

CLEANING MACHINERY FOR AGRO AND FOOD INDUSTRIES

BY

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A day has come when business has to compete not only on national fronts but on global level also. Whereas most of the industries. In India, in the field of chemicals, Pharmaceuticals, Petrochemicals. Plastics, Engineering etc. has gained out of most advanced technology from foreign countries. Agro base industries has yet to realize the importance of high-tech process machinery's for cleaning and grading of spices, grains & seeds. Whereas in other process industries operations are well defined before a plant is set up, it is almost on empirical way of working in the field of spice and grain processing.

Because spices and grains are agricultural produce, quality of which depends more on natural factors like soil, rain weather etc. A produce differs widely in shape, size, weight etc. depending upon particular variety of a crop. It is almost impossible to employ one process and or one equipment to clean the produce for desired quality.

In general a cleaning processing industry should consider the following factors while setting up a plant.

Initial separation: Removal of all undesirable foreign matter from seeds / grains to obtain required product quality.

Minimum seed loss: Some good seeds are removed along with undesirable materials in almost every processing operation but this must be kept at a minimum.

Up-grading quality: Improvement of seed quality not only through removal of undesirable seeds but also removal of rotten, cracked, broken, insect-damaged or low quality immature seeds etc.

Efficiency: Highest capacity consistent with effective separation for producing desired quality.

Minimum labor: Labor is direct operating cost and should be as low as possible; which necessitate material handling system.

Grains: Seed processing is based on difference in physical properties, between desirable seed and undesirable material or other crop seeds. Seed that do not differ in some physical characteristics can not be separated. If a difference exists between seeds and a machine is available which can differentiate between them in a consistent manner, they can be separated. Seed processors can choose from wide selection of machine that differentiate between seed differing in size, length, shape, weight, surface, texture, affinity

for liquids or color or conductivity. A single machine can not separate seeds that differ in all these characteristics. In most instances different machine must be used to make separation based on each of these characteristics.

Selection of most suitable type of machine is very important for the grain / seeds to be processed. Very light impurities are best separated by properly engineered aspiration systems, which also help contain dust in the plant. When it comes to removal of metallic and colored impurities, high-tech machineries like metal detector and color sorters need to be employed. Now I present below details of various machineries in brief.

Pre-cleaning Machinery:

Air-wash scalper/aspirator:

This is most simple pre-cleaning machine in which-light grains, light and fine impurities are separated by air current passing through falling admixtures in a vertical column. It is a static machine having only fan as moving component. In this machine, sizing of grain is not possible. However, in some aspirators, grains are roughly separated on the basis of density into different chambers.

Plain cleaner/scalper:

These are open type machines without air systems. They separate large and small size impurities on the basis of sieve openings provided. They can not separate light impurities matching to product size. These cleaners can be flat deck vibrating type or cylindrical rotary drum type.

Screen-air-separators/air cleaners:

These types of machines are built in flat rectangular decks - either 2 decks or 3 decks -having larger and smaller perforations to control seed size. They are provided with pre-aspiration and/or post aspiration system to remove light seeds, light & fine impurities. According to motions of decks, they are classified as:

- (1) Vibratory Type
- (2) Reciprocating Type
- (3) Gyrotory Type

This type of pre-cleaners provide more effective pre-cleaning as equipment are provided with adjustable controls for feed, air, amplitude, vibrations, speed, inclination etc.

Fine cleaning/grading machinery:

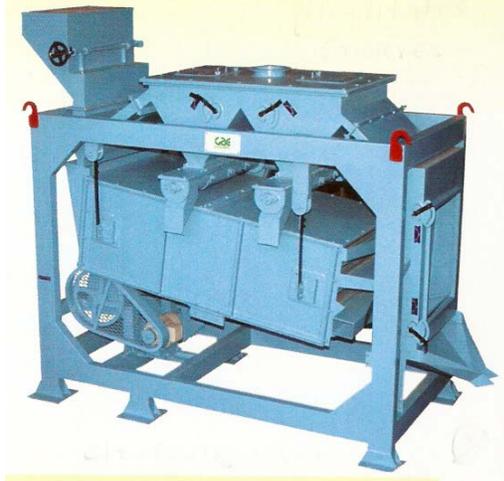
Plain graders:

- These are without aspiration systems. They are built
- (1) Flat horizontal decks type with reciprocating motion,
 - (2) Cylindrical drum type with rotary motion,
 - (3) Flat inclined decks type with gyrotory motion.

In these machines selection of sieve sizes are precise. Suitable sieve cleaning device is important as close grading of seeds creates chocking of sieve openings.

Fine cleaners cum graders:

These are mostly horizontal inclined flat type multi deck machines provided with pre-aspirator and post aspirator to remove lights and fines, light seeds etc. which are not removed by pre-cleaners. These machines are built with fine controls for feed, air, inclination of deck, speed, vibrations, amplitude in addition to having sieve cleaning devices to individual deck.



Indent cylinders:

These are rotary type machines provided with specially indented cylinders, to suit given seed to separate on the basis of length. Hence they are also called length graders. They are built in multi-cylinder machines also. Indent sizes decide grade of seed by length.

Finishing machinery:

Destoner:

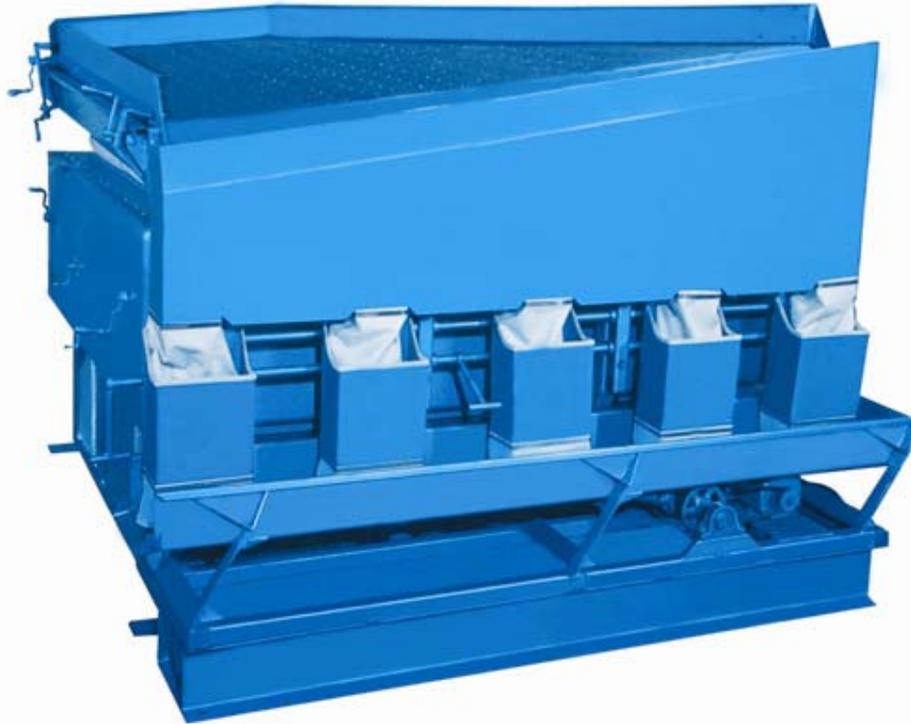
This machine consists of vibrating single flat deck with air system. If the cleaned product after fine cleaning and grading is left with product-size heavy impurities like stones, mud balls, metal pieces etc. Destoners are used to separate these heavy contaminants. Vacuum type Destoners with aspiration system are better equipped for dust free plant operation compared to pressure type destoner of open design. These machines are provided with fine controls on air, feed, inclination of deck, thrust to the deck & speed.



Gravity separator:

This machine consists of a vibrating flat deck in triangular or rectangular construction and air system. Whereas destoner provides facility of two separations i.e. heavy contaminants from seeds, the gravity separator is more elaborate machine providing multi separations (3 to 5) of seeds on the basis of density. This machine is widely used to remove light / shriveled / wrinkled seeds and produce bold & heavy variety of seeds and grains. The product obtained is more than 99% pure.

This machine is also built in vacuum type with aspiration system as well as pressure type in open construction. It is provided with many controls which require a skilled operator to adjust for optimum performance of the machine. These adjustments are air, feed, speed, long side inclination and cross side inclination of deck, thrust to the deck, torque action to the deck and inline motion of the deck. It is an important machine for spice seed processors and grain cleaners who desires to produce highest quality cleaned product.



It is only experience of designing and manufacturing of separation machineries can help guide selection of suitable equipment for specific operations of cleaning process. This is where **GLOBAL AGRITECH ENGINEERS** play the role to suggest and supply most suitable machinery for needed performance considering various properties of products in question.

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