



**Blowing Type Gravity Separator**  
**METRA BLGS**  
**USER MANUAL**



**DON'T start up the machine until:**

- 1) You have finished reading this Manual and understood very well;**
- 2) You have checked and refastened every parts that may get loose in transportation.**

# **BLGS-200 GRAVITY SEPARATOR**

## **1. Brief Introduction**

BLGS-200 Gravity separator, also known as density separator, is one of the crucial equipment for seed processing, to sort out light seeds from heavy seeds by friction and suspension characteristics. Main function is to separate seeds which are already treated by air screen cleaners and indented cylinders into different streams by density, to remove blighted, immature, insect damaged, moldy and germinated seeds, impurities, and admixtures such as same-size stones but with different specific weight. Hyde BLGS-200 gravity separators are designed with simple operation, long service life and above all, accuracy in separation of as slight as 0.5% difference in specific density. Optimal effects rely on the precise adjustment of feeding speed, screen deck tilt angle (lengthwise and sidewise), vibration speed and air volume.

## **Features of BLGS-200 Gravity Separator**

1. 4 bottom built-in air-conditioner fans to supply positive air pressure, larger motor for heavy seeds, with lower noise, wide adjustable range, more flexible application.
2. De-dusting cover with view-windows for screen deck, to reduce the dust content in workshop effectively as well as to monitor the processing situation.
3. Screen deck vibration speed is controlled by frequency inverter, stepless adjustment with display.
4. Wide adjustable range for main parameters, flexible application.
5. Safe guards to all moving parts ensure the safe operation.

The manual includes installation, operation, maintenance, etc. Please read it carefully before installation and operation.

## 2. Main Technical Parameters

|                                        |                        |                                             |
|----------------------------------------|------------------------|---------------------------------------------|
| Model                                  |                        | BLGS-200                                    |
| Dimension(L×W×H)                       |                        | 151.2x83.1x80.3 in<br>3840×2110×2040 mm     |
| Total Weight                           |                        | 3090 lb<br>1400 kg                          |
| Rated Capacity                         |                        | 200 bu/h<br>5 t/h<br>based on wheat         |
| Power                                  | Vibration-Driven Motor | 2.2                                         |
|                                        | Side-discharge Motor   | 0.75                                        |
|                                        | 4 Bottom Fan Motors    | 3×2+2.2×2                                   |
|                                        | Total Power            | 13.35 kW                                    |
| Working Air Pressure of Vibration Deck |                        | 0~0.15 psi<br>0~1000 Pa                     |
| Amplitude                              |                        | 0.27 in<br>7 mm                             |
| Direction Angle                        |                        | 30°                                         |
| Frequency                              |                        | 300~800 l/s                                 |
| Screen Area                            |                        | 39.4 ft <sup>2</sup><br>3.66 m <sup>2</sup> |

Main structure and overall size please refer to Figure 1.

### Note:

Specifications of screen are variable for different seeds, buyer should specify according to seeds characteristics. We usually supply 12 mesh screen for paddy rice and wheat. If the specification is not proper to your grain, please contact us for other specification. Specifications in Deck 1 below is just for reference.

### Deck 1

| Screen Specification (mesh) | Processing Particle              |
|-----------------------------|----------------------------------|
| 10                          | Beans, Peas, Maize               |
| 12                          | Rice, Wheat, Oats                |
| 30                          | Alfalfa, Clover, Vegetable Seeds |
| Silk                        | Small Grass Seeds                |

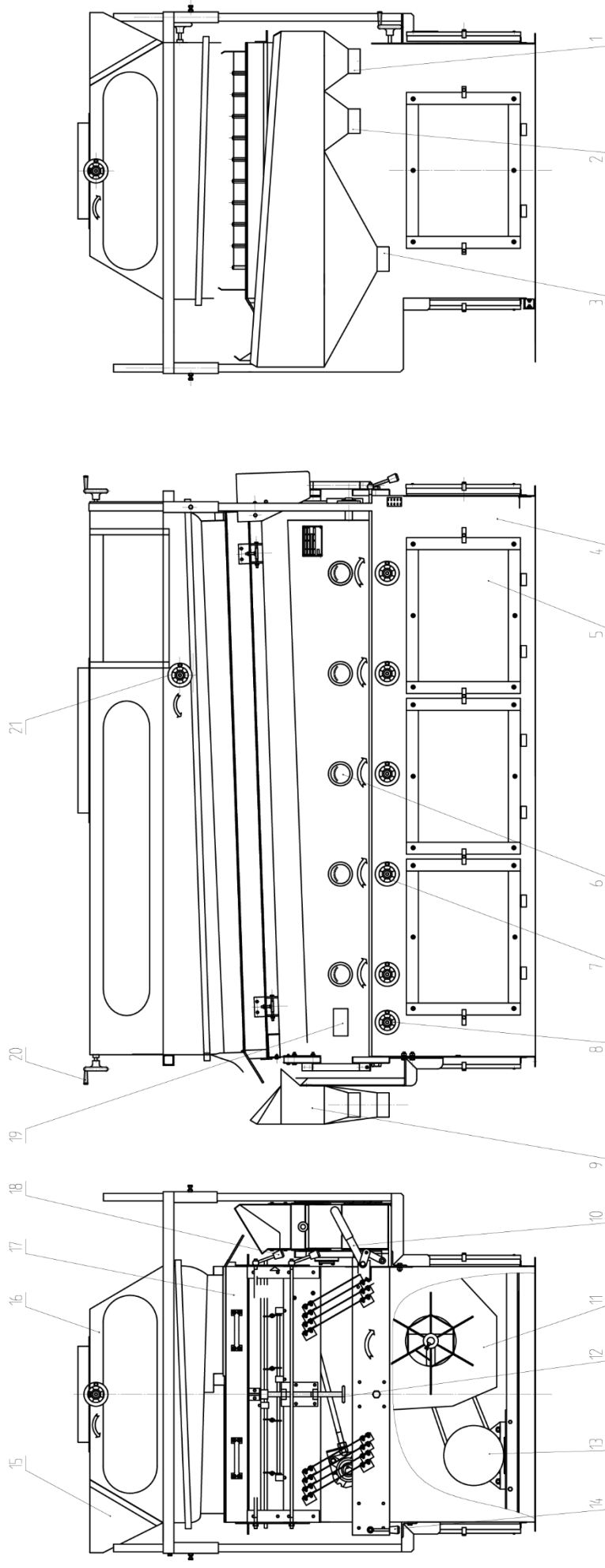


**Figure 1.**

1. Light Grain Outlet. 2. Middle Grain Outlet. 3. Heavy Grain Outlet. 4. Machine Frame. 5. Air Filtering Cover. 6. Air Volume Direction. 7. Control Handwheel of Air Volume. 8. Control of Vibration Speed (replaced by frequency converter). 9. Discharge Outlet. 10. Control of Longitudinal Tilt Angle. 11. Fan System. 12. Control of Lateral Tilt Angle. 13. Motor. 14. Fixing Handle of Longitudinal Tilt Angle. 15. Feeding Hopper. 16. De-dusting Cover. 17. Screen Deck. 18. Fixing Handle of Lateral Tilt Angle. 19. Vibration Speed Display. 20. Control Handle of Dedusting Cover Air Outlet. 21. Control Handle of Feeding Speed.

### 3. Working Principle

#### 3.1 Stratification and Separation Theory

Air flow produced by bottoms fans with certain pressure and speed goes through screen deck and the particle layer to stratify the particle by specific gravity. Figure 2 below shows a side sectional view of the gravity separator with bottom fan. The mixture is already on the screen deck, and the fan is closed. In Figure 3, turn on the fan and adjust, making the heavy particles stay on the deck surface, and light particle leave the surface completely. The key here is to adjust the air flow properly; otherwise all particles will leave the separation deck surface with too strong air flow as shown in Figure 4.

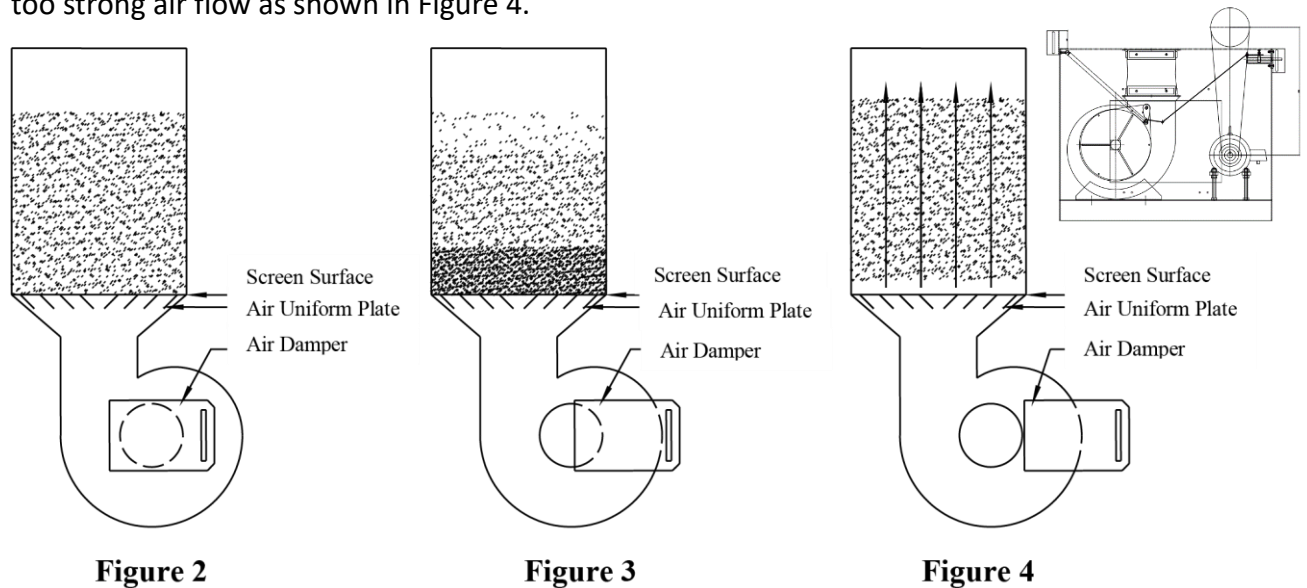


Figure 5 below shows the top view of the ideal situation for particle separation on deck surface

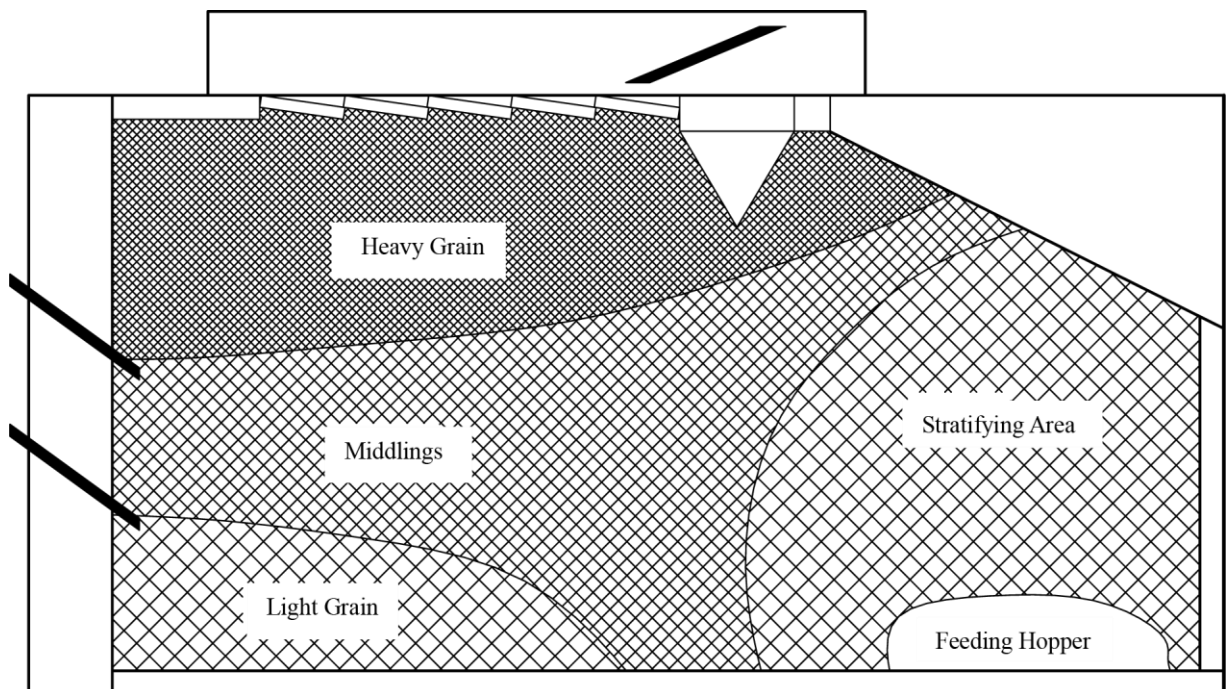


Figure 5

Grains flow onto the deck surface through feeding hopper to the stratifying area. Grains will be separated into many layers by vibration of deck and pressurized air flow, heavy particles stay at the bottom, and light particles rise to the top as shown in Figure 3. The particles will then be separated after stratifying.

Normally, the stratifying area should be no more than 1/3 of the deck surface. The harder the separation is, the larger area needed to have correct stratifications. For example, stratifying area is larger to separate the frost-damaged beans from good beans as their specific gravity is very similar; but stratifying area is smaller to separate the insect-damaged peas from good peas. To achieve bigger capacity, the stratifying area should also be larger.

After stratification, the eccentric vibration of screen deck will drive the heavier particles which in contact with screen surface uphill, and lighter particles which not attach to screen surface downhill. With the flow from feeding side to discharging side, the vibration motion will make the vertical stratifications to horizontal separation, and finish the separation when particles reach the discharging outlet. Heavier particles should accumulated at the higher side and lighter particles at the lower side, middle particles stay between them.

Note: It is the ideal situation in Figure 5. In practice, the stratifying area boundary is not so obvious, usually takes up 2.15~6.45 ft<sup>2</sup> (0.2~0.6 m<sup>2</sup>). Meanwhile, the separation begins even early when only part of particles are stratified. Thus it is very important to make the particles stratified as fast as possible. Otherwise the lighter particle will be driven to the higher side before stratification. The best solution is to supply more air to feeding side than to discharging side.

In some practice, the differences with heavier particles (good grains) and lighter particles (bad grains) are too slight to be distinguished by eyes. In this situation, please regularly test each batch from outlets to see if you get the correct separation.

Products from gravity separator are continuous graded particles from heavier to lighter, which are separated into 3 parts: (1) heavier or needed products, (2) lighter or undesired products, (3) small amount of middle products which are not separated.

### 3.2 Guideline for Application



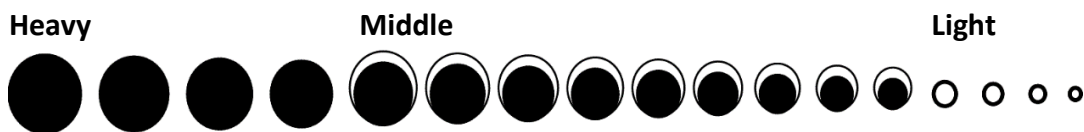
**Guideline 1:** Materials with the same size and different specific gravity can be separated according to the specific gravity.

Common example is to remove light grains such as insect-eaten and immature seeds.



Guideline 2: Materials with the same specific gravity and different sizes can be separated according to the size.

Common example is to remove shriveled corn grains with the same specific gravity.



Guideline 3: Materials with different specific gravity and different sizes cannot be effectively separated.

Corn grain is an example with different specific gravity and different sizes. According to the location of corn cob, there are different shapes of corn grains: small round, medium round, small flat, medium flat and large flat. The specific gravity is also different because of the different growing condition. Generally, corn grains that have not been size-sorted won't have a satisfactory result by gravity separator.

As separation result will be effected by size, shape and specific gravity, seeds must be cleaned and thoroughly graded by size and shape before using gravity separator.

### 3.3 Control system for Gravity Separator

The most important part of the gravity separator is the screen deck surface (Figure 6). The work surface consists of a refined wooden frame, a punched screen that improves the air flow mode, and a woven screen that separating products on the surface.

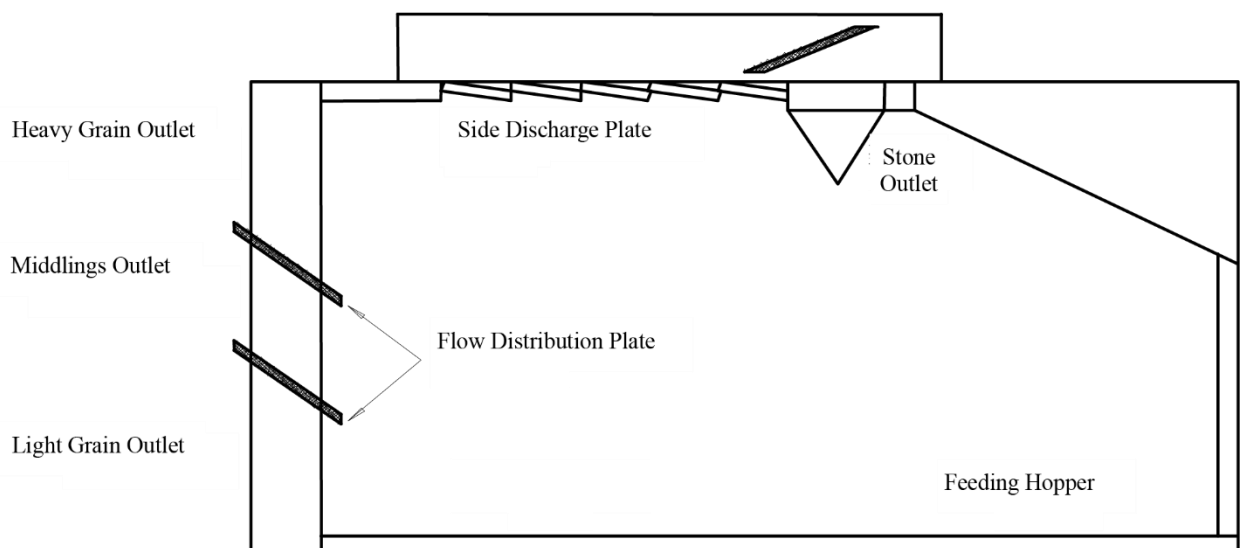


Figure 6

Two flow distribution plates are installed at the outlet end of the deck to separate the final products into 3 parts according to the grade standard. Discharge plates is located at the side opposite the feeding hopper to increase the output capacity. Stone outlet, position close to feeding part, at the same side of side discharging plate, is to remove heavy impurity, avoid mixing into good heavy products a. gate for removing heavy impurities from the equipment and avoiding pinching into good heavy products.

Before operation, it is necessary to understand thoroughly about the details of the control systems and their positions of gravity separator (Figure 7). Key point for effective gravity separation is the correct adjustment of the control mechanism. So please learn the proper use of these controls before operation.

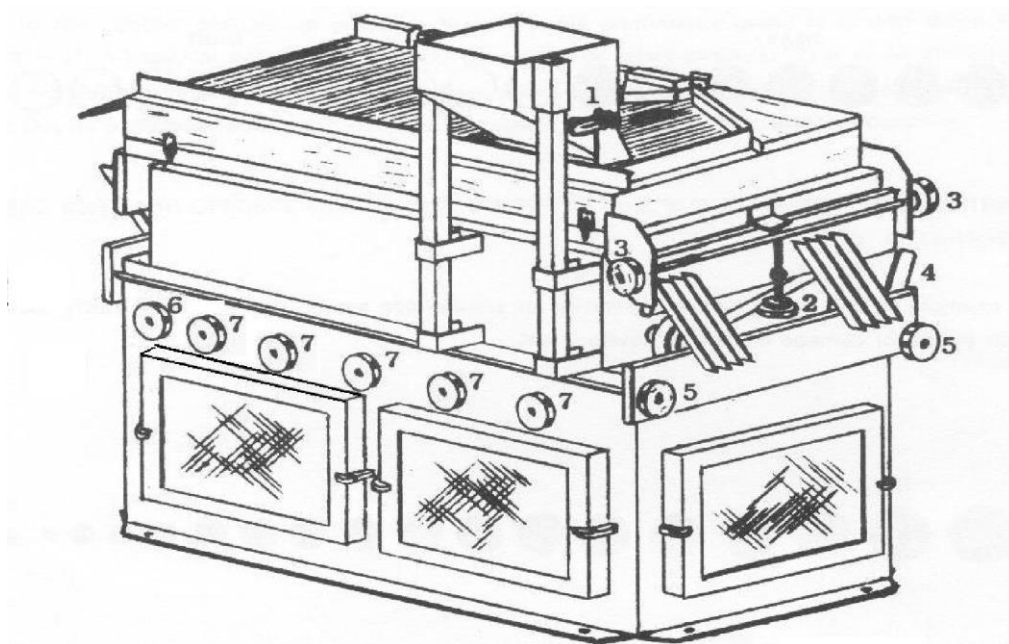


**Figure 7**

1. Control Handle for Feeding Speed    2. Control for Lateral Tilt Angle    3. Fastening for Lateral Tilt Angle    4. Control for Longitudinal Tilt Angle    5. Fastening for Longitudinal Tilt Angle    6. Vibration Control (updated by Frequency Inverter)    7. Control Hand wheel for Air Volume

There are 5 aspects for adjustment: feeding speed, lateral tilt angle, longitudinal tilt angle, vibration speed and air volume. The worker must control correctly and coordinate with each aspects to achieve the optimal separation result. Please check the following:

### **3.1.1 Feeding Speed (speed ↑ , capacity ↑ , quality ↓ )**

It is necessary to installed electromagnetic vibration feeder above the feeding hopper. The feeder control panel and feeding hopper opening rate control handle will control the grain flow rate to screen deck. The feeding speed must be stable and uniform, to achieve a good separation result.

Generally, the feeding speed depends on average capacity in production process. To have the best separation result on gravity separator, the feeding speed must be as slow as possible, but no slower than the minimum speed which keeps the deck fully covered. Maximum speed is no faster than which makes the optimal necessary separation result. When starting the machine, set the speed to lowest to meet the separation requirement, and then increase the speed to capacity requirement. Usually, when production capacity increases, separation quality reduces; when production capacity reduces, separation quality increases.

### **3.1.2 Lateral Tilt Angle (angle ↑ , flow speed ↑ , quality ↓ )**

The lateral tilt angle is the slope from feeding end to discharging end of the deck working surface. The angle size directly affects the grain flow speed from feeding end to discharging end. A larger lateral tilt angle means faster grain flow speed and less residence time. A smaller lateral tilt angle means slower grain flow speed and more residence time. The separation quality is related to the residence time, longer processing time will have a more thorough separation result.

Faster feeding speed requires larger lateral tilt angle and slower feeding speed requires smaller lateral tilt angle. The lateral tilt angle also determines how long time for separation. Therefore, the lateral tilt angle will affect the separation quality directly. Generally, increasing the lateral tilt angle will reduce the separation quality; reducing the lateral tilt angle will improve the separation quality.

The adjustment for lateral tilt angle and feeding speed should be coordinated. When increasing the feeding speed, the lateral tilt angle must be increased to keep the grain thickness on deck surface not too thick. When reducing the feeding speed, the lateral tilt angle must be reduced so that the grain thickness on deck surface will not be too thin and the deck surface remains completely covered. The lateral tilt angle control (2) is located at the feeding end. When changing the lateral tilt angle, loosen the fastening device (3), adjust the handle to desired position, and then retighten the fastening device.

### **3.1.3 Longitudinal Tilt Angle (angle ↑ , flow speed ↓ , quality ↑ )**

The longitudinal tilt angle is the height difference between higher side and lower side of deck working surface. Increasing the longitudinal tilt angle will drive the material to lower side. Reducing the longitudinal tilt angle will drive the material to higher side. Generally, the optimal separation effect will be obtained when the longitudinal tilt angle is set at or near the maximum tilt angle. However, in operation, please don't set the angle too large. When longitudinal tilt angle is too large, materials cannot flow to higher side of the deck though increasing the vibration frequency. When longitudinal tilt angle is too small, though the vibration frequency is also very small, all materials will flow to the higher side.

When adjusting the longitudinal tilt angle, loosen the two fastening device handles (5), move the longitudinal tilt angle control handle (4) closer to the machine direction and increase the tilt angle; move away from the machine to reduce the tilt angle.

### **3.1.4 Vibration Frequency (higher ↑ , flow to higher side ↑ )**

The vibration speed is the swing speed of the deck. Swing caused by eccentric motion stratifies the material and produces a reciprocating motion that separates the heavier particles at the bottom from the lighter particles at the top. Increasing the vibration frequency will move materials up to higher side of deck; reducing the vibration frequency will drive the material to the lower side. The vibration frequency is related to the longitudinal tilt angle. Generally increasing the vibration frequency (moving materials to the higher side) and increasing the longitudinal tilt angle (making the material return to lower side) allow for more accurate separation. When the vibration frequency is too high, though using the max longitudinal tilt angle, all materials will move to the higher side of deck.

Vibration frequency control is not executed by inverter in local or central control cabinet. Just rotate the button to the value generally between 35 ~ 45.

### **3.1.5 Air Volume (higher ↑ , flow to higher side ↑ )**

Air volume control is the most important adjustment for gravity separator. The most common mistake is to use excessive air. Gravity separation is not to "blow away" lighter materials from heavier materials, but to stratify materials by controlled air flow and then separate them by the vibration motion of the deck. Excessive air will cause a boiling state that will rise up heavier materials from the deck bottom to mix with the upper lighter materials. Too small air cannot

make materials flow away but accumulate at the higher side of the deck. Appropriate air volume will let material layers in visual quasi-flow state and make materials oscillate and flow freely on deck except for stratified area below feeding hopper. The boiling state should be limit to minimum, so that the separation can be finished on vibrating deck.

The experiment shows that when processing different materials or even different amounts of the same material, the air flow mode under the deck should be different. In order to adjust the air flow quickly and accurately, we designed and produced the multi-fan mechanism. Each fan can be adjusted individually to allow the user to control the air flow mode and air volume to have optimal separation result. Generally, more air volume at the feeding area to obtain good stratification. With the material movement from feeding end to discharging end, the amount of air should be gradually reduced to maintain proper stratification.

When adjusting the air volume, rotate the handwheel (7) clockwise to increase the air volume; anti-clockwise to reduce the air volume. Around 110 revolutions between full close and full open.

The five controls for gravity separator must be coordinated to achieve the optimal separation result.

## **4. Safety Cautions**

1. Please read this manual carefully before using the machine.
2. Make sure the machine and components are grounded.
3. Always disconnect the power supply for repairs and maintenance.
4. Do not operate the machine when the air aspiration cover is removed, some parts are missing or broken, or screen deck is damaged.
5. Do not stand on the equipment, do not place other items on the screen deck.
6. Always check for wear situation and operate correctly.
7. Safety first, as always.

## 5. Installation and Requirement

### 5.1 Unpacking ( top plate → side plates → bottom)

For LCL shipment with wooden case packing, please carefully remove the top plate of the package and then side plates, and move the gravity separator from the bottom of wooden case. When moving, Be careful with moving to avoid collision and friction with other objects, and the force should be uniform to prevent deformation.

### 5.2 Installation

Gravity separator requires a solid horizontal foundation. Temporary vibrations on the ground will affect the gravity separation quality. 5.9 in (150 mm) thick concrete foundation is the best choice. Machine base should be bolted to the ground and then connection should be firm and reliable. After installation, the flatness and verticality of the machine should be no more than two thousandths with and foundation level.

When fixing the gravity separator, make sure that there is enough space for operation and control, removal of the screen deck for replacement or cleaning, and normal maintenance. The screen deck can be removed from either side. Generally, the space for removing the deck is approximately equal to the deck size. Please refer to the dimensional data in the manual.

The anchor bolt positions for grounding installation are shown in Figure 8 as below.

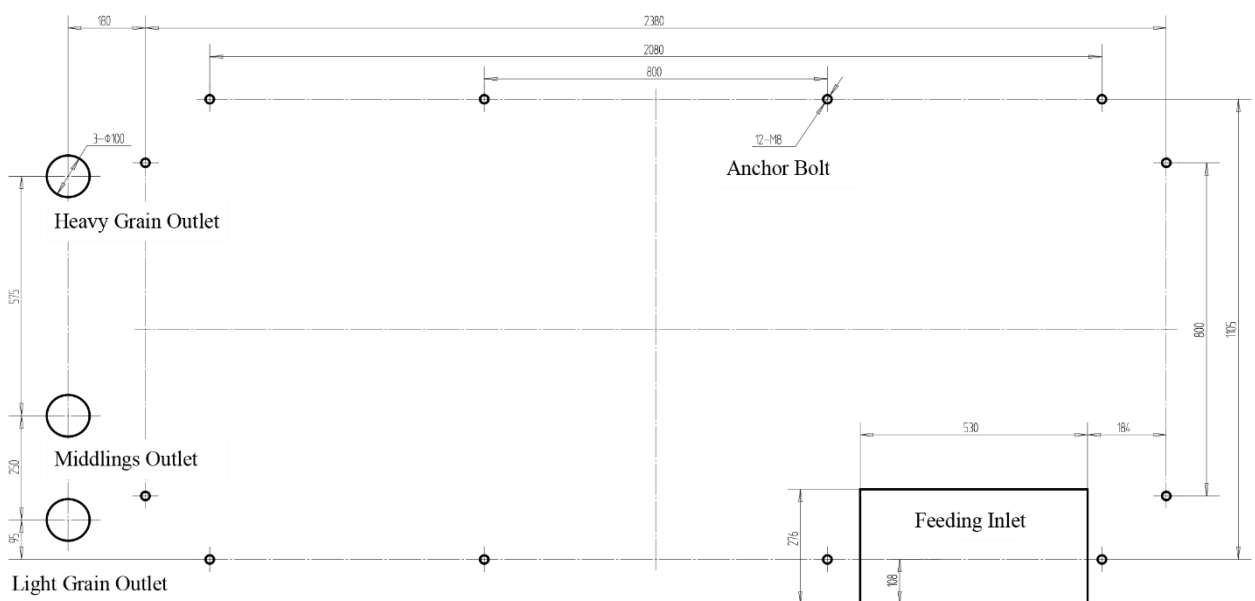


Figure 8

## **5.3 Belt Adjustment and Electric Power Connection**

Belt must be adjusted to the proper tension. When the belt is too tight, it will affect the service life of bearing and belt; when too loose, it will slip between belt and pulley and affect the transmission efficiency. To check the proper tension, first shut down the machine, then apply pressure to the outer side of belt between two pulleys, the belt should be offset around 0.5 in (13 mm). After machine running for 8-10 hours, check the belt again. Normally, new belt may be stretched, so belt tension have to be re-adjusted accordingly.

For electric wiring, make sure the wiring is correct and the motor direction is correct. See from the motor side, all axis (motor, fan and eccentric) should be rotated clockwise.

## **5.4 Clean Air Source**

Gravity separator requires clean external air. When working, keep the air around the machine clean and do not use dusty waste gas from factory. Or supply the outdoor clean air to the machine by an air pipe, just remove one air filtering cover (item 5 on Figure 1) instead. The air pipe can be installed at the position of any filtering cover, but best position is the one closest to feeding area for best effect.

Once machine is installed, motors are connected, and fans rotate in the correct direction, please read the working principle and control instruction of gravity separator before operation.

# **6. Startup and Operation**

## **6.1 First Startup Process**

Before starting up the machine, carefully check whether the connection of the moving parts is firm and reliable, and no other objects placed on the screen deck. Turn on the power after confirming the safety. Idle for a few minutes to check any abnormal noise during machine running, and check the vibration of the deck top and adjust the vibration speed to increase or reduce.

Recognize the positions of tilt control handles. Loosen the fastening device and adjust tilt handle to increase and decrease longitudinal tilt angle of deck. Keep in mind that longitudinal tilt angle and vibration speed must be coordinated to create a smooth and consistent layer of material on deck.

Check the feeding mechanism to ensure that the feed rate can be adjusted. Recognize the position of the screws for lateral tilt angle at the feeding side. Loosen the fastening device to raise or lower the feeding side of the deck. Feeding speed and lateral tilt angle must be

coordinated to ensure consistent flow speed of material from the feeding side to discharging end.

Finally, open and close air dampers. Although gravity separation effect cannot be seen on the deck surface without materials, when adjusting air volume, put your hand on screen surface to feel the change of air volume. Air volume control is the most important part for successful gravity sorting.

Before shutdown, make a final check to ensure that fan shafts rotate in correct direction (see from the feeding side of the machine, all shafts should rotate clockwise).

## 6.2 Preset Adjustment

Take the rice seeds processing as example, please preset the adjustment for gravity separator according to the following table (Table 2 for reference only):

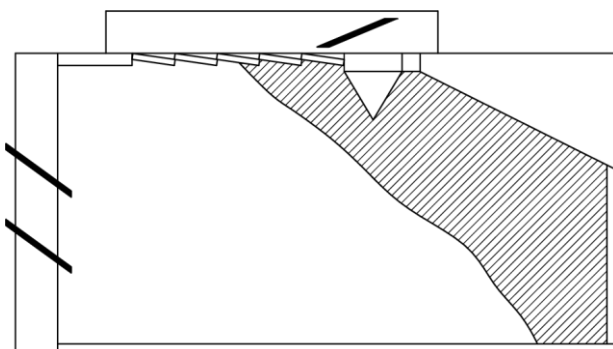
**Table 2**

|                           |                                        |
|---------------------------|----------------------------------------|
| Lateral Tilt Angle        | 3.4 (scale value)                      |
| Longitudinal Tilt Angle   | 2.5 (max scale value)                  |
| Vibration Frequency       | 450 rpm                                |
| Air Volume (from feeding) | (from full close to required position) |
| #1                        | 32 laps                                |
| #2                        | 55 laps                                |
| #3                        | 18 laps                                |
| #4                        | 30 laps                                |
| #5                        | 8 laps                                 |

## 6.3 Adjustment Process

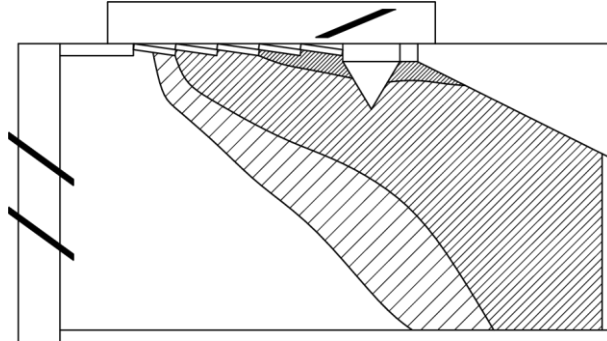
### Step 1

Refer to Table 2 to preset all adjustments. Tighten the fastening device after adjusting the proper lateral and longitudinal tilt angle. Start up the machine, slowly open the feeding door, then adjust the vibration speed, and materials start to move to the higher side of the deck.



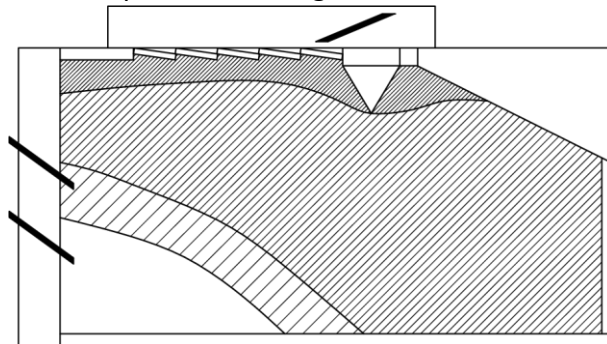
## Step 2

When the deck surface is covered 1/2, adjust each air damper to provide proper amount of air to keep materials flowing. From the feeding end, adjust each air damper in turn for best results. Wait until you see the adjustment effect before adjusting the next damper.



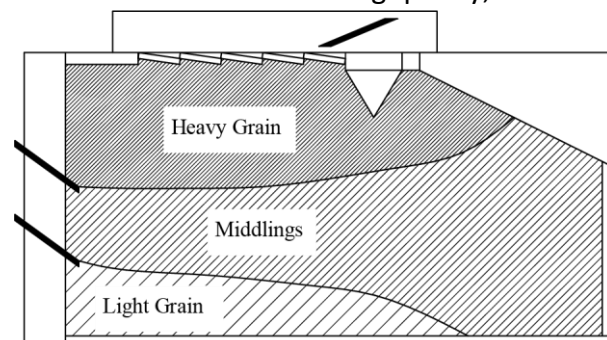
## Step 3

If light materials area does not appear, slowly increase air volume, longitudinal or lateral tilt angle. Once deck surface is completely covered, wait a few minutes and then re-adjust to get the best possible sorting effect.



## Step 4

After obtaining the required sorting quality, please start to increase the production capacity. First, increase the feed speed and adjust lateral tilt angle to increase capacity. Open the side discharging plates (Figure 6) at the higher side along screen deck to further increase capacity. In order to maintain the sorting quality, the air volume should be appropriately increased.



## **6.4 Gravity Sorting Process**

### **6.4.1 Settings**

Start the operation once you are familiar with the operating procedure. Preset the adjustment according to Table 2, close all side discharge plates at the higher end along the screen table.

### **6.4.2 Startup**

Turn on the power, start the machine, and slowly open the feeding door to make materials flow to the deck at a small flow rate. When a small amount of materials appear on the deck, adjust the vibration speed from slow to fast, and materials begin to flow to the higher end of deck.

### **6.4.3 Control of Air Volume**

When the deck surface is covered 1/2, adjust each air damper in turn and observe the stratification effect and moving state of materials during the adjustment process. Do not open the air damper too large. If too much air enters through the damper, materials will "boil" rather than flow smoothly on the deck. Pay special attention to these areas with too small air volumes (where materials don't move or move slightly), that is because the screen deck surface is not completely covered, excess air will pass through the uncovered area instead of these covered area. When the deck is fully covered, the air flow mode will become normal.

Once the screen deck is completely covered, reduce the air flow speed from the last fan which is closest to discharging. Reduce the air volume of each fan in turn to minimum, so that the separation can still be carried out. If the air damper is completely closed, turn it off and adjust the next fan closer to the feeding area.

### **6.4.4 Control of Longitudinal Tilt Angle and Vibration Speed**

After obtaining a good air flow mode, go to the discharging end of gravity separator and check the thickness of the material passing through the discharging end of deck. The materials surface should be smooth and consistent. Thickness of the deck higher side should be 1~ 3 times thicker than the lower side. If higher-side material layer is too thick, increase the longitudinal tilt angle firstly, and then reduce vibration speed or air volume. All these adjustments will drive materials move to the lower side of deck.

If the lower-side material layer is too thick, increase vibration speed firstly, and then reduce the air volume and longitudinal tilt angle. All these adjustments will move materials to the higher side of the deck. After these adjustments, observe the sorting effect and adjust the air flow mode if necessary.

#### **6.4.5 Control of Lateral Tilt Angle**

Check the lateral tilt angle. If the adjustment is correct, material thickness at the feeding end should be 2~4 times the discharging end. If material layer is too thick, increase lateral tilt angle to allow the material to flow faster from the feeding end. If material layer too thin, reduce the lateral tilt angle so that materials stay at the feeding end for a longer time. When adjusting the lateral tilt angle, loosen the fastening handle (3 in Figure 7) at the feeding end, and then use the jacking screw to raise or lower the deck. Re-tighten the fastening handle once meet the requirement.

### **6.5 Increase the Production**

Start to increase the production once meet the required sorting quality.

**6.5.1 First**, increase the longitudinal tilt angle. This will drive materials to the lower side of the deck. For coordination, increase the vibration speed until obtain the correct flow mode. Continuously and alternatively increase the longitudinal tile angle and vibration speed until with the maximum longitudinal tilt angle, you can still maintain the proper material layer thickness by adjusting the vibration speed.

**6.5.2 Next**, slowly open the feeding door. During this step, increases the feeding speed to increases the material layer thickness. Observe the changes of material on the deck. Then increase lateral tilt angle in order to coordinate with the increased feeding speed. Continuously increase the feeding speed and the lateral tilt angle until with the maximum feed rate, you can still maintain the required sorting effect. Slowly increased the air volume to coordinate with the thicker material layer. Be sure to tighten the fastening handle after increasing the lateral tilt angle every time.

**6.5.3 Opening** the higher-side discharging plates along the deck can also increase production.

First, open the side discharging plate closest to the discharging end of the gravity separator, and open the next plate after a few minutes. After opening two or three side plates, open the

feeding door to compensate for materials discharged from the deck. When the material layer at the discharging end becomes thin, re-adjust the air volume if necessary.

The number of open discharging plates should depend on the difficulty and final requirements of the sorting. The easier to sort, the more plates to open, and the higher production it is. Remember that production (quantity) and quality are mutually constrained. Therefore, if the sorting quality does not meet the standard requirement, reduce the production. On the contrary, if the final product quality is better than requirement, increase the production.

## **7. Repair and Maintenance**

Gravity separators can be used for many years. Periodic maintenance is required to maintain optimum working conditions.

### **7.1 Screen Deck**

The deck surface is the part that actually contacts material and make gravity sorting. In order to ensure the best sorting, check the deck surface frequently, clean or repair if necessary. Even in very clean environment, dust and dirt can accumulate under the working surface, which will hinder or even completely block the air flow go through the deck. When the machine is running, regularly blow off the dirt on screen deck surface with compressed air from top to bottom, the dust under the work surface will be loosened by the counter airflow and then be blown up through the deck by the airflow generated by the bottom fans.

When the screen deck is blocked, remove the deck and clean it. The best way to clean is to use compressed air to blow from top to bottom. Clean the entire deck completely, partially clean can be quickly blocked again. To check whether the deck is completely cleaned, hang a light with a string under the deck. If the deck surface is clean, you can see the light passing through each hole in the screen. Dim part indicates dirty areas and needs to be cleaned up again.

As the screen deck is directly in contact with materials, it is easy to be worn away. Frequently check the table for wear and tear. When the deck surface is worn away, the surface becomes smooth and it is increasingly difficult to move heavy seeds below the light seed layer. Typically, all of the deck surfaces consist of a punch screen that improves the air flow mode and a wire mesh woven screen that make gravity sorting. Repair the deck when the wire mesh woven

screen of deck is partially worn. There is a risk of damage to the punched screen if woven screen is completely worn. No need to replace it if the punched screen is not damaged.

When repairing the screen deck, first check it completely, look over the lower side of the deck and see if every rib is broken. It must be completely removed from the deck and replaced if any broken found. If the ribs are intact, check the punched screen. As long as the punched screen is not damaged, no need to replace it. When removing the woven screen, be careful not to damage the punched screen. When installing a woven or punched screen, it is best to put the table top on two wooden frames, place a light underneath, and look at the screen surface against the light, you can easily install the fixing ribs. Tighten the screen as tight screen has a better sorting effect than loose screen. Finally, check the bottom plate, barriers, and grids of the screen deck and replace them if necessary.

Strips are horizontal metal strip that cross the deck surface. Strips block heavy materials from moving to the higher side but allow light materials to pass over. The strips on screen are replaced in the same way, each strip on each rib.

## **7.2 Transmission Mechanism**

There are two sets of belts and pulleys on the gravity separator. They are: screen deck vibration driving motor belt; side discharging driving motor belt. New machine should be inspected frequently during the first few weeks as the new belt will stretch at the beginning. When checking the belt tension, shut down the machine first, then apply pressure on the outer side of the belt between two pulleys, the belt should be offset about 0.5 in (13mm).

## **7.3 Vibration Speed Frequency Inverter**

The screen deck vibration speed is controlled by frequency inventor. General range: 35~45.

## **7.4 Bearing**

There are several bearings to support the fan shaft and the eccentric shaft. We offer sealed bearings for maximum maintenance. However, bearings require regular maintenance to ensure maximum life like any moving part.

Check all the fixing screws before the machine is initially turned on. Shut down after 8 to 10 hours of operation, and check the fixing screws before the bearings cool down. After operation for 100~150 hours, shut down the machine and check again.

Sealed bearings also require lubrication for the longest life. As the bearing temperature increases, the lubricant will "evaporates" from the bearing, which dry the bearing race out and even cause the bearing to fail. Bearing manufacturers recommend to lubricate the bearings regularly. Turn off the machine after every 1000~1500 hours of operation and apply lubricating oil to bearings. Do not over-lubricate the bearings. All bearings should be lubricated with one or two injections. Also check the fixing screws. The machine should be inspected every 500 hours, and maintained every 1000 hours in case of working overtime or overuse.

## **8. Common Problems and Solutions**

Many operators expect to get satisfactory results quickly from gravity separator. When making an adjustment, wait at least two minutes to decide if you need to improve. The reason is that it takes a certain time to adjust the entire surface of the screen deck to a new state due to the amount of materials on the deck.

Do not operate the machine when you don't know its working principle well. The gravity separator performs sorting based on the specific gravity of materials and the resistance to air flow. For the optimal gravity sorting, all control mechanisms must be properly adjusted. Remember the five adjustment aspects: feeding speed, lateral tilt angle, longitudinal tilt angle, vibration frequency, and air volume.

## **10 Most Common Questions**

The following 10 most common problems are most likely to occur when operating a new gravity separator. Please check below for solution.

**1) Fans rotate reversely.** Many problems are caused by the reverse rotation of fans. If cannot have enough air volume, check the direction of the fan. See from the motor end of the gravity separator, the fan and all axes should rotate clockwise.

**2) Deck surface blockage.** If the deck surface does not have sufficient air volume when the fans rotate properly, remove the screen deck and clean it. When the machine is running, use compressed air to blow dirt and chaff from top to bottom to clean the deck surface.

**3) Dirty air filtering cover.** The air filtering covers of the gravity separator are used to filter impurities in the air in workshop before it enters the machine. If the covers are blocked, the fan cannot suction enough air through the filtering covers to produce the correct gravity sorting. For cleaning, just remove the filter covers and gently tap on the ground, or use compressed air to blow off dirt for more effective cleaning.

**4) The foundation is not strong enough.** The gravity separator must be mounted to a solid foundation. It is preferably a 5.9 in (150 mm) thick concrete foundation. If there is vibration on the ground while machine is running, it may because that the foundation is not strong enough. A weak foundation will reduce sorting quality because the foundation absorbs some vibrations for sorting.

**5) Too much production.** Slightly lower the production can greatly improve the sorting quality. Usually the production depends on the required quality grade and the raw material quality fed to the gravity separator. Sorting quality and production are inversely related. That is: increasing production usually reduces quality, while lowering production increases quality.

6) Fastening handle get loose. Fastening handle looseness is not a common problem, but it is often overlooked. It is usually happened when the operator does not tighten the fastening handle after adjustment. The loose fastening handle will cause a temporary swing which will absorb the vibration of the screen deck and have the similar results with the weak foundation.

**7) Using an incorrect screen mesh.** The screen surface is the actual part for gravity sorting by the friction between screen surface and materials. Therefore, user must choose proper screen mesh and good quality screen to complete the gravity sorting of a certain material. Poor wires for screen mesh will result in poor sorting quality, low production, and sometimes damage the deck surface to be repaired. Generally, the screen should have a rough surface structure and screen holes should be as uniform as possible to prevent materials from falling off. We usually use 12 mesh screen for wheat and paddy rice, 10 mesh for corn grain. If the user has special request, please tell us in advance.

**8) Belt slips.** The belts of new machine often slip as they will stretch a little at the beginning of operation. So please check frequently during the first few weeks. When inspecting the belt, turn the machine off first, then apply pressure on the back of the belt between two pulleys. The offset is about 0.5 in (13mm).

**9) Processing materials that are not suitable for gravity sorting.** The problem is seldom seen because the gravity separator usually can make some improvement for any batch of seeds. However, the gravity separator is specially used to sort materials of the same size with different specific gravity. If the material has not been graded by size, it is not suitable for sorting by gravity separator.

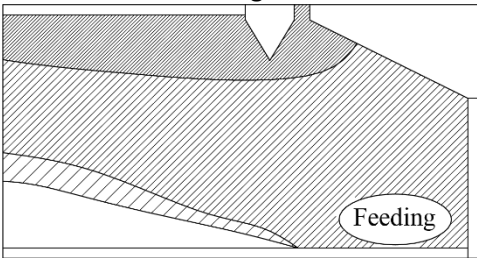
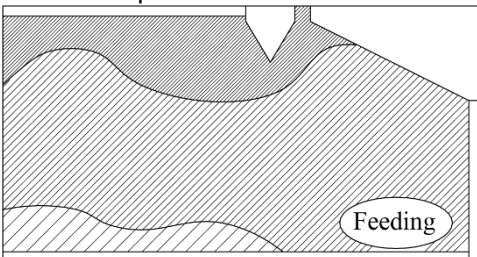
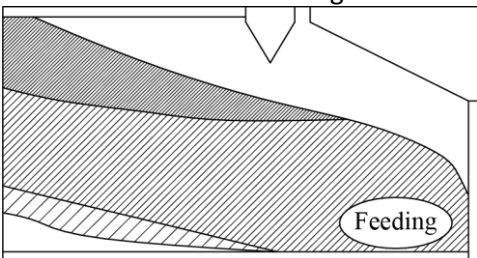
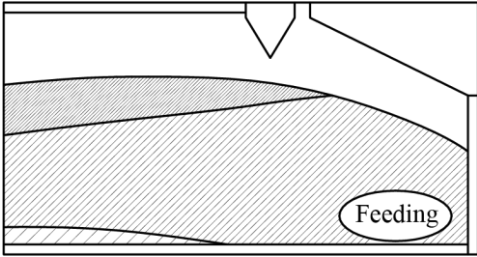
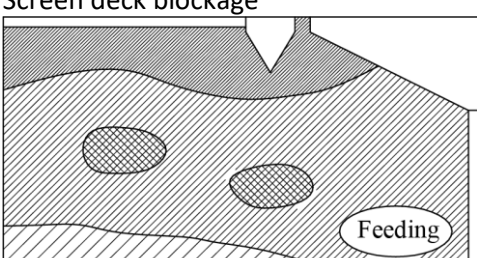
**10) Incorrect adjustment.** This is the most common problem for new inexperienced operators. Adjustment requires more experience. After one adjustment, wait a few minutes to see the effect if it is good or bad. If the effect is good, make other adjustments for better results. If not, return to the original settings and wait a few minutes for next adjustment. Finally, remember to adjust little by little. Settings obtained with several small adjustments is better than that with one large adjustment.

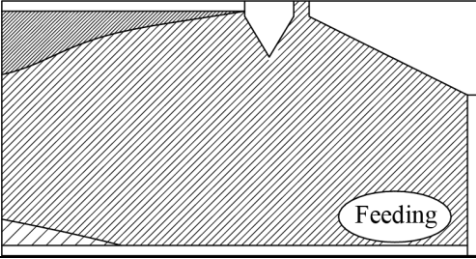
The final flow mode of the screen deck differs with different materials. However, for most materials, the general flow mode is similar. Material average thickness on screen deck recommended:

- 0.98~1.9 in (25~50 mm) for soybean-sized seeds particles;
- 0.5~1 in (13~26 mm) for wheat-sized seeds;
- 0.23~0.47 in (6~12 mm) for alfalfa seeds;
- less than 0.23 in (6 mm) for smaller seeds than alfalfa seeds.

Generally, the material thickness of the higher-side should be 1~3 times thicker than the lower side. The material average thickness at the feeding end should be 2~4 times than that of the discharging end. The above rules are not for all products, but all products which flowing situation is similar can be sorted. However, necessary adjustments are needed to obtain the best sorting effect.

Check below list for possible failures and corresponding measures

| No. | Operation Problem                                                                                                          | Reason                            | Measures                           |
|-----|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------|
| 1   | <b>Materials move to higher end</b><br>   | Vibration frequency too large     | Reduce the frequency               |
|     |                                                                                                                            | Longitudinal tilt angle too small | Increase the tilt angle            |
|     |                                                                                                                            | Air volume too small              | Increase the air volume            |
| 2   | <b>Material separation fluctuate</b><br>  | Belts loose                       | Tighten the belts                  |
|     |                                                                                                                            | Unstable foundation               | Reinforce                          |
|     |                                                                                                                            | Feeding fluctuation               | Feeding uniformly                  |
|     |                                                                                                                            | Abnormal power supply             | Use normal power                   |
| 3   | <b>Materials on deck not enough</b><br> | Feeding speed too slow            | Increase feeding speed             |
|     |                                                                                                                            | Lateral tilt angle too large      | Reduce the lateral tilt angle      |
| 4   | <b>Move to lower side</b><br>           | Vibration frequency too small     | Increase vibration frequency       |
|     |                                                                                                                            | Longitudinal tilt angle too large | Reduce the longitudinal tilt angle |
|     |                                                                                                                            | Excessive air volume              | Reduce air volume                  |
| 5   | <b>Screen deck blockage</b><br>         | Screen surface blocked            | Remove the deck to clean           |
|     |                                                                                                                            | Air filtering cover blocked       | Clean the air filtering cover      |
| 6   |                                                                                                                            | Feeding speed too fast            | Reduce feeding speed               |

|                                                                                                                         |                              |                                 |
|-------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------|
| <div>Materials on deck too much</div>  | Lateral tilt angle too small | Increase the lateral tilt angle |
|                                                                                                                         | Air volume not enough        | Increase air volume             |