



# ROHINI

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

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## DEPARTMENT OF AGRICULTURAL ENGINEERING

### AI3601 POST- HARVEST TECHNOLOGY

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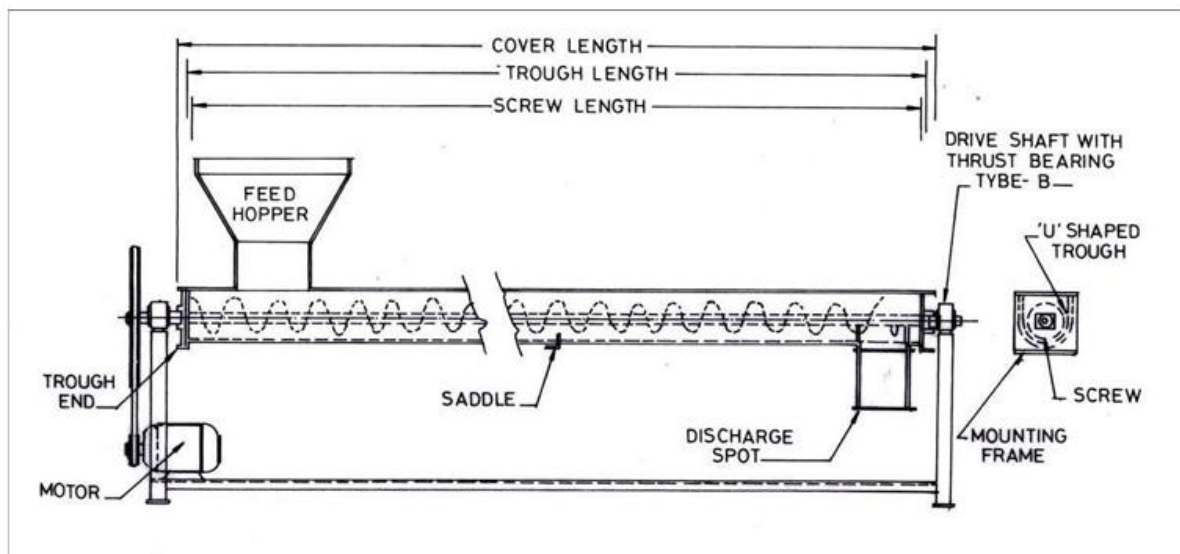
## UNIT IV: SHELLING AND HANDLING

**CO4:** To understand the operation of post-harvest equipment like shellers and conveyors.

### Screw Conveyor

A screw conveyor is a mechanical conveying device used to transport bulk materials such as grains, powders, and semi-solids. It consists of a rotating helical screw (auger) enclosed in a trough or tube, which moves the material along its length.

#### Major components and their functions:



- **Screw (Flights):** Helicoid or sectional flights welded to a pipe.
- **Trough or Tube:** Encloses the screw (tube for vertical/inclined, trough for horizontal).
- **Drive unit:** Motor and gearbox at one end.
- **Inlet and outlet spouts.**
- **Hanger bearings:** Support the screw at intermediate points in long horizontal conveyors.

#### Working principle:

A screw conveyor consists of a helical screw (auger) rotating inside a trough or tube. When the screw rotates, the material is pushed forward along the axis of the screw due to the rotational motion.

- Material enters through the inlet.

- The rotating screw moves it forward.
- Material is discharged at the outlet.

### **Types of screw conveyor:**

- **Based on inclination:**
  - Horizontal: standard trough design.
  - Inclined: efficiency drops as angle increases (>45° requires a tubular housing).
  - Vertical: used for lifting grain (e.g., filling silos).
- Based on flight type:
  - Continuous flights: general purpose.
  - Ribbon Flights: for sticky materials (prevents buildup).
  - Paddle Flights: for mixing while conveying.

### **Advantages of screw conveyors:**

- Low cost and simple to maintain.
- Totally enclosed (dust control, weather-proof).
- Can handle multiple inlets and outlets.
- Excellent for vertical space utilization.

### **Limitations of screw conveyors:**

- High grain damage: Grinding and cracking at flight edges and between flight and casing.
- High power consumption.
- Limited length (typically < 150 ft for single drive).
- Wear and tear on flights and trough is high, especially with abrasive materials like sand or shelled corn.

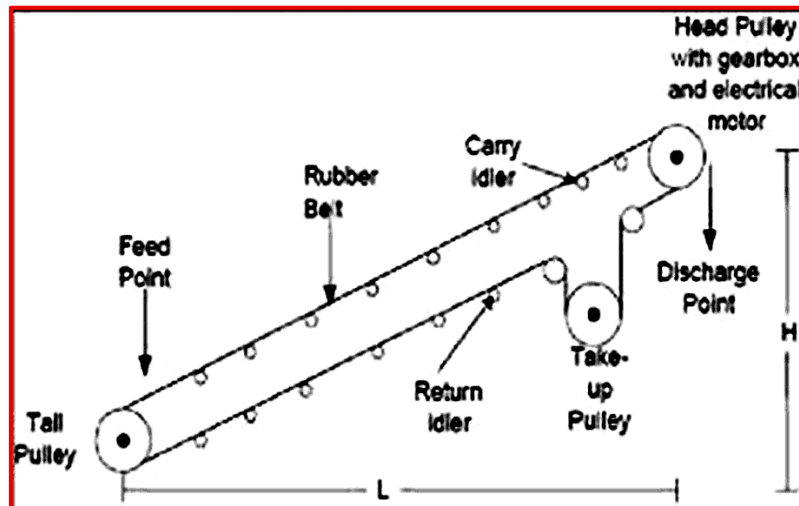
### **Applications of screw conveyors:**

- Farm augers: filling and emptying grain bins.
- Feed mills: moving ground meals and mash.
- Under-dryer discharge: removing dried grain from the bottom of a bin dryer.
- Fertilizer and chemical handling (due to enclosed nature).

## Belt Conveyor

A belt conveyor is a widely used material handling system for transporting bulk materials like grains and crops over short to long distances. It consists of a continuous moving belt supported on rollers and driven by a motor to carry materials efficiently.

### Major components and their functions:



- **Belt:** Rubber, fabric, or PVC – the carrying medium.
- **Head pulley (Drive):** Powered pulley at the discharge end.
- **Tail pulley:** Non-powered pulley at the loading end.
- **Idlers:** Rollers that support the belt (carry idlers on top, return idlers below).
- **Frame:** Structural support.
- **Loading hopper / chute:** To feed material centrally.

### Working principle:

A belt conveyor consists of a continuous moving belt mounted on pulleys.

- The belt is driven by a motor-driven pulley.
- Material is placed on the moving belt.
- The belt carries the material to the discharge point.

### Advantages of belt conveyors:

- Gentle handling: Ideal for seeds and grains prone to cracking (e.g., maize, peanuts).
- High capacity over long distances.

- Low power consumption relative to capacity.
- Can handle a wide variety of materials.

**Limitations of belt conveyors:**

- High initial cost (belt and idlers).
- Not suitable for high-temperature materials.
- Belt can be damaged by sharp or oily materials.
- Inclines are limited (typically  $< 20^\circ$  for grain, requires special belts for steeper angles).

**Applications of belt conveyors:**

- Receiving pits: Moving grain from truck unloading into the facility.
- Grain dryers: Loading and unloading of columnar dryers.
- Sorting / grading lines: Transporting fruits or vegetables gently between inspection tables.
- Long-distance transfer between storage bins in a flat storage building.