FAQ

1. Name the various operations of rice milling.

Cleaning – Removes foreign matter, such as sand, stones, straw, seeds and pieces of iron from paddy.

Dehusking – Removes husk from the paddy with a minimum of damage to the grain.

Husk separation – Removes the husk from the mixture obtained after dehusking.

Paddy separation- Separates dehusked brown rice from remaining unhusked paddy, the paddy being returned for dehusking.

Polishing – Removes all or part of the bran layer from the brown rice to produce polished rice.

Grading – Separates brokens from unbroken rice. The broken are separated into different sizes.

Sorting – Optical sorters sort discoloured, deshaped rice along with any other unwanted material.

2. Explain the process of sorting?

<u>Sorting</u>: is normally carried out through an optical sorting system. The optical system sorts discoloured, deshaped and any broken rice left in the head rice. The final product normally contains 99% head rice with uniform colour and shape.

3. Explain the control systems

Control systems that have been developed to handle complex process dynamics of milling are explained below

- Feed forward control: which controls the feeding of paddy to minimise the disturbance of feeding.
- Ratio control: this helps in controlling one of the functions when the other functions can be varied.
- Cascade control: to control the feeding of the partly processed paddy from one of the step to another step of process. Eg from cleaning to dehusking etc.
- Constraint control, these help in moving a process variable to help in deconstraining the process if there are any constrains.

• Dead-time or lagging compensated controllers, these systems help in slowing the process which helps in sampling and testing in between the milling process. This will help in uniform production.

4. Which are the areas where automation using computer aided programme?

Computer Integrated Manufacturing (CIM) and Programmable Automation (PA) in the milling and baking industries suggest that:

the milling and baking industries do not have CIM developments.

- the number of such developments is slowing increasing, although slowly in rice milling when compared to wheat and maize milling
- Industry especially in India remains unconvinced about the benefits of CIM and PA

Benefits of CIM and PA for the milling industries needs to be further be made clear.

5. Explain the conventional controls of modern milling technology.

<u>Conventional controls:</u> Conventional controls are generally Single-Input Single-Output (SISO) Proportional Integral Differential (PID) controllers. These have been in use for many years and are especially effective when process dynamics are reasonably constant. The objective is to adhere to some measurable set point. Other control systems have been developed subsequently to handle complex process dynamics. These include:

- Feed forward control, which controls the feeding of paddy to minimise the disturbance of feeding.
- Ratio control, this helps in controlling one of the functions when the other functions can be varied.
- Cascade control, this is used to control the feeding of the partly processed paddy from one of the step to another step of process. Eg from cleaning to dehusking etc.
- Constraint control, these help in moving a process variable to help in deconstraining the process if there are any constrains.
- Dead-time or lagging compensated controllers, these systems help in slowing the process which helps in sampling and testing in between the milling process. This will help in uniform production.

6. What are the various types of tradition mills used in rice milling?

The various types of tradition mills used in rice milling are

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- Hand Pounding like (a) mortar and pestle, (b) Dhenki and (c) hand stone (chakki)
- Huller mill
- Battery of hullers
- Sheller-cum- huller mill
- Sheller-cum-cone polisher mill
- Small Capacity Rice Mills
- Engelberg huller

7. Write a note on Sheller-cum- huller mill?

Sheller-cum- huller mill contains a disc sheller (emery sheller, emery dehusker) is used for dehusking and the huller is used for polishing the dehusked (brown) rice. After cleaning paddy in a sieve, the cleaned paddy is dehusked in a disc sheller and the husk is aspirated. The stock from the sheller is fed to hullers for polishing, often with a screen-type paddy separator in between. The mixture is then sifted and aspirated to remove bran and small brokens from head rice. The outturn of rice form this mill is higher by 1-2% over the huller mill for raw paddy.

8. Write a note on Sheller-cum-cone polisher mill?

The Sheller-cum-cone polisher mill consists of a cleaner, disc sheller, aspirator to remove husk, paddy separator, cone polisher and broken rice separator. This mill gives more outturn of rice than hullers by at least 3% (for raw rice). In addition, the head rice yield is higher, breakage is reduced, bran and husk are separated, the rice is clean and free from paddy and the degree of polishing can be easily controlled.

9. Explain Engelberg huller rice huller?

The Engelberg huller is the most widely used for a small capacity rice mill. The huller consists of an 'iron ribbed cylinder' mounted on a rotating shaft and fitted in a cylindrical housing. The bottom half of the housing is fitted with a slotted sheet. It combines the dehusking and polishing processes into one operation.

10 Explain the composition of glutinous rice?

Glutinous rice flour contains 11.0–13.5% moisture, 1% ash (max.), 75–80% total starch, 5.5–6.5% protein, and 0.5% total fat. Glutinous rice flour is often used in making snack foods since the sticky characteristics of high amylopectin content are necessary in many specialty

rice foods.

11. Describe paddy harvesting, threshing and handling process?

Paddy is harvested from the fields and thrashed to separate the straw from the grains. The grains are then transported to the mills for further processing. Paddy received in the mill generally contains moisture higher than that is safe for storage and hence needs to be dried. Moisture content of 18-25% is normally present in freshly harvested paddy. Moisture content of below 14% is considered safe for short periods of storage. For longer storage, the grain should be dried to 13% moisture or less. Drying process may be either through heat supplied by hot air or by the sun drying where the moisture from the grain evaporates, while the moving air carries away the evaporated moisture.

12. Explain the importance of single huller milling system?.

The single huller mills are by and large located at village levels or in localities where paddy is milled based on the customer requirements. The quantities are normally small and are milled to the requirements of the customers who bring the paddy and takes back rice for their own captive consumption. Hence, the capacity of these mills ranges from 250-750 kg per hour and they still handle the bulk of our country's production. The large capacity rice mills located in urban or semi-urban areas for commercial milling are of ½ to 4 tonnes per hour capacity where the paddy milling is normally carried out for commercial requirements.

13. Explain the process of Scalping?

Scalping is the first step in modern rice milling. It not only enables the production of clean rice but also protects the other milling machinery and increases milling capacity. Impurities that are lighter than paddy are removed by an aspirator. This prevents spreading of dust inside the building and creates hygienic conditions. Metallic (iron) impurities are removed by the use of a magnet. Impurities larger or smaller in size but heavier than paddy are removed by sieves. Vibrating or rotating sieves or a combination of both are used. Impurities that have the same size as paddy but are heavier than paddy are removed by specific gravity separators, namely destoners. Intake paddy is often subjected to a preliminary partial cleaning (scalping) prior to storage and prior to the main cleaning in the mill.

14. Explain the importance of Polishing?

The brown rice is next polished to remove bran layers. Some amount of polishing is essential for easy cooking and storage, although excessive polishing reduces the nutritive value of rice.

There are two types of polishers, one of emery and other of metal. The emery polishers (also called whiteners) polish the grains by abrasion with emery while the metal polishers (also called pearler) polish by friction between the rice grains. The emery polishers are again of two types – vertical (cone polisher) and horizontal.

15. Explain the process of Husk separation?

A mixture of dehusked rice (brown rice), unshelled paddy from the Sheller is subjected to sieving-cum aspiration to separate brokens and husk. Sieving prior to aspiration helps in separating. Husk separator: The mixture of paddy, brown rice, brokens and husk are fed at the top of a vibrating sieve. The brokens pass through the perforations of the sieve. As the mixture of husk, paddy and brown rice overflows from the sieve, air is blown or sucked through the mixture. Husk is carried away by the air. The paddy and brown rice are collected separately.