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Commercial Grain Dryers

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A Commercial grain dryer is a machine used to dry large quantities of grain such as corn, wheat, rice, and soyabean. It is commonly used by farmers, grain elevators, and food processing companies to reduce the moisture content in grains to a safe level for storage and transportation.

Types of grain dryers

- Recirculatory batch dryer (RPEC).
- Tray dryer.
- Solar dryer.

Recirculatory batch dryer

- This is continuous flow non-mixing type dryer.
- This dryer was developed at rice processing engineering centre, IIT, Kharagpur.
- It consists of two concentric circulars made of perforated sheets of 20 gauge. The cylinder is set about 20cm apart, to move the grain downward.
- These two cylinders are supported on four channel sections.
- A bucket elevator of suitable capacity is provided to feed and recirculate the grain into the dryer.
- A centrifugal blower blows the hot air into the inner cylinder which act as a plenum.
- The hot air from the plenum passing the grain moving downward by gravity and comes out of the perforated cylinder.
- A torch burner is employed to supply the necessary heat with kerosene oil as fuel.
- RPEC dryers are made for half, one and two tones holding capacities.

What are the advantages of a recirculating batch dryer?

Re-circulating batch dryers have several advantages over the cheaper fixed-bed batch dryers:

- Very small floor space is required.
- Continuous mixing of the grains results in very low moisture content variation.
- During circulation, the grain is tempered, which improves drying efficiency and grain quality.
- Automatic controls with automatic shutoff make the dryer virtually fully automatic.

What are the disadvantages of recirculating batch dryer?

- Recirculatory batch dryer is that it may not be suitable for materials that require a very low moisture content or a specific drying temperature.
- The dryer may also require regular maintenance to ensure that the heating and circulation systems are functioning properly.
- The initial cost of purchasing and installing a recirculating batch dryer may be higher than other types of dryers.

Tray dryer

- Schematic of a typical batch dryer.
- Tray dryers usually operate in batch mode, use racks to hold product and circulate air
- over the material.
- It consists of a rectangular chamber of sheet metal containing trucks that support racks.
- Each rack carries a number of trays that are loaded with the material to be dried.
- Hot air flows through the tunnel over the racks. Sometimes fans are used to on the
- tunnel wall to blow hot air across the trays.

- Even baffles are used to distribute the air uniformly over the stack of trays.
- Some moist air is continuously vented through exhaust duct; makeup fresh air enters
- through the inlet.
- The racks with the dried product are taken to a tray-dumping station
- These types of dryers are useful when the production rate is small.
- They are used to dry wide range of materials, but have high labour requirement for
- loading and unloading the materials, and are expensive to operate.
- They find most frequent application for drying valuable products.
- Drying operation in case of such dryers is slow and requires several hours to complete
- drying of one batch.
- With indirect heating often, the dryers may be operated under vacuum.
- The trays may rest on hollow plates supplied with steam or hot water or may
- themselves contain spaces for a heating fluid.
- Vapour from the solid may be removed by an ejector or vacuum pump.

What are the advantages of tray dryer?

- No loss of substance during handling.
- it is a batch dryer so that small amount of wet solid mixture can also be dried.
- Easier to operate and repair.
- Good control on heat and humidity.
- It may be operated under vacuum.

What are the disadvantages of tray dryer?

- It is not suitable for large scale production.

- High labour requirement.
- Time consuming method.

Solar Dryer

1. Function Drying of fruits, vegetables, and agricultural commodities.
2.Specification
(i) Collector area 2.4 x 1.8 m.
(ii) Type and Model Step type, 40.
(iii) Number of trays 10 in five steps.
(iv) Insulation (Bottom) Glass wool, 10 cm thick.
(v) Motive power Natural convection.
3. General Information.

- Step type solar dryer has a collector area of about 4.32 m^2.
- This multi-track step type dryer can hold 10 aluminium trays at a time.
- The absorber is 20-gauge GI sheet, black painted at the top with bottom insulation.
- The drier is covered at the top with 2 layers of 3 mm thick plain glass kept
- at an air gap of 2.5 cm. At the rear side of the collector, two chimneys of 120 cm height are provided. Chimneys
- are provided with butterfly valves to control the movement of air.
- Holes provided at the bottom of the collector just below the first step allow the entry of atmospheric air into the dryer.

What are the advantages of solar dryer?

- Solar dryers are more economical compared to dryers that run on conventional fuel/electricity.
- The drying process is completed in the most hygienic and eco-friendly way.
- Solar drying systems have low operation and maintenance costs.
- Solar dryers last longer.

What are the disadvantages of solar dryer?

- Drying can be performed only during sunny days, unless the system is integrated with a conventional energy-based system.
- Due to limitations is solar energy collection, the solar drying process is slow in comparison with dryers that use conventional fuels.