



ROHINI

COLLEGE OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF AGRICULTURAL ENGINEERING

AI3601 POST- HARVEST TECHNOLOGY

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UNIT III: CLEANING AND GRADING

CO3: To recognize the working principle of grain cleaning and grading devices and able to select suitable equipment for cereal grains, oilseeds and pulses.

Air Screen Cleaner

An air screen cleaner is a fundamental machine used in seed and grain processing plants to remove impurities based on differences in size and weight. It combines air aspiration and mechanical screening to efficiently separate light chaff, dust, and oversized or undersized particles from the good seeds.

- **Universal basic cleaner:** Used in most seed processing plants as the primary cleaning step before further refinement.
- **Sizes vary widely:** Ranges from small 2-screen farm models to large industrial units with 7–8 screens.
- **Multi-characteristic separation:** Cleans seeds based on size (using screens) and weight (using air aspiration).
- **Three cleaning elements:**
 - ❖ Aspirator – removes light materials.
 - ❖ Scalper – drops good seeds through screen openings; carries larger debris over.
 - ❖ Grader – allows good seeds to ride over screens; smaller particles drop through.
- **Upgrading:**
 - ❖ Purpose: Handles seed lots requiring more precise cleaning after initial processing.
 - ❖ Challenge: Removes adulterants similar in size and shape to the good seeds, which cannot be separated in earlier stages.
 - ❖ This is the final stage of seed processing to achieve high purity and quality.
- **Key Functions of upgrading:**
 - ❖ Sizing: Precisely separates seeds to keep only those within the required size range.

- ❖ Grading: Removes cracked, damaged, or otherwise defective seeds.

Principle of Cleaning:

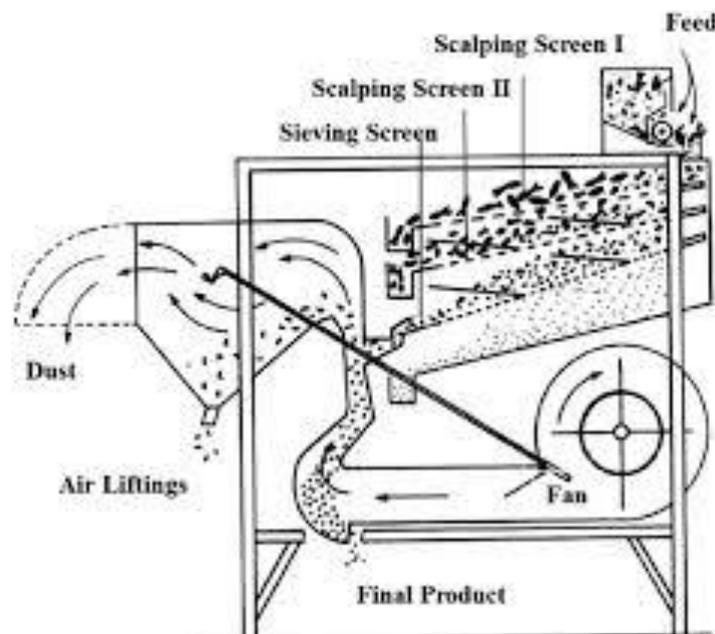
Cleaning involves the removal of undesirable materials from the harvested crop, such as:

- Foreign matter (soil, stones, chaff, weed seeds)
- Broken, immature, or damaged grains
- Dust, stems, leaves, and other impurities

The principle is based on separation using differences in physical and aerodynamic properties between the good produce and the impurities.

Working principle:

- ❖ Air and grain mixture enters the machine, where an air stream lifts and carries away light impurities like chaff, dust, and husks.
- ❖ The remaining material flows onto oscillating screens with specific-sized openings.
- ❖ Smaller particles fall through the top screen, while good seeds pass over it onto a second screen.
- ❖ Larger impurities ride over the top screen and are discharged separately.



- ❖ Good seeds fall through the second screen, while any remaining small debris passes through.
- ❖ Adjustable air velocity and screen tilt / oscillation allow precise control over separation.
- ❖ Clean, sized seeds are collected at the bottom, ready for further processing or packaging.

Advantages of Air screen cleaners:

- **Versatile Cleaning:** Combines air aspiration and screen separation to remove both light chaff and particles of different sizes.
- **Scalable Design:** Available in sizes from small farm models to large industrial units, suitable for various scales of operation.
- **High Efficiency:** Performs multiple cleaning tasks (aspirating, scalping, grading) in a single machine, saving time and space.

Limitations of Air screen cleaners:

- **Limited to size / weight differences:** Cannot separate impurities that are similar in both size and weight to the good seeds.
- **Screen blockage risk:** Wet or sticky seeds can clog screen openings, reducing efficiency and requiring frequent cleaning.
- **Skill-dependent adjustment:** Requires proper setup of airflow and screen selection; incorrect settings can damage seeds or reduce purity.

Applications of Air screen cleaners:

- **Seed processing plants:** Used as the primary cleaner for grains, pulses, and vegetable seeds before further treatment.
- **Farm and foundation seed programs:** Suitable for cleaning small batches of high-quality breeder or foundation seeds.
- **Industrial seed & grain cleaning:** Handles large volumes in commercial processing of cereals, oilseeds, and legumes.