



# ROHINI

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

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## DEPARTMENT OF AGRICULTURAL ENGINEERING

### AI3601 POST- HARVEST TECHNOLOGY

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## UNIT V: CROP PROCESSING

**CO5:** To use different post-harvest operations and processing methods of harvested crops.

### Rice Polishers

#### Introduction to Rice Polishing:

Rice polishing is an essential unit operation in post-harvest processing. After paddy is milled to remove the husk (dehusking) and produce brown rice, a layer of bran remains on the kernel. The purpose of rice polishing is to remove this bran layer to yield white, polished rice (also called milled rice).

#### Why Polished Rice?

- **Appearance:** Consumers prefer white, translucent rice.
- **Cooking Quality:** Polished rice cooks faster and has a softer texture.
- **Storage:** Removing bran (which contains fats that can rancidify) extends the shelf life of rice.

#### Types of Rice Polishers:

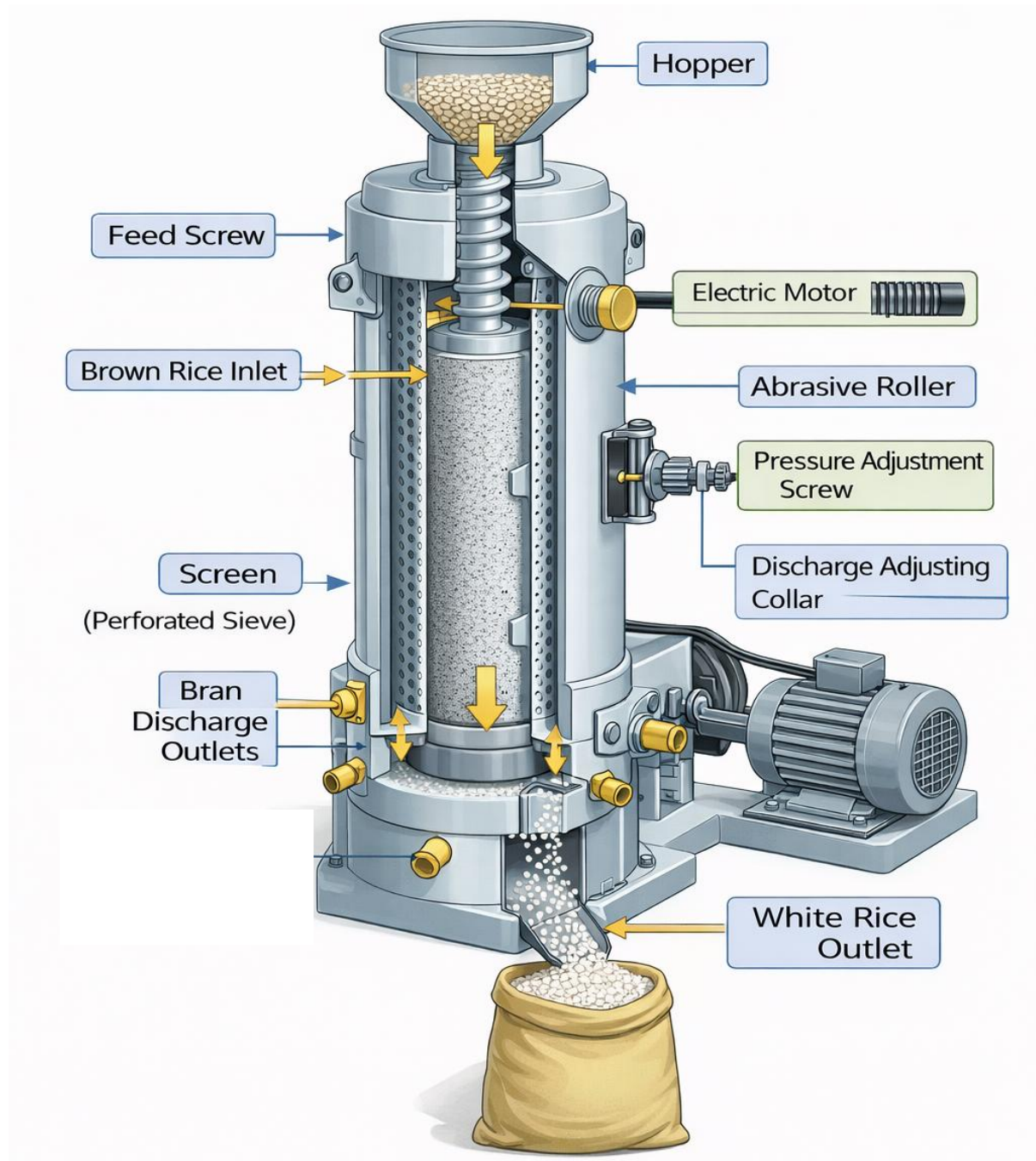
Rice polishers are broadly classified into two main types based on the principle of operation and the mechanism that applies the abrasive or frictional force.

Type	Principle	Mechanism	Output Quality	Common use
Abrasive Polisher	Abrasion	Emery or carborundum stones/rollers cut away the bran.	Matte finish, less shiny.	First pass (whitening)
Friction Polisher	Friction (Shearing)	Steel rollers create pressure between kernels to rub off bran.	Glossy, shiny finish.	Final pass (polishing)

### Abrasive type Rice Polisher:

**Principle:** It uses a rotating abrasive roller (coated with emery or carborundum) that literally cuts or scrapes off the bran layer from the brown rice surface.

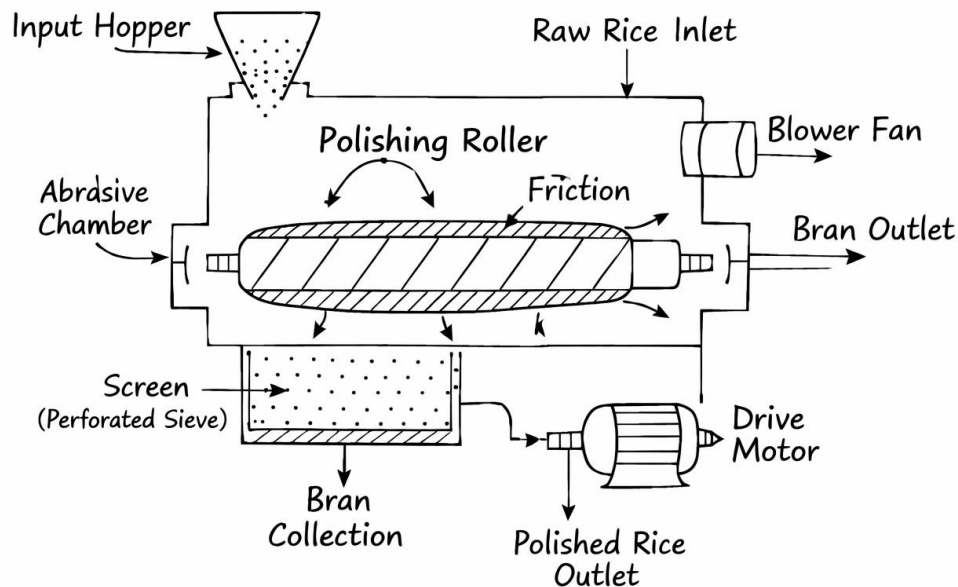
**Typical application:** Used as a whitening machine (the first stage of polishing).



### Friction type Rice Polisher:

**Principle:** It consists of steel rollers that create high pressure within the polishing chamber. The rice-to-rice friction causes the bran to be rubbed off, resulting in a smoother and shinier surface.

**Typical application:** Used as a polishing machine (the final stage to add polished appearance).



### Combination Polisher

**Principle:** Modern machines integrate both actions. The first section uses abrasion to remove the bulk bran, and the second section uses friction to polish the rice to a glossy finish in a single pass.

### Constructional details of a typical Rice Polisher:

While designs vary, most rice polishers have common constructional features.

- i) **The Hopper (Inlet):** A funnel-shaped container at the top that holds the brown rice. Equipped with a feed gate or control valve to regulate the flow of rice into the polishing chamber.
- ii) **The polishing chamber:** This is the heart of the machine, consisting of:
  - perforated metal screen: a cylindrical mesh or screen that surrounds the roller. It allows the removed bran powder to escape while retaining the rice kernels inside the chamber.

- rotating roller assembly: For abrasive polishers, a rotating shaft fitted with cylindrical emery stones or abrasive ribs; for friction polishers, a rotating shaft fitted with special steel ribs or a solid steel roller designed to create pressure.
  - Pressure mechanism: a weighted gate or adjustable cone at the discharge end (outlet) that creates back pressure. By increasing the resistance at the outlet, the residence time and friction inside the chamber increase, resulting in a higher degree of polishing.
- iii) **The Blower/Air Suction System:** A fan is attached to the screen housing. It creates a strong air current that sucks the fine bran powder passing through the perforated screen into a cyclone separator or a settling chamber.
- iv) **The Drive Unit:** An electric motor coupled to the main shaft via pulleys and V-belts to provide the required rotational speed (rpm).
- v) **Discharge outlet:** An opening at the bottom or end of the chamber where the polished white rice is collected.

#### **The Polishing Process:**

- i) **Feeding:** Brown rice from the hopper enters the gap between the rotating roller and the perforated screen.
- ii) **Mechanical action:**
- In an abrasive polisher, the rough surface of the emery roller cuts the bran layer off the kernel.
  - In a friction polisher, the high-speed rotation creates a helical path. The pressure gate at the end resists the flow, causing the kernels to rub violently against each other, shearing off the bran.
- iii) **Bran removal:** The fine bran powder is pushed through the perforated screen by centrifugal force and is immediately sucked away by the air suction system to prevent it from clogging the screen or reattaching to the rice.
- iv) **Discharge:** The de-branned rice exits through the outlet. If a single pass is insufficient, the rice may go through a second polisher (usually a friction type) for a glossy finish.
- v) **Grading:** The polished rice is often passed over a length grader or indented cylinder to remove broken kernels before packaging.

**Key factors affecting polishing efficiency:**

- **Moisture content:** Rice with low moisture (below 12%) breaks easily. Ideal moisture level is 13-14%.
- **Pressure:** Higher pressure increases polishing but also increases the percentage of broken rice.
- **Roller speed:** Optimized rotational speed is critical for throughput and quality.
- **Screen condition:** Worn-out or clogged screens reduce bran removal efficiency.
- **Rice variety:** Long slender grains break more easily than short bold grains during polishing.