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COLLEGE OF ENGINEERING AND TECHNOLOGY

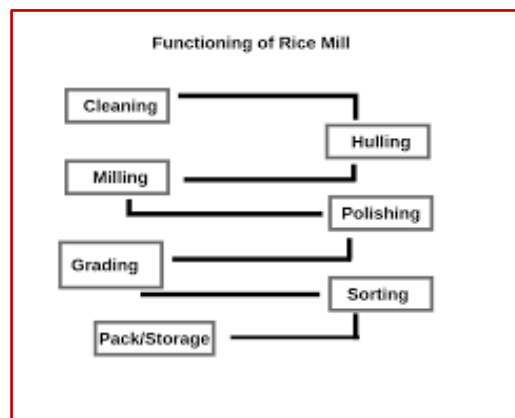
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DEPARTMENT OF AGRICULTURAL ENGINEERING

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.

Layout of Modern Rice Mill

A modern rice mill is an integrated processing facility designed to convert paddy into high-quality polished rice efficiently with minimal breakage and maximum recovery. The layout of a modern rice mill is planned to ensure continuous material flow from raw paddy intake to finished product output, with each section performing specific unit operations. Proper layout minimizes handling, reduces processing time, and maintains product quality.

Comprehensive Layout of a Modern Rice Mill:

i. **Raw paddy intake:**

Description: The process begins with the unloading of raw paddy from trucks or farm vehicles.

Equipment: Truck unloaders, hoppers, bucket elevators.

Material flow: Paddy is conveyed to the cleaning section using belt conveyors or bucket elevators.

ii. **Cleaning section:**

Purpose: To remove impurities such as stones, dust, chaff, straw, and metal particles.

Equipment:

- **Pre-cleaner:** Removes coarse impurities like straw and sticks.
- **Destoner:** Separates stones based on specific gravity difference.
- **Magnetic separator:** Removes iron and steel particles.

Material flow: Clean paddy moves to dehusking section; separated impurities are collected and disposed of.

iii. **Dehusking section:**

Purpose: To remove the outer husk from paddy and produce brown rice.

Equipment:

- **Rubber Roll Sheller:** Two rubber rollers rotating at different speeds shear off the husk.

- Aspirator (Husk suction): Separates the light husk from the brown rice by air flow.

Material flow:

- Husk is collected separately for use as fuel or animal bedding.
- Brown rice (with some unshelled paddy) moves to paddy separation section.

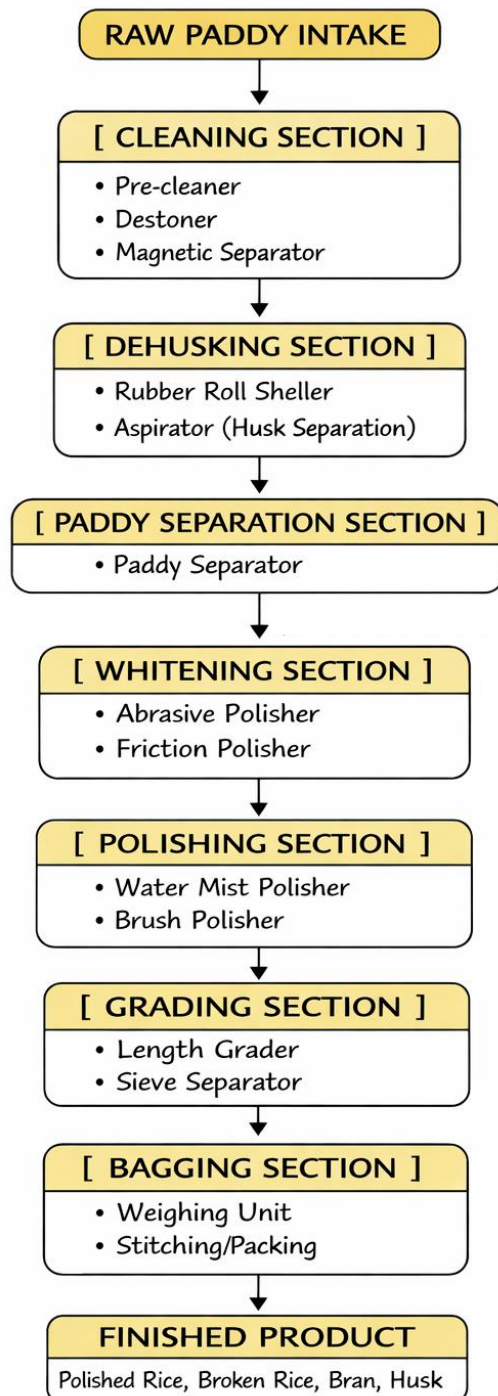


Fig. Comprehensive layout of Modern Rice Mill

iv. **Paddy separation section:**

Purpose: To separate the brown rice from unshelled paddy that escaped dehusking.

Equipment: Paddy Separator (Oscillating deck type or centrifugal type).

Material flow:

- Brown rice moves forward to the whitening section.
- Unshelled paddy is returned to the dehusking section for reprocessing.

v. **Whitening section:**

Purpose: To remove the bran layer from brown rice to produce white rice.

Equipment:

- Abrasive whitener (First pass): Uses emery rollers to cut off the bran layer.
- Friction whitener (Second pass): Uses steel rollers to create rice-to-rice friction for further bran removal.

Material flow:

- Bran powder is collected separately (used for oil extraction or animal feed).
- Partially whitened rice moves to the polishing section.

vi. **Polishing section:**

Purpose: To give a glossy, shiny appearance to the rice by removing any remaining bran dust.

Equipment:

- Water mist polisher: A fine spray of water is applied to polish the rice.
- Brush polisher: Soft brushes gently polish the rice surface.

Material flow: Polished rice moves to the grading section.

vii. **Grading section:**

Purpose: To separate head rice (whole kernels) from broken rice and classify by size.

Equipment:

- Length grader (Indented cylinder): Separates based on kernel length.
- Sieve separator: Separates by width and thickness.

Material flow:

- Head rice moves to bagging section.
- Broken rice (different sizes) collected separately for different markets.

viii. **Bagging section:**

Purpose: To weigh and pack the final products for dispatch.

Equipment:

- Electronic weighing scale
- Bag filling unit
- Bag stitching machine

Material flow:

- Polished rice, broken rice, bran, and husk are bagged separately.
- Finished products are stored or dispatched to market.

Advantages of Modern Rice mill layout:

- **Continuous flow:** Material moves continuously without manual handling.
- **Higher recovery:** Efficient separation reduces losses and improves yield.
- **Better quality:** Multiple polishing and grading steps ensure uniform, high-quality rice.
- **By-product utilization:** Husk, bran, and broken rice are collected separately for value addition.
- **Reduced breakage:** Gentle handling and optimized processing minimize kernel breakage.