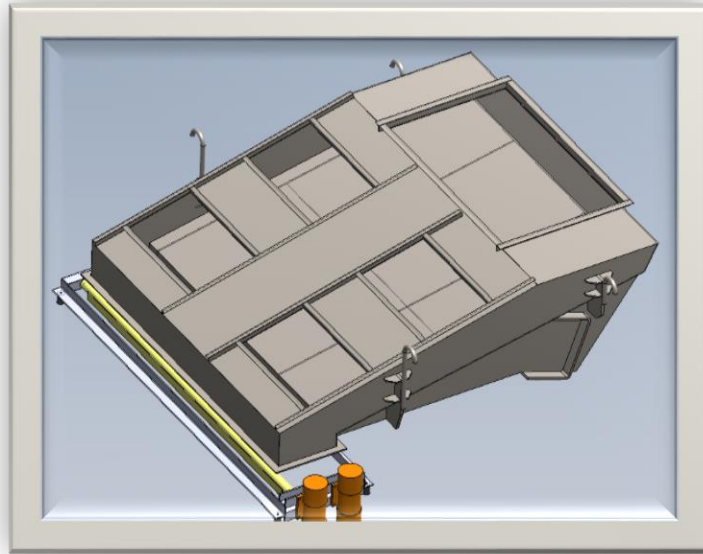
#### Features of Specialized VSI in e-7 Sand

- Special 5 Port Rotor for Improved crushing performance and low power requirement
- Favorable grain shape
- Consistent gradation
- Low operating cost

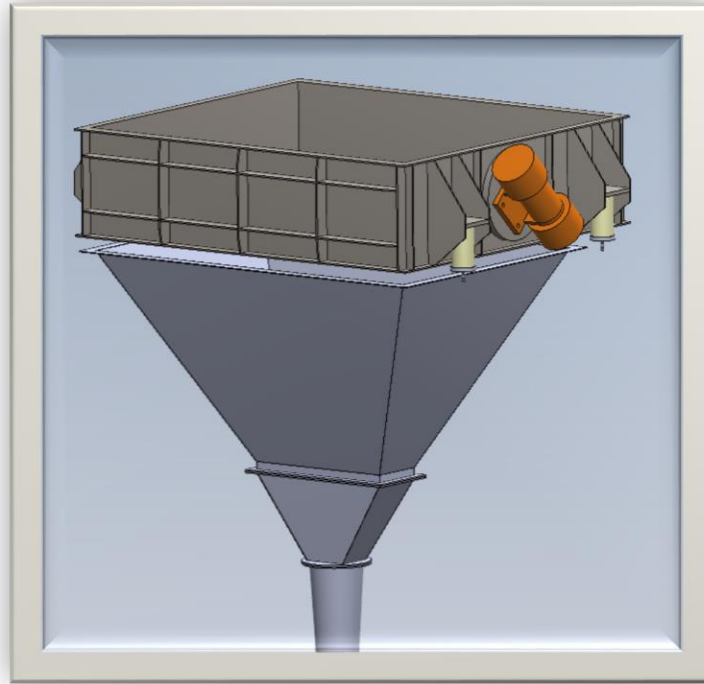
#### 5) ID BLOWER



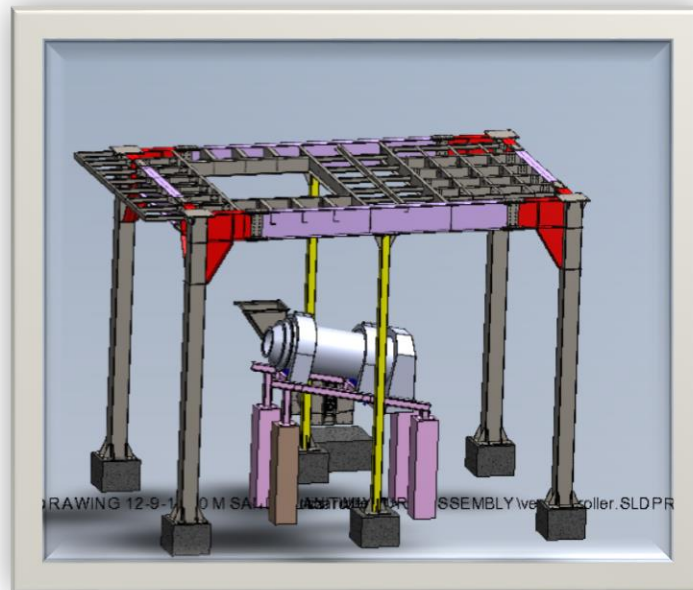
6) DIFFUSION FEEDER



7) VIBRATOR

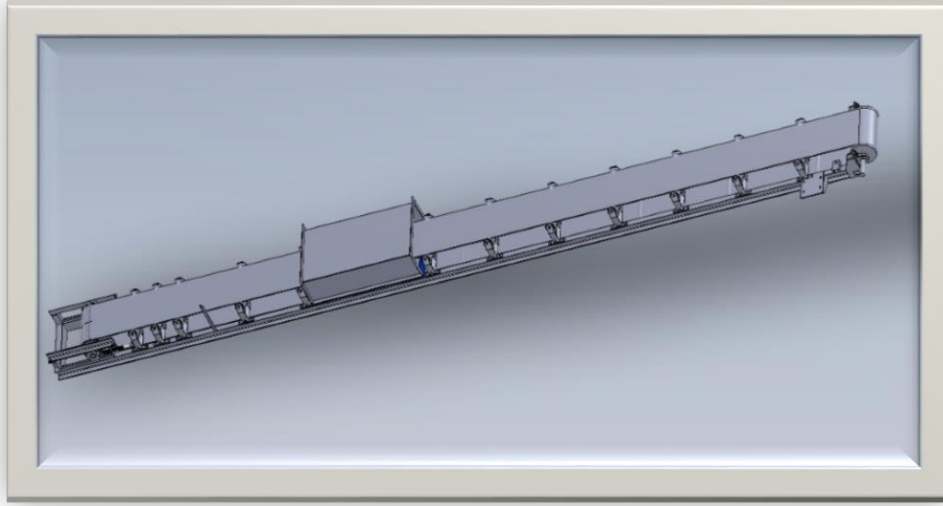


**8) MIXER DRUM**

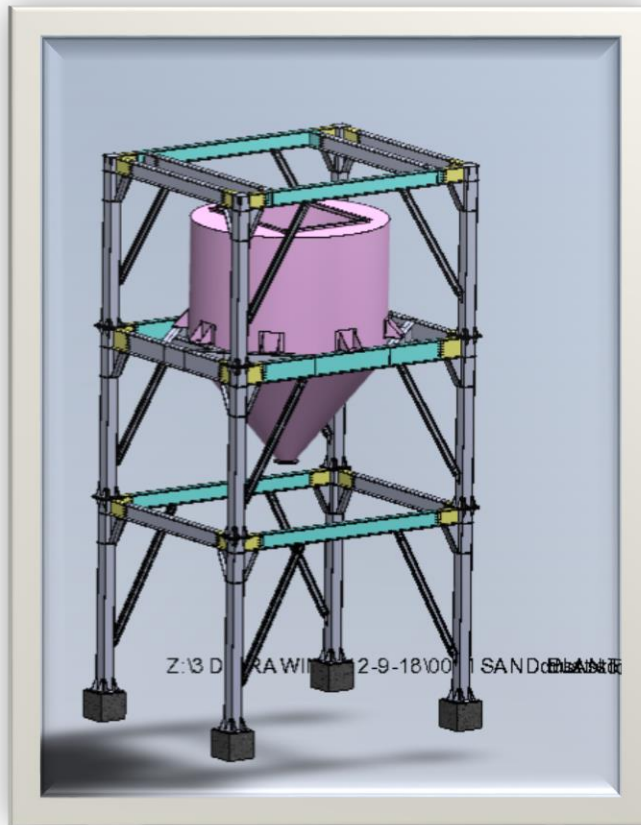


**9) DRUM CONVEYER**

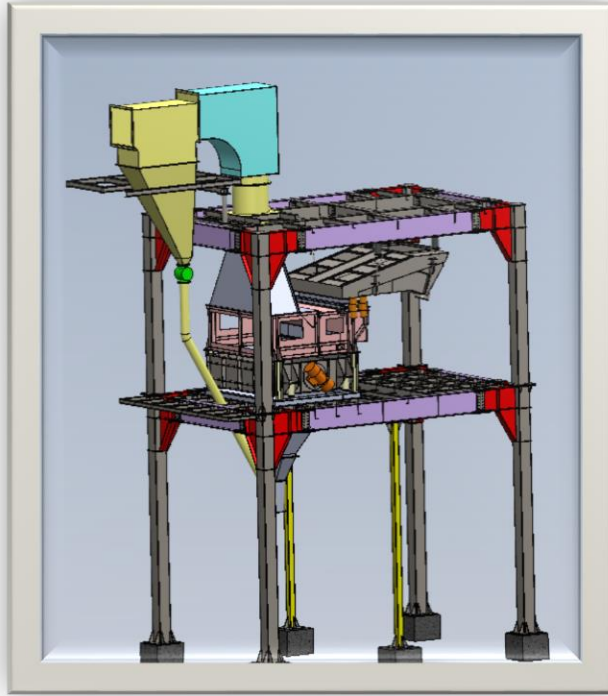




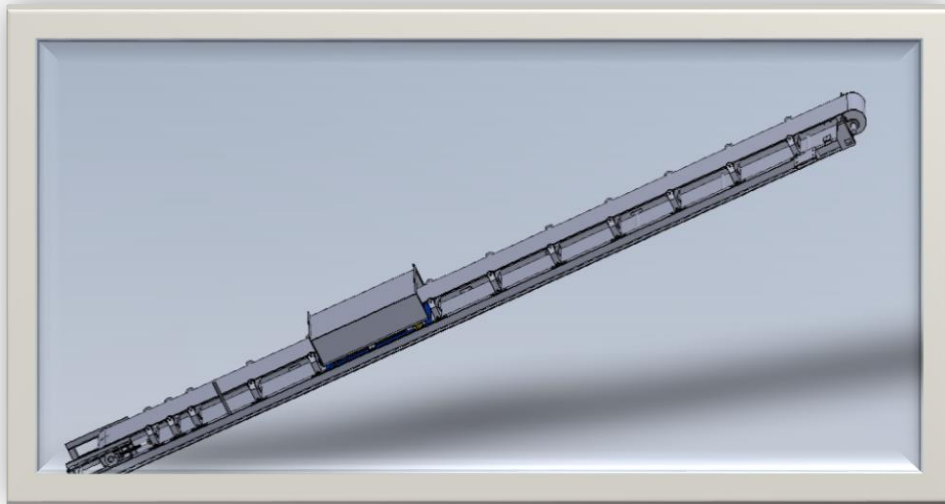
**10) STORAGE HOPPER**



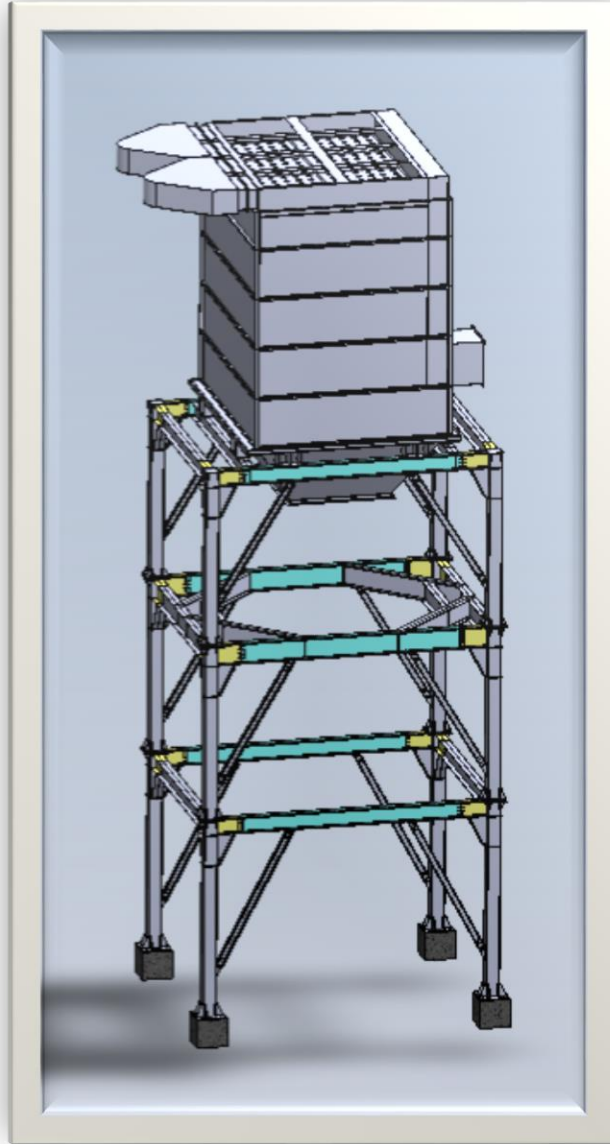
**11) AIR SEPARATOR % PRE-DUSTER**



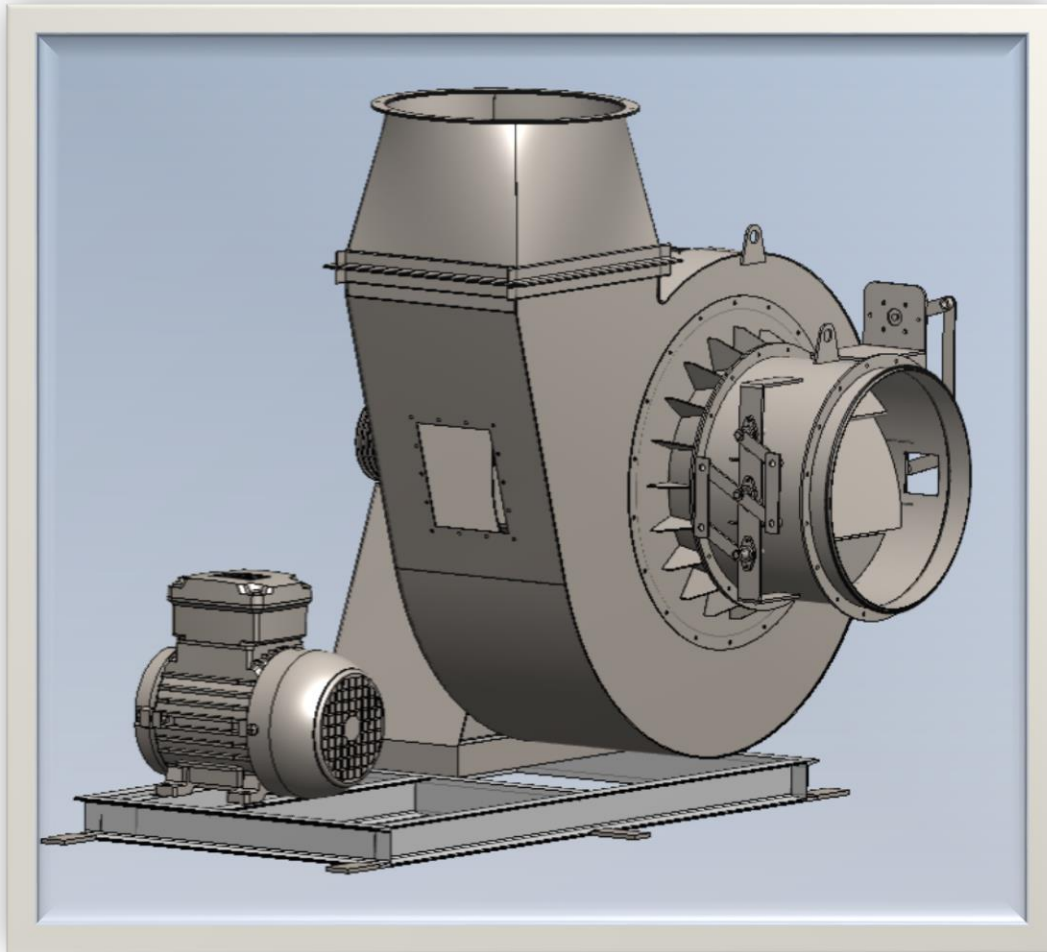
**12) RECYCLE CONVEYER**



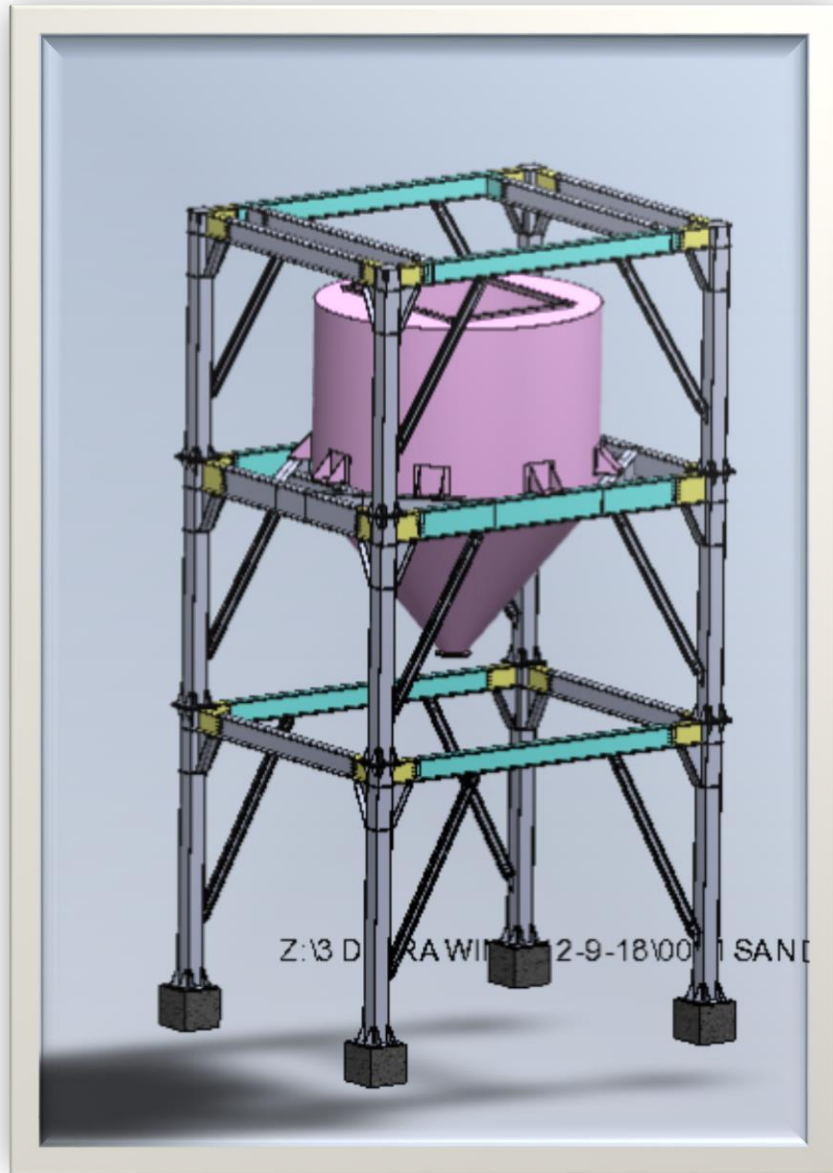
**13) BAG HOUSE**



**14) EXHAUSTER & DUMPER**

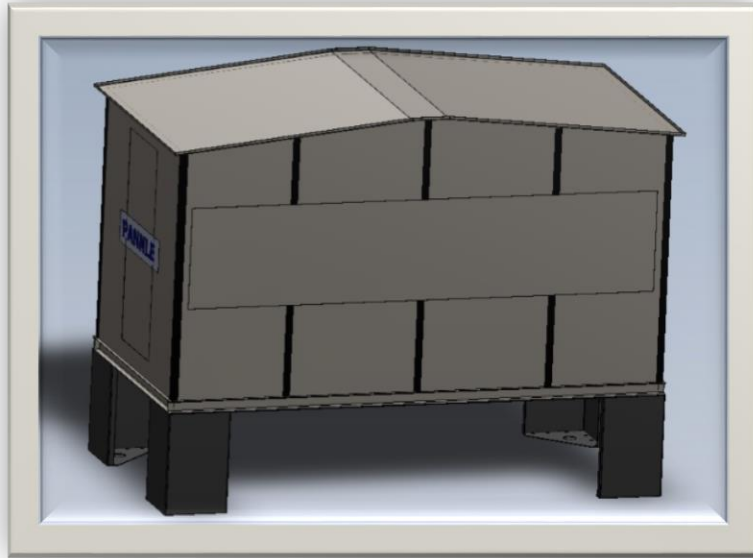


**15) STORAGE SILO**

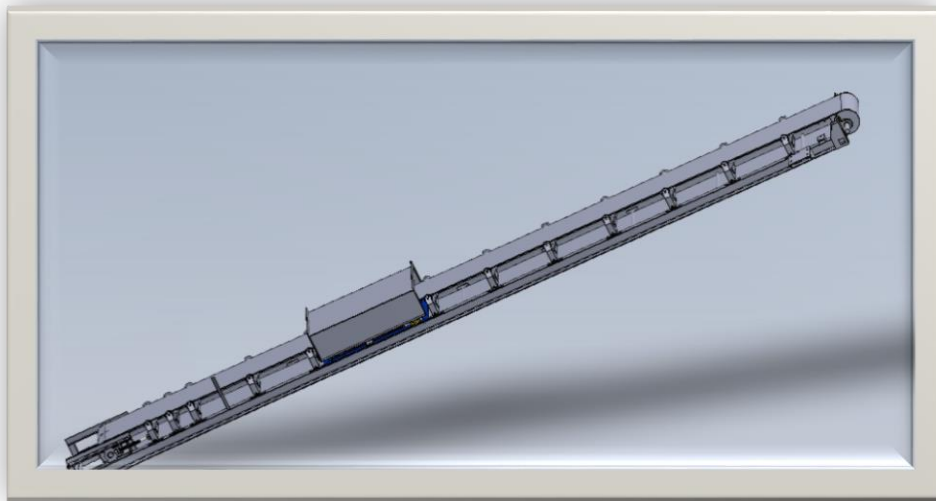




**16) PLANT PANEL**



**17) OUT PUT CONVEYER**



**18) ROTATING CONVEYER ( PRICE NOT INCLUDING IN BASIC PRICE )**

### Common Items & Other Items

- Foundation Bolts & Nuts for All Equipment in Scope
- Name Plate and Machine Number Plate
- Painting Including Primary and Final Coating
- Operation and Maintenance Manual for All Equipment in Scope.

### Engineering Scope

- Plant Layout Drawing With Load Data of Equipment With Structures for Civil Design.
- Drive List (Lt Motor & Component List)

### Note

- Equipment Is Skid Mounted and Requires Only Civil Footings. All Civil Design and Civil Work Is Excluded From Scope.
- Length of Conveyors Are Tentative, May Change During Detail Engineering & Layout.

### Additional Scope

- Producer Model Pd-800 With Re Circulating Duct – 1 Set
- Water Adding Mixture – 1 Set

### Exclusions

- Any Dg Set/power Source, Input Cable, Plant Lighting and Related Electricals/any Other Electrical Not Specified in Scope.
- Any Civil/site Work (Ground Leveling, Civil Footings Etc.)
- First Fill of Lubricants
- Maintenance Hoists/eot Crane.
- Any Civil, Structural, Electrical Work
- Any Arrangement for Loading/unloading of Material.
- Any Work Related to Dismantling, Modification, Shifting, Assembly, Erection and Disposal of Existing Equipment, Structures and Accessories
- All Erection and Commissioning Activities of Plant. (Only Supervision Is Considered in Our Scope)

### Other

- Any Statutory Approval & the Fees Thereto
- Third Party Inspection Charges
- Transportation, Insurance, Unloading & Storage of Material at Site.
- Any Other Item Not Specifically Mentioned Under Scope of Supply.