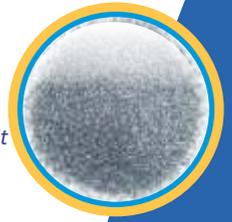




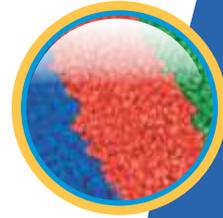
# Kleenair

Systems P. Ltd.

*Delivering Quality Products is our Habit*



## Excellence in **SOLID & POWDER** HANDLING SYSTEMS



Pneumatic Conveying Systems, Mixing & Blending, Storage, Weighing & Batching,  
Bag Dump Stations, Big Bag Discharger, System Accessories





## About us



An automated as well as energy saving Solid & Powder Handling System has become need for almost every industry to increase its productivity & reduce valuable product losses.

Emerged as a vision of two young & dynamic technocrats, **Kleenair** offers efficient and long lasting **Air Pollution Control Systems** & also **Automated yet Power Efficient Solid & Powder** handling systems to various applications in the industry.

Since its incorporation in 1987, Company's long history is built on endless challenges offered by world wide customers to provide a **Correct Solutions** to their problem in these areas.

With the expertise in this field, **Kleenair 's** strong foundation is built on its core values, vision & mission which distinguish and guide them :

- To offer efficient environmental control and solid & powder handling systems.
- To protect the environment for benefit of customer & community.
- To become leader in the field of **Air Pollution Control and Solid & Powder Handling Systems** by exceeding customers expectations.

**Kleenair's** dedicated & loyal team of professionals convert customers demand to innovative yet correct solutions with "we can do it" attitude & ingenuity. We work hard continuously to enhance our reputation for accessibility, professionalism, performance and the depth & quality of our long term relationship with clients.

### **A world renowned reputation :**

For more than 25 years we have been in this business of providing quality technology a proven track record that speaks for itself.

### **Commitment to Quality Products :**

Always exceeding customers expectations on product quality by continuously increasing methods and systems.

### **Unparalleled Customer Support :**

As a customer driven solution provider, we earn credibility and establish mutually beneficial relationship by exceeding expectations of professional services at each stage of project engineering

### **Innovative and committed team of professionals:**

Always, we keep the technology at the forefront ensuring continuous product advancements through ongoing investments in Research & Development, Design and Manufacturing.





## Industries we serve



Pigments



Pharmaceutical



Grains



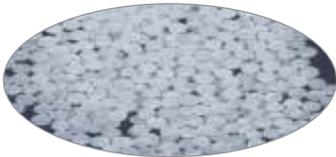
Chemical



Spices



Ceramics



Plastics



Agro Products



Cement



Fly Ash



Glass / Fiber Glass



Food

## Materials We Handle



Free Flowing Materials



Materials which Fluidize or Liquefy



Non-Free Flowing Materials



Contamination-Sensitive Products



Moist Sticky Materials



Abrasive Material



Products which Pack, Cake, Smear or Plug



Hazardous Materials



Heterogeneous Mixtures



Friable Materials



## Pneumatic Conveying Systems



Our vision is to take advantage of valuable technology in offering world class quality products and services to our customers. Our aim is to reach beyond our customer satisfaction.

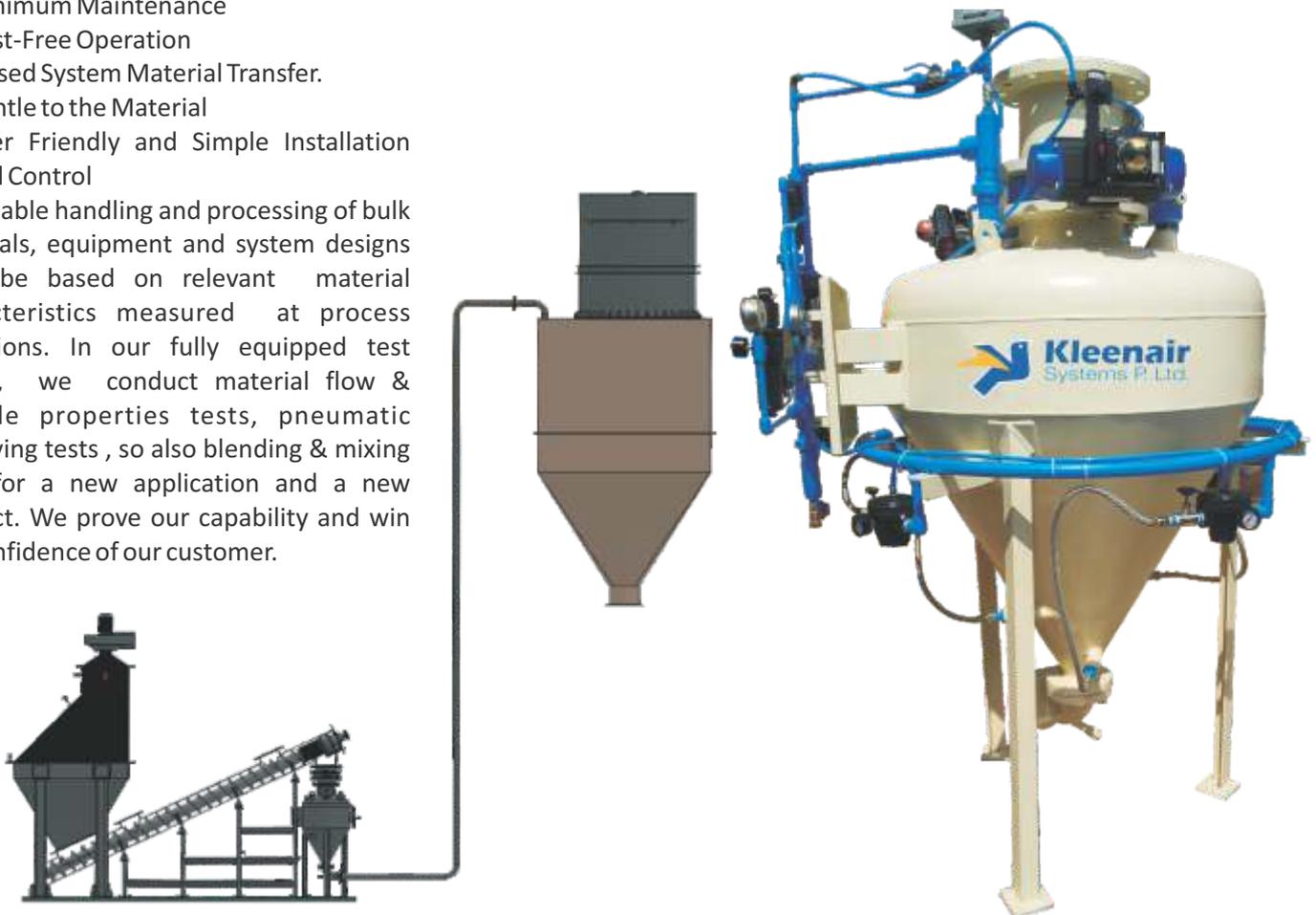
Our Pneumatic Conveying Systems are :

- Economical to Install & Operate.
- Ensures contamination free transfer of material
- No Spillage / Wastage Involve
- Minimum Maintenance
- Dust-Free Operation
- Closed System Material Transfer.
- Gentle to the Material
- User Friendly and Simple Installation and Control

For reliable handling and processing of bulk materials, equipment and system designs must be based on relevant material characteristics measured at process conditions. In our fully equipped test facility, we conduct material flow & particle properties tests, pneumatic conveying tests, so also blending & mixing tests for a new application and a new product. We prove our capability and win the confidence of our customer.

### Broad Classification of Pneumatic Conveying System

Dilute Pressure	<1 kg/cm <sup>2</sup> (10000 mm WC) >	Dense Pressure
Dilute	<15-20 kg Material / kg of Air >	Dense
Dilute Vacuum	<300 mm Hg >	Dense Vacuum
Dense	<18 mtr/sec air Velocity >	Dilute
Dense	<Product Velocity>	Dilute
Dilute: Product Velocity = air Velocity		





## Dense Phase Conveying Systems



**Dense Phase Conveying Systems** use less amount of air to move a large amount of bulk material. As the conveying velocities are lower, dense phase conveying systems are most suitable for highly abrasive material and fragile products.

Materials can be conveyed to long distances using higher conveying pressures. Dense Phase system achieves high material conveying rates at lower velocities.

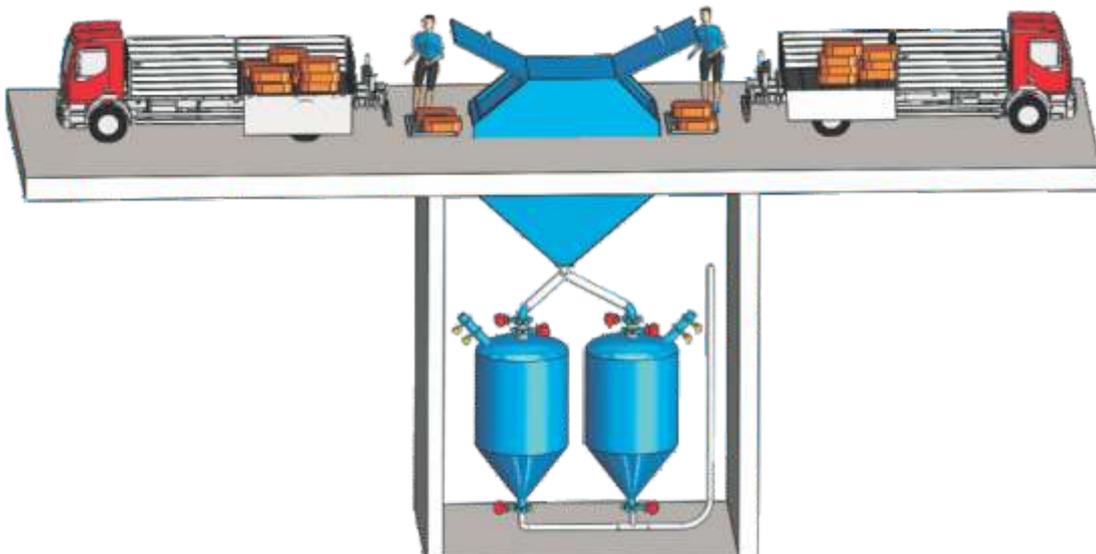
Kleenair's state of art air management system along with smart control used for dense phase ensure that systems are efficient with minimum product degradation or abrasion.

In **Dense Phase Pressure Conveying** material is loaded into a transporter vessel until it is full, sensed by level indicator or load cell. The material inlet valve as well as a vent valve is then closed and a compressed air is then metered into vessel. This compressed air then pushes material through pipeline at a slow speed which causes less abrasion and degradation of the material and the system.

These systems generally operate on a batch basis where transporter vessel is repeatedly filled with material. To

ensure smooth conveying of material, the air pressure and velocity of the material is controlled through a panel of supplementary air valves and sensors.

For continuous conveying or to handle very high throughput twin vessels mounted either side by side or in one above another configuration, are used-when one vessel is under filling, another vessel is under conveying mode. The use of air is optimized by using supplementary air & other intelligent control.





## Dense Phase Conveying Systems



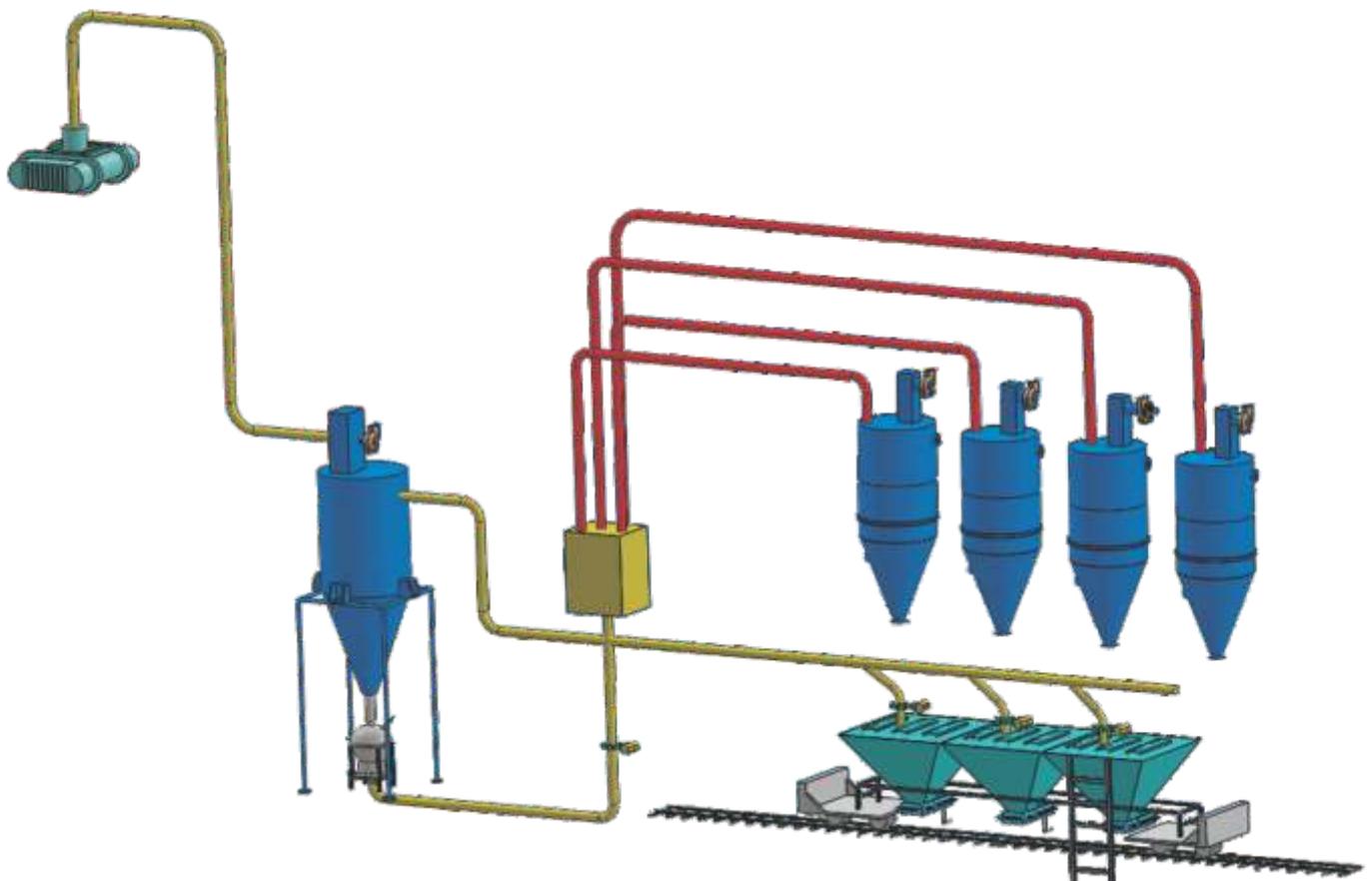
**Dense Phase Vacuum Conveying** utilizes high capacity vacuum pump to convey the material from a rail unloading wagon or truck Hopper to product Silos located close to unloading point ,which are equal in capacity of unloading wagon or truck volume. The material from this silo is then transferred inside the plant by using same vacuum source .

A vacuum pump which is set at full vacuum condition & lowest amount of air, draws material at very high material to air ratio into the pipeline and at receiving vessel a high efficiency bag filter separates the material from air and material discharges in to silo.

The material is conveyed through the pipeline at a controlled low velocity usually in a fluidized state to reduce friction and pressure drop.

Valves and sensors are used throughout the system to control applied vacuum, product fluidizing settings and velocities at all part of the system to ensure smooth reliable conveying of the product.

The low convey velocities and vacuum method make it suitable for unloading materials at high throughput from rail cars/wagon or trucks.





## Dilute Phase Conveying Systems

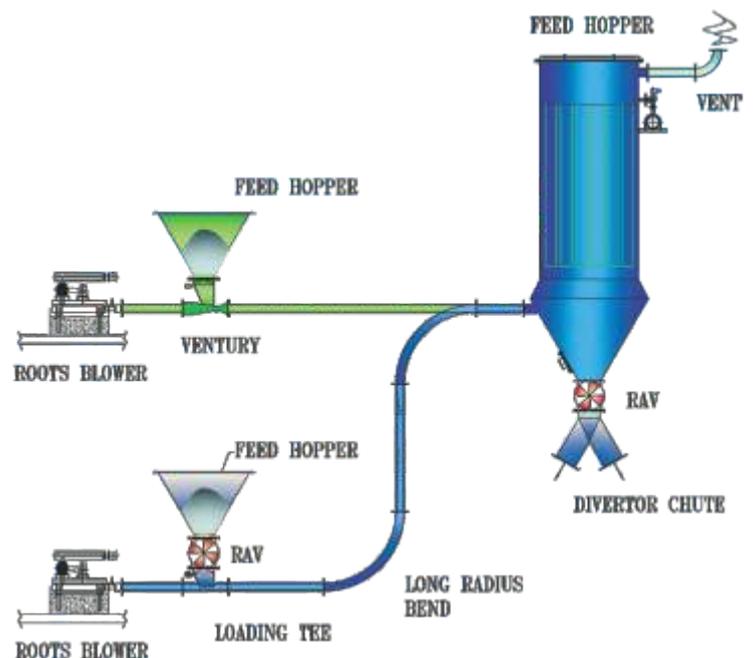


**Dilute Phase Pressure Conveying Systems** are used to convey bulk materials from one single source to one or multiple destinations, over long distances and with high capacity. Pressure type systems usually use blower as prime mover & the pick-up velocities are lower.

It is based on the simple concept of providing sufficient air to entrain, suspend and transport particles through pipeline. Pressure system generally use rotary airlock as a feed device. Most suitable for raw materials of coarse particle size. Lower power consumption than vacuum systems.

### Specific Characteristics are :

- From one source to one or more collection points
- Low pressure with high conveying velocity
- Suitable for non or mildly abrasive products





## Dilute Phase Conveying Systems



### Dilute Phase Ventury Conveying

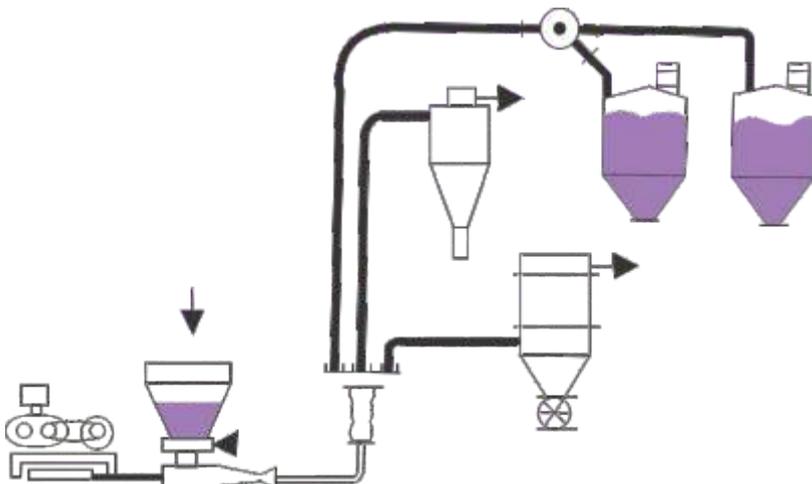
Ventury eductors convert the blower output into a vacuum which entrain and feeds powders, pellets and bulk solids. The benefits are :

- No moving parts and no maintenance.
- No blowback and no mechanical shearing
- Replaces problematic, non performing and maintenance prone rotary valves.
- Best suitable for abrasive, fine & irregularly shaped products.
- Applications as diverse as Powders, Plastics, Chemicals, Food & Dairy, Mining industries.

### Fan Conveying

The pressure or vacuum is created by high pressure centrifugal fan.

- This conveying is used when distances as well conveying capacities are low.
- Suitable for non free flowing, tacky, fibrous materials.
- Mostly used for pick-up of material from discharge of pulverizers, dryers, kiln.
- The material to air ratio is very low.
- Also used for product cooling/heating while conveying.





## Dilute Phase Conveying Systems

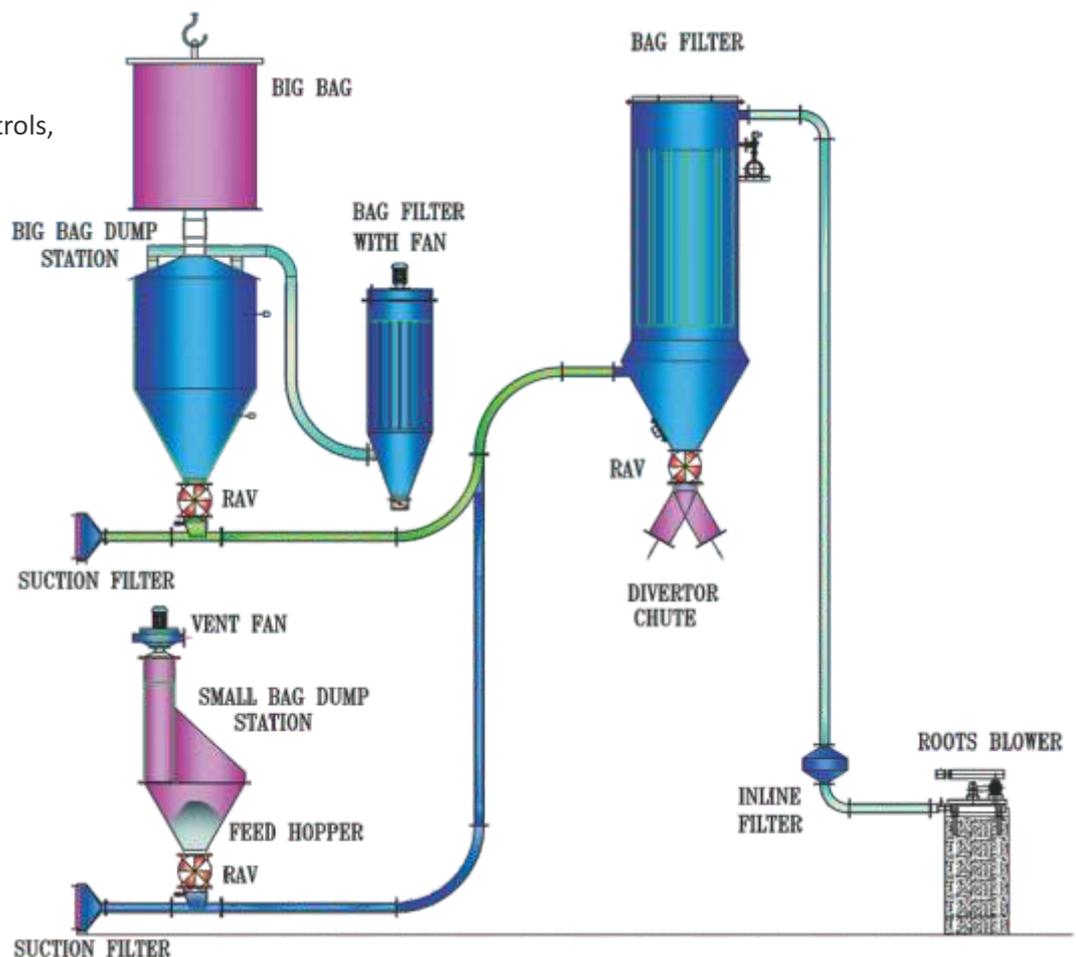


**Dilute Phase Vacuum Conveying System** works on high pick-up high velocity, continuous vacuum conveying systems for short and medium distances. Vacuum type usually use blower or fan for prime mover. It works on negative pressure for conveying the material from one or multiple pick up points to one discharge point. With Vacuum conveying, materials are drawn to the delivery point through a totally

enclosed pipeline, in a clean, contained stream of air generated by a vacuum blower. As the air & material is drawn inside the pipe-line by vacuum, best suited for materials which are hazardous/toxic. As little higher pick-up velocities are used, the vacuum conveying systems may consume higher power if not designed correctly.

### Specific Characteristics are :

- Multiple pick up points,
- Low cost & maintenance ,
- Operates on fairly simple controls,
- Constant flow operation





## Mixing & Blending



Kleenair Mixers and Blenders contribute to efficient material mixing and blending immediately upon start up. From pilot scale to full scale, Kleenair Batch & continuous mixers deliver fast and continuous mixing of powders, pellets, granules and other dry solids. Batches of materials having high variations in bulk densities & quantities along with varied particle size can be homogeneously mixed in minutes without product segregation.

### **Intensive Mixer :**

The twin shaft paddle type intensive mixer, mixes the product in most homogeneous manner irrespective of variations in bulk density, particle sizes and quantities. The specially designed paddles when rotating creates a budding bed, where new surfaces of materials gets exposed to achieve a uniform mix in shortest possible time.

This action also helps to mix liquids additives in small proportions in the solid without agglomeration.

The specialized discharge arrangement at bottom ensures that entire material is discharged.

The top door arrangement can be made suitable to ensure that no material is left inside the mixer making it suitable for food / pharma / chemicals / bakery products.

The sanitary finish designs can be provided with CIP nozzles for quick cleaning of mixer. The power requirements are minimal and no product segregation during discharge.

Available from 60 ltrs to 5000 ltrs capacity.

Kleenair also offers intensive mixers for continuous mixing and also for drying of powders.

### **Food Industry**

- Dairy powders
- Flour/bakery mixes
- Frozen vegetables
- Instant drinks/soups
- Spices
- Flour

### **Chemical Industry**

- Pigment
- Dyestuff
- Chemicals
- Pesticides
- Detergent.
- Explosives
- Fertilisers

### **Feed Industry**

- Animal feed
- Mineral premixes
- Aqua/fish feed
- Petfood

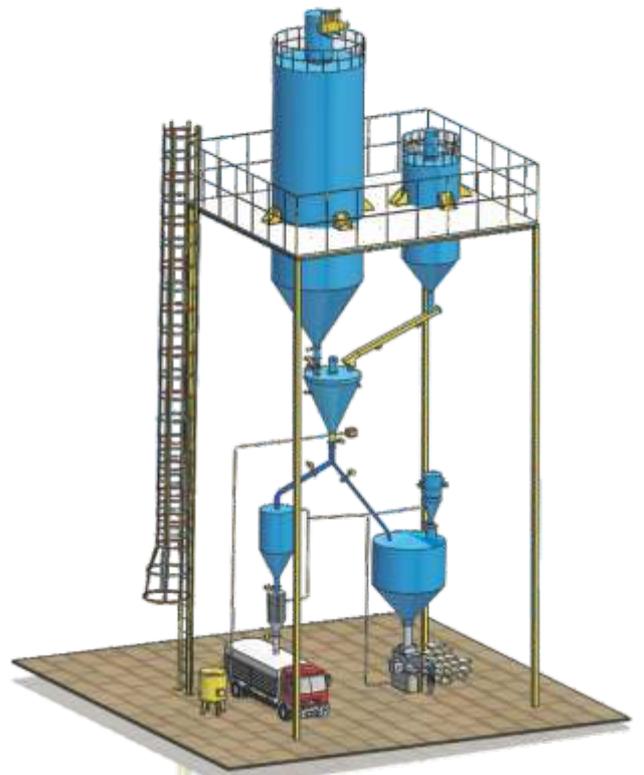
### **Building Industry**

- Mixing of various cement additives
- Fly ash with cement and other additives.

### **Environmental**

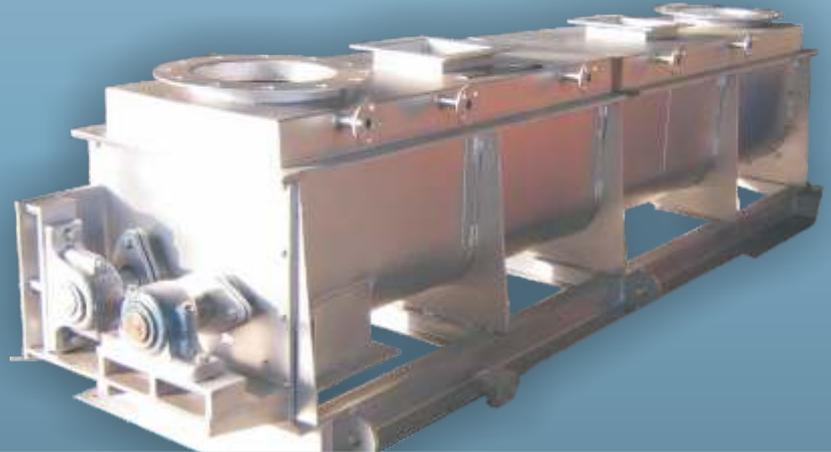
- Sewage sludge
- Food waste

### **Typical Cement Flyash Mixing/Blending System**





## Mixing & Blending



### **Air Blenders**

Air blenders are one of the most efficient, fastest and also cleanest method of powders blending to achieve a uniform and homogenous product mix.

It is most suitable for abrasive materials, fine powders, granular materials so also light and fluffy materials.

The blender comprises of air pulsing valves which provides the small air pulses to the materials through various angles making them fluidized and lift upward to get mixed. The baffles provided in the chamber ensures that material are mixed thoroughly. The uniformity in blending is achieved by variation in compressed air flow, pressure and intensity of pulsing. The important feature is minimal working part and hence negligible maintenance.

Provides quick blending with control, virtually no maintenance, cleanliness operation process, Also available in stainless steel, dairy finish, Sanitary finish or quick clean construction with CIP nozzles.

### **Continuous Paddle Mixers**

Kleenair offer paddle mixers to mix two/three ingredients on continuous basis. These mixers are suitable for direct addition of liquid to powders.

The blending time and quality can be controlled by offering various designs of paddles, their backward or forward motion and also the speed.

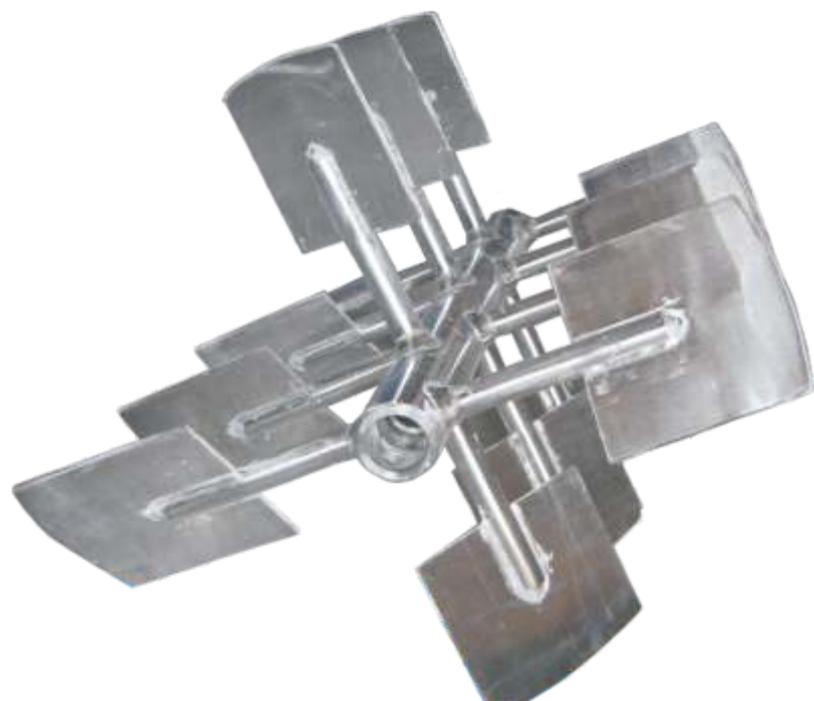
These mixers are also ideal for mixing powders in the cake, during feed of cake to driers. The moisture in the cake is can be brought down by adding dry powder to cake to get a friable cake suitable for drying operation.

They are also used as coolers/heaters for powders by providing external jackets and by circulating water thru the shaft and paddles.

Available in varied sizes and material of construction.

### **Ribbon Blenders**

Kleenair offers ribbon blenders in various sizes from 100 ltrs to 10000 ltrs capacity in variety of material of construction as well configurations of blending ribbons, to mix various powders in shortest possible time.





## Big Bag Discharger



**Big Bag Discharge** are most useful to unload materials from jumbo bags with minimum manual interface and to ensure safe operation.

BIG BAG DISCHARGING SYSTEMS eliminates dust emission, product loss and contamination. It can be customized to suit systems taking into account all customer specifications regarding type of product, type of bag, environmental aspects, system capacity and budget.

Every Discharge Unit can be supplied with a wide range of ancillary equipment such as Rotary Air Locks, Screw Conveyors, Pneumatic Conveying, dosing and weighing equipments, for further dosing and conveying of the discharge product.

Can be provided for jumbo bags carried by fork lifts as well for unloading of jumbo bags with 1 or 2 Ton electric hoist controlled by pendant.

Provided with bag lift spreader or bag agitator for easy discharge of fine powders which tends to pack in the bag while storing.

Adjustable height bag spreader supports.

### Specific Characteristics are :

- Modular design allows to use any where for variety of process requirements.
- Safe and clean & dust free working environment
- Safe handling of toxic and explosive powders
- Applicable for different conveying and storage systems
- Easy to clean



## Bag Dump Station



**Kleenair Bag Dump Station** collect dust generated when dumping powder and bulk solids from bags, boxes, drums and containers. The discharge of bag-dump is fed to pneumatic conveying line or to other processes such as vibro-feeders, process reactors, weigh hoppers, bins etc.

The system reduces material waste and eliminates the need to clean a remote dust collections, while protecting workers & preventing plant contamination. When the material must be dumped from bags, Kleenair bag dump station provides operators with a means for doing so at a convenient level, with less chance of material spillage and with provision for evacuation of any dust that may result from dumping.

### Specific Characteristics are :

- Carbon steel construction with a painted exterior and a mill-finish interior
- Options in stainless steel/pharma grade, CIP construction in various finish.
- Easily changeable & cleanable filter cartridges
- Suitable for small capacity
- Easily installable & quiet operation.
- Heavy duty fabricated construction
- Light weight access door, control discharge by providing rotary air lock valves





## Storage, Weighing, Batching



**Storage Systems** are designed to maximize the space and utility with efficient silo discharge devices and dust control. **Weighing and Batching** include precision load cell based systems integrated with automatic valves and PLC.

The combination gives precise weighing, metering and dosing of products to the downstream processes for consistent batch quality. Many Powder Handling systems require weighing of large amounts of material and the preparation of product batches for ingredient formulations. Typical applications are for food mixes, breakfast cereals, pharmaceuticals and many others. Custom-engineered systems increase output and product consistency, eliminates waste and generate production data.

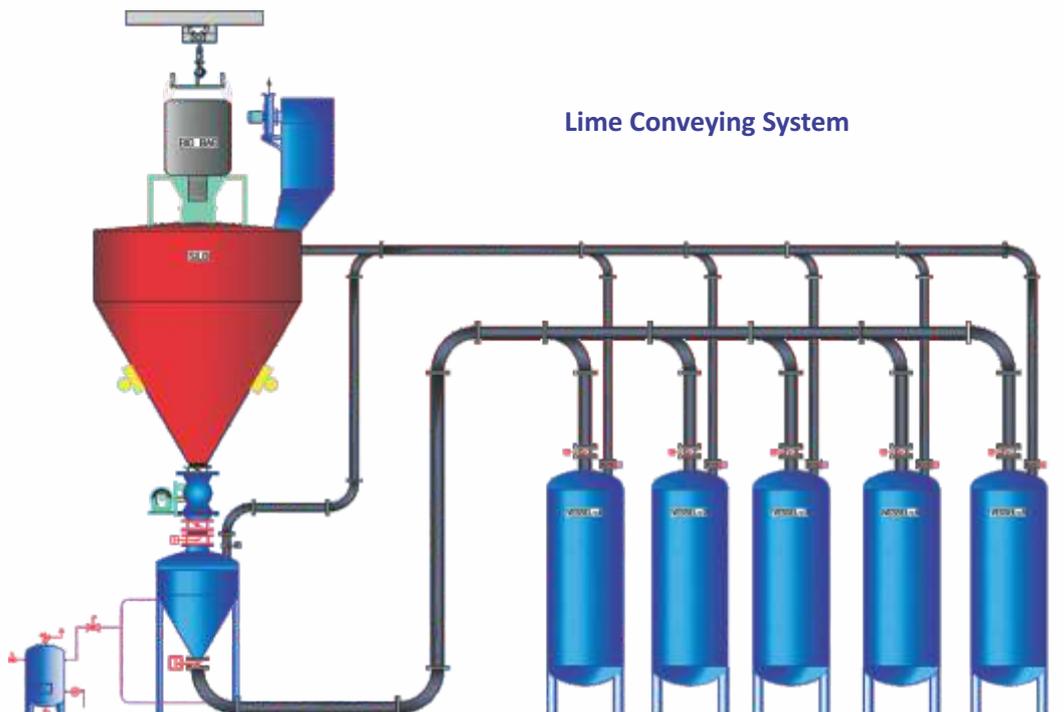
The **Weighing and Batching Systems** provided by Kleenair are widely used for weigh measurement of various material irrespective of any size and count. This range of system can be upgraded as per customers requirement.

They can also upgrade the levels of automation, data capture and automatic feedback based process of the systems.

High accuracy load - cells and weigh controls electronics.

Major, Minor and Micro ingredient dosing systems. Safe, Sanitary and dust free system.

The Control and recipe management done by using SCADA/HMI Software for process visualization, inventory control & reporting functions for management information system.



**Lime Conveying System**



## System Accessories



### Rotary Air-lock Valves/dischargers :

Available in cast as well as fabricated construction.  
Sizes available from 100 mm to 1000 mm with square or circular inlets.  
Various rotor configurations.  
Special valves for abrasive duty conditions  
Airlock available for pressure differential.  
Drop thru/off-set/blow thru designs available.

### Industrial Dampers :

Butterfly type dampers suitable for various diameter/temperatures.  
In various MOC and for medium pressure differential .  
Automation by pneumatic or electric actuation



### Slide Gate Valves :

Available from 100 mm to 500 mm size.  
In square/circular disc configuration.  
Slide gates available in various MOC to suit product and process conditions.  
Actuation by pneumatic/electric actuators.

### Expansion Bellows For Ducts :

Available for different diameter ducts in either circular/square or rectangular configuration.  
Special MOC for higher temperatures upto 900 deg.





## System Accessories



### **Screw Conveyors :**

Available from 100 mm to 500 mm sizes-  
single/twin/three or four shaft configuration.  
In various flight pitch configurations . Wear  
resistant flights for abrasive materials .



### **Air Slides :**

Available from 100 mm size up-to 450 mm.  
complete dust tight enclosure with fluidization by  
either compressed air/roots blowers or by high  
pressure blower. Aeration media available for  
various temperatures.



### **Silo Dischargers/ Air Cannon :**

Works on minimum compressed air requirement  
on Long lasting internal parts.



### **Diverter Chutes/flow Diverters :**

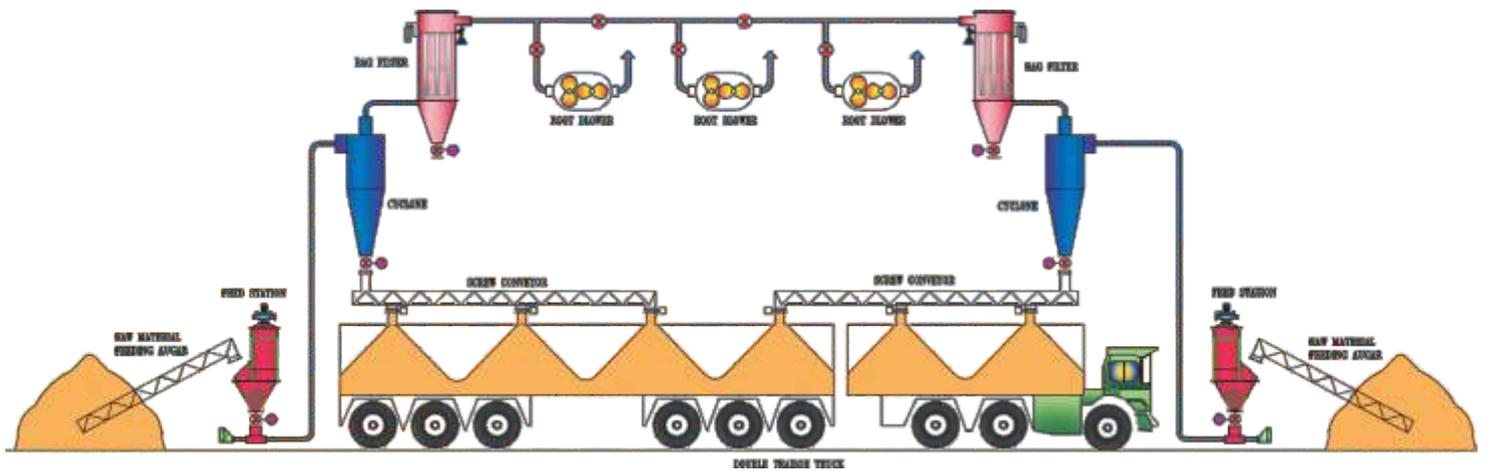
For diverting the flow of material to 2 or 3  
discharge stations.  
Leak proof design .  
Automation by pneumatic/electric actuation,



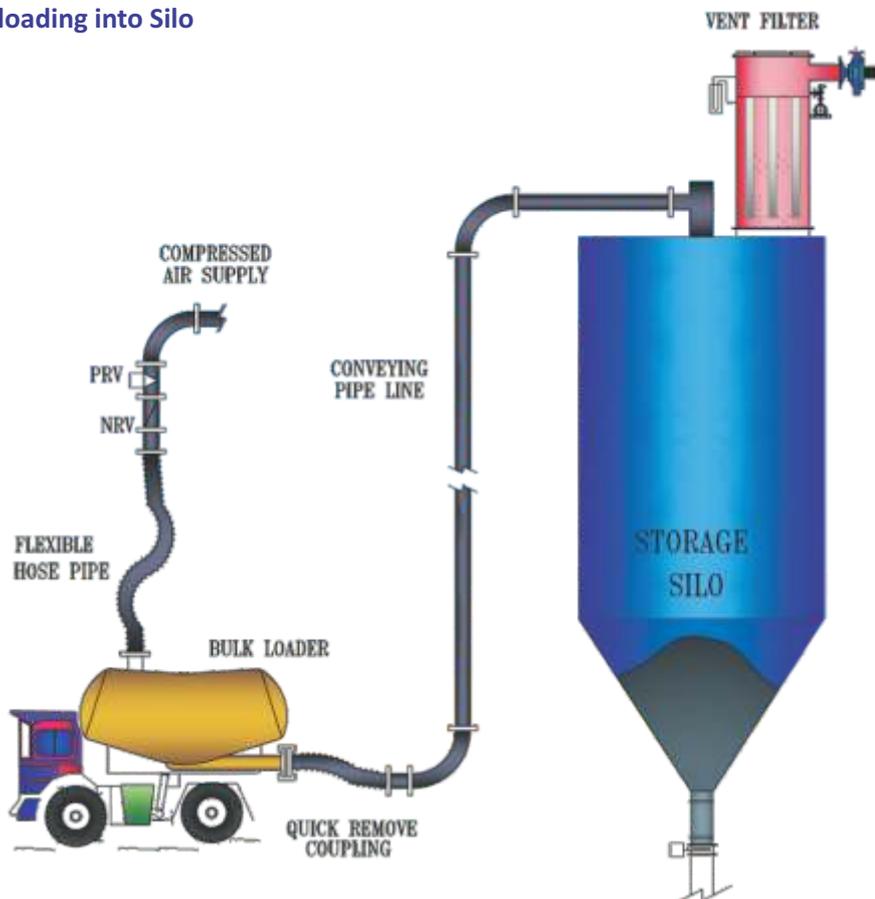


## Schematic

### Agro Product Feeding System into Container



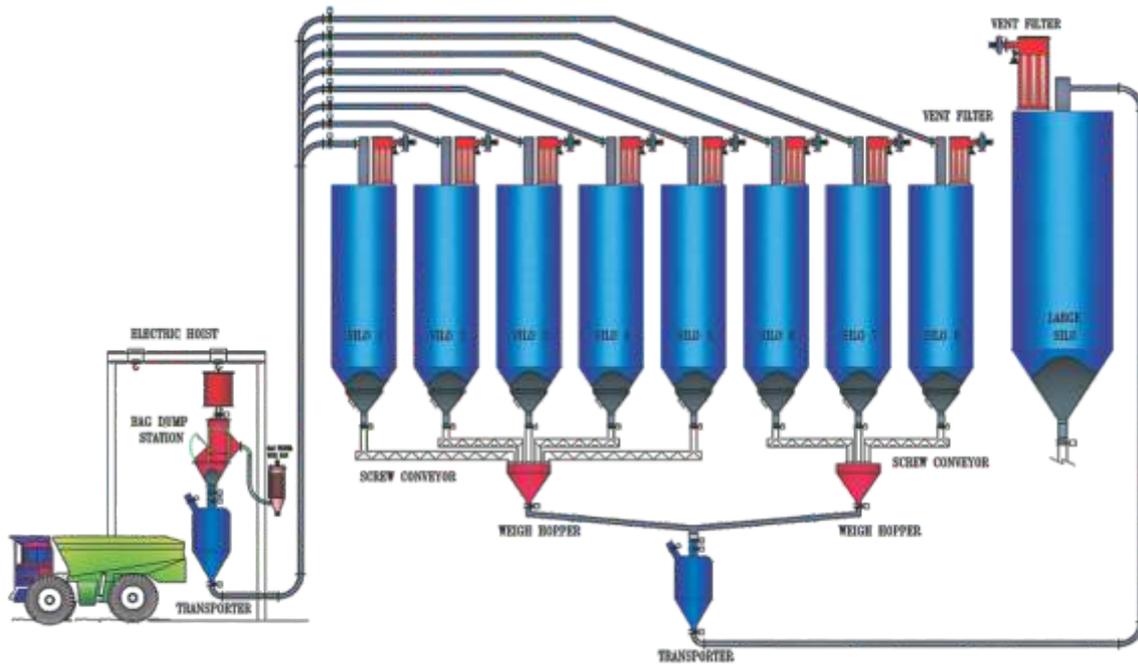
### Bulker Unloading into Silo



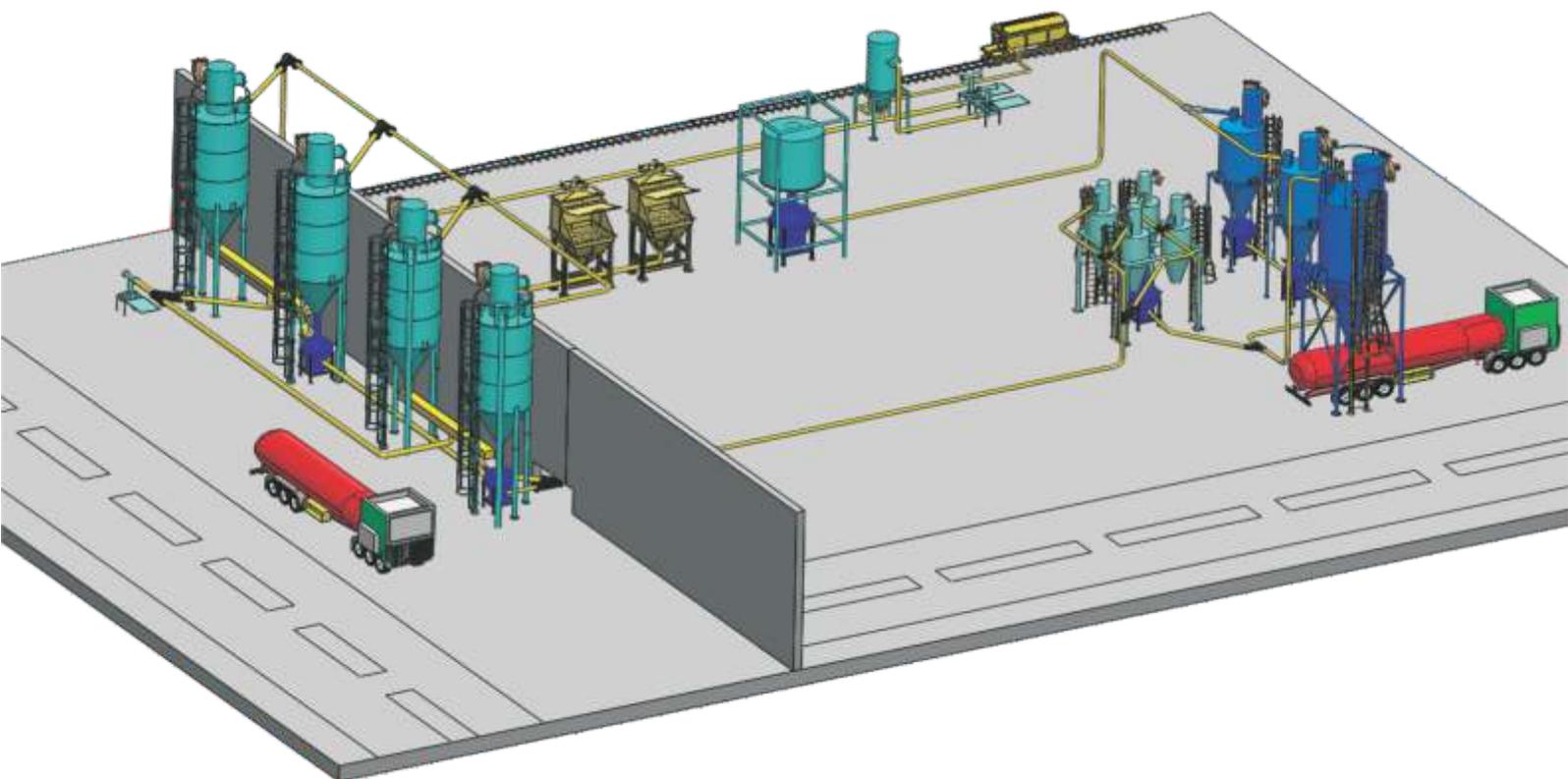


## Schematic

### Batching, Weighing and Material Transport Scheme



### Raw Material unloading into Silos and Product Despatch System





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