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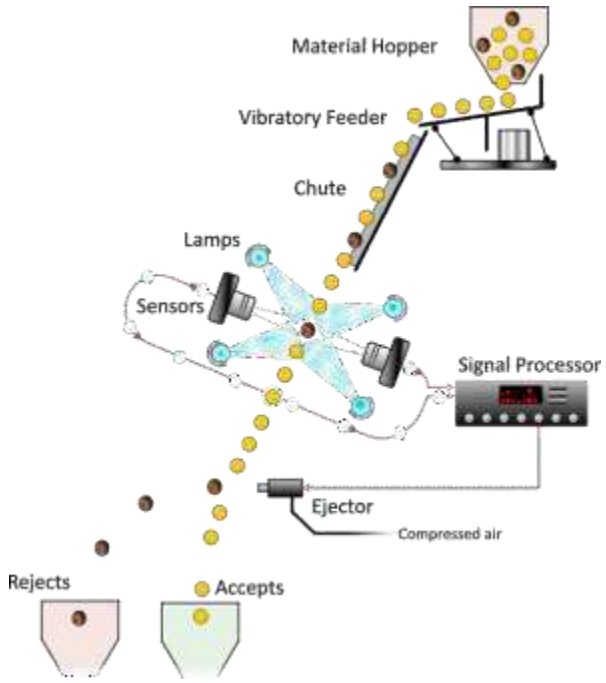
Unit 2 – Topic 3
Colour sorter, inclined belt separator, length separators, effectiveness of separation and performance index

How does a color sorter work?

The raw material enters the machine from the top hopper/storage hopper. Through the vibration of the vibrator device, the raw material slides down the channel accelerate down into the observation zone in the sorting cabinet and pass between the sensor and the background plate. Under the action of the LED light source, according to the intensity and color change of the light, the output signal of the system is driven to drive the solenoid valve to blow the heterochromatic particles into the waste outlet hopper, and the accepted material continues to fall to the finished product cavity of the acceptation outlet hopper. In order to achieve the purpose of color sorting.



Working Principles

The main components of the color sorter are feed hopper, vibrating feeder, chute, light source, background plate, CCD lens, outlet hopper, nozzle, air compressor, air tank, and filter.

Feeding system

It consists of feeding hopper, vibrating feeder, and chute. Raw material enters into vibrating feeder from the feeding hopper, then automatically be arranged into a series of continuous current line by vibration and a guiding mechanism, and fall to a detection zone at a constant speed after being accelerated by the chute. to ensure that the material is clearly present in the sorting cabinet. The feeding system also controls the capacity of the color sorting machine in addition to the function of providing raw material.T through the adjustment of the vibration amount of the feed hopper flow control plate and the vibration hopper, the control of the output of the color sorter per unit time can be realized.

Optoelectronic system

The Optoelectronic system is the core part of the color sorting machine, which is mainly composed of an LED light source, background plate, CCD lens, and related auxiliary devices. The light source provides stable uniform illumination of the material being tested and the

background plate. The CCD lens converts the reflected light of the material to be measured into an electrical signal in the detection area. The background plate provides a reference signal for the electronic control system.

Sorting system

The sorting system consists of accessories such as sorting cabinet, nozzles, air supply. The nozzlehas been experimentally proved that the nozzle spacing and the number of nozzles are one of the key factors affecting the accuracy of the color sorter.

Cleaning system

The cleaning system consists of cylinders, glass cleaning brushes, and other components. Because some items come with the dust and other impurities that may adhere to the glass during the color sorting process. Once the dust and impurities are attached to the window glass, the optoelectronic system may cause chain-chain problems such as false detection, which will affect the color sorting accuracy and carryover ratio.

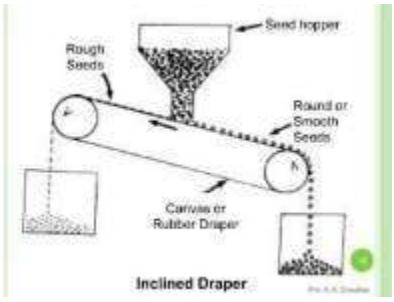
Operating System

The large-screen wide-angle touch screen is used to preset multiple color sorting modes for customers. And establish a friendly man-machine interface, according to the specific conditions of materials convenient and quick to achieve adjustment.

Selected material from the hopper into the machine through the vibrator device vibration, the selected material along the channel into the observation area of ??the sorting room, passing through the CCD sensor and the background plate, under the illumination of the light source, the CCD from the selected material Of the synthesis of optical signals, the system generates output signals, and amplified to the processing operation of the processing system, the optical signal into electrical signals by the control system to issue instructions to drive the electromagnetic valve jet blowing different color particles to the waste area, a good continuation Down to the best material area, to achieve the purpose of sorting. Affect the color selection effect of several major factors: 1, camera resolution 2, software algorithms, the ability to distinguish color 3, feeding system 4, nozzle performance ? Proper nomenclature for color sorters 1, the net rate of selection: the sample after the actual removal of the color selection of color materials and color selection before the need to remove the ratio of different color materials, the higher the net selection rate, the better the performance of the machine. 2, with a ratio of: color selection to remove the color particles and color removal of heavy weight out of the qualified particles out of ratio, with a smaller ratio, the better the performance of the machine. 3, production: the total weight of materials per hour. 4, the channel: refers to the color sorting machine to complete the removal of the number of different particles action mechanism nozzle number, the same as the number of solenoid valve.

Inclined Belt Separator

- The separation due to difference in shape and surface texture.
- The mixture to be separated is fed over the center of an inclined draper moving in upward direction.
- The round and smooth grains roll or slide down with the draper at faster rate than the upwardsmotion of the belt and these are discharge in a hopper .
- The flat shape or rough surfaced particles are carried to the top of inclined draper and dropped offinto another hopper .
- The belts of different degrees of roughness may be used as draper for separate materials.
- **The inclined belt separator**, or draper, separates seed by their relative ability to roll or slide, whichis in turn determined by the seed's shape and surface texture.



Uses

The seed mixture is fed onto an inclined draper belt which is moving toward the high end. The slope of the draper belt can be adjusted to more or less slope, to the slope that causes round seed to roll or slide downhill, while flat or rough seed can lie on the draper belt and be carried upward and fall off the high end of the draper belt (Figures 33.1, 33.2). While the draper is not in generaluse, it offers great flexibility in separating seed which differ in their relative ability to roll.

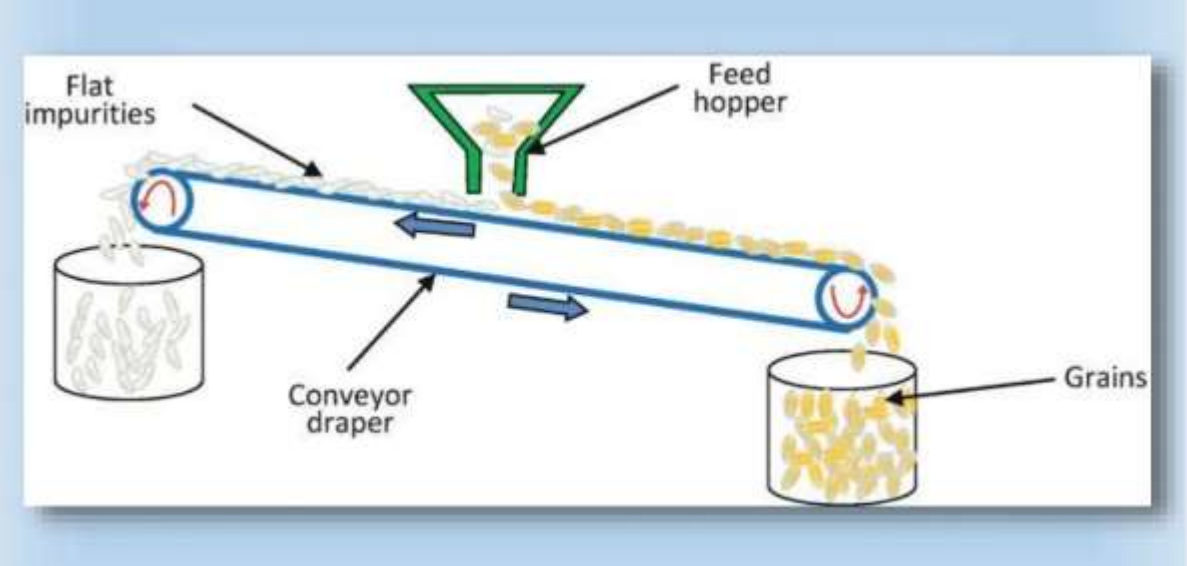
Application

It transfers light weight, bulk and powder materials like seeds, coffee beans , grains , powdersetc. This machine helps for easy movement of material from one place to another place. The product received will be fed over the belt which shall transport the item from one place to another. Newtech Industries Mangalore is a well-known manufacturer, exporter, service providerand supplier of this machine.

Inclined Belt Conveyor is mainly used to collect material from one machine and transfer to another machine to ensure continuous process. It can be in trough shape or flat shape also.

Key Features

- It is available from 100 mm to 1000 mm belt width.
- Available from 500 kg per hour to 10 ton per hour capacity.
- Easy tensioning of belt
- Crowded inner flat pulley as standard for self alignment.
- Geared motor drive with sprocket system available as standard.
- It comes with standard Food grade belt.
- In feed hopper available on request.
- Belt cleaning scraper available if required.



EFFECTIVENESS OF SEPARATION

The screen effectiveness may be defined as the ability of a screen in closely separating the feed into overflow and underflow according to its size. If the screen functions properly, all material 'O' would be in the overflow, while all the material 'U' would be in the underflow. The material balance in a screening operation can be derived as follows:

F = mass flow rate of feed, kg/hr.
O = mass flow rate of oversize, kg/hr.
U = mass flow rate of undersize, kg/hr.
mf = mass fraction of material in feed.
mo = mass fraction of material in overflow.
mu = mass fraction of material in underflow.