

# **X Series Combine and Front-End Equipment Optimization**

**“Ready To Harvest” for Soybeans and Grain Quality**

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**John Deere Harvester Works**

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## **Preface**

The content of this material is intended to help you know how to choose the best configuration and set up an X Series combine and platform, for any Soybean variety and condition before going to the field.

Setup and Adjustment recommendations are intended as a starting point before harvest season. Additional adjustments and fine tuning will be necessary depending on crop moisture and harvest conditions.

Crop setting checklists and Grain Quality Tips are a quick reference for configurations and operating speeds to help optimize grain quality.

## Platform and Draper Setup and Adjustments

### Most common problems in Soybeans are:

- Poor appearance of the field after harvest (flagging)
- Uneven cut stubble
- Cutterbar Plugging/Pushing
- Poor cutting / losses
- Increased feeding difficulty in damp conditions
- Grain Loss

**FACT: The highest percentage of Soybean Harvest field grain losses are at the platform on the Cutterbar and Reel.**

4 soybeans per sq. /ft. = 1 bu. /ac. loss



## Cutter Bar Knife Configurations

The following components are critical to ensure that the cutting system performs to its optimum:

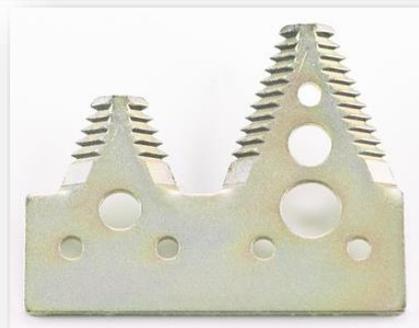
### Coarse Tooth Sections are recommended for Soybeans on both Draper and Auger Platforms

Cut quality is critical.

Be sure all knife sections and knife guards have sharp edges and knife hold downs are tight.

Coarse-tooth Sections  
Blunt Nose Knife Guards

For **No-Till soybeans in corn stalks** the Short/Long sections and the Non-Clog knife guards are recommended.



**Non-Clog guards** have the cross bar between the points removed to prevent stalks from plugging and a blunt nose to prevent stabbing stalks from hair pinning and pushing/plugging.



For **No-Till Double Crop Soybeans in straw stubble** Open Top Knife Guards with long coarse tooth sections are recommended to prevent straw stubble plugging.



## Attachments for HD & RDF headers

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### Reel Flip-Over Bundle

Recommended to reduce reel wrapping. *Not compatible with Steel Tine Standard Reel.*



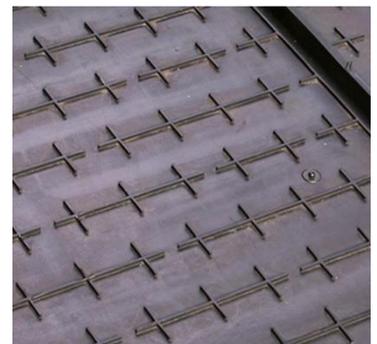
### Divider Rods (HD & RDF)

Optional divider rods can be installed to help divide the crop and help prevent material wrapping between the end of the reel and divider point.



### Grain Saver Draper Belts (HD only)

Optional side belts designed for small grains to help prevent header grain loss in shatter prone crops.



### **Cleated Center Belt**

Recommended for cereals, oil seed, and pulse crops.



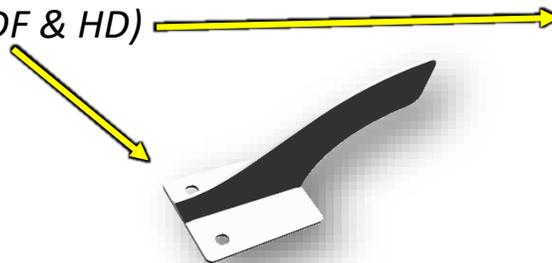
### **Standard Center Belt (RDF option only)**

Recommended for soybeans to promote feeding and minimize grain loss at the center section.



### **Center Crop Flow Divider**

Recommended for light crop to minimize underfeeding. (RDF & HD)



### **Gauge Wheel Scrapers (HD)**

Recommended to reduce gauge wheels from accumulating material which could cause inaccurate header height position for off ground cutting.



## Recommended Reel Adjustments

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**Flex Draper:** the reel needs to only pull crop over the cutterbar onto the side belts. The reel should be operated higher and further out. **Up and Out.** Reel speed should be matched with the ground speed or slightly faster. A reel speed that is TOO FAST can lead to pod shatter and cause header loss.



### Reel Finger Pitch

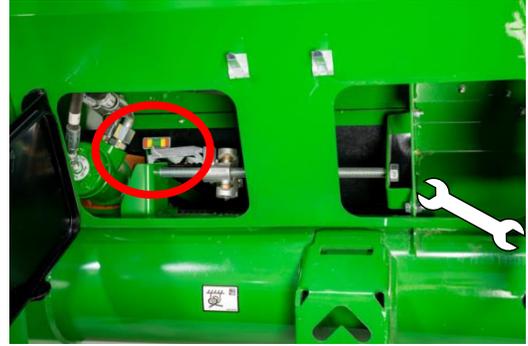
Reel Fingers should be adjusted for crop condition:

- Most aggressive position (pulled back) for down or tangled crop.
- Medium aggressive position (leaned back) for normal crop conditions.
- Least aggressive position (Straight down) for tall standing crop.



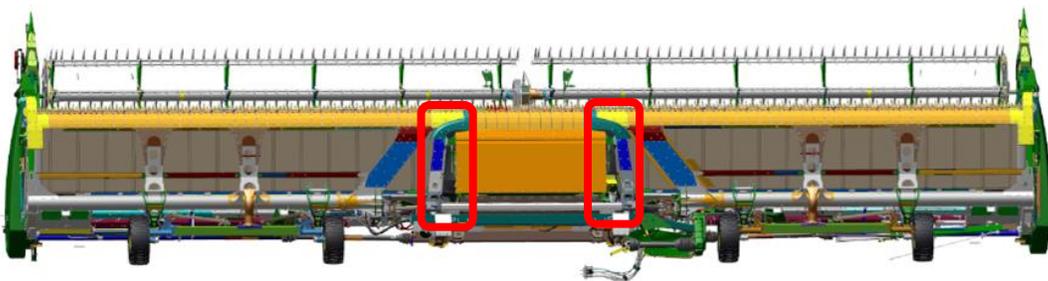
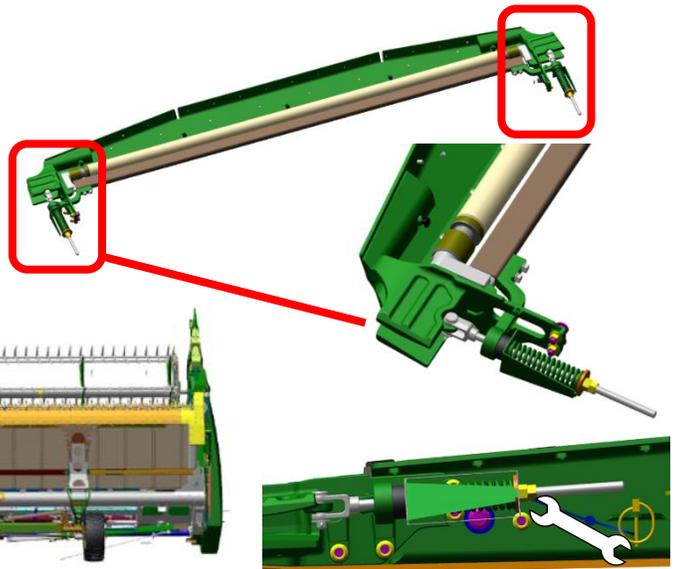
## Draper Belt Tension

Check and adjust the draper belt tension on both sides of the header. Adjust so the indicator is in the center of the gauge.



## HD Center Draper Belt Tension

Both sides of the center belt will need to be checked. If necessary, tension or de-tension the belt according to the gauge.



**Reel Finger Timing** – Proper setting of minimum reel height will protect against unexpected reel movements that can place reel fingers in contact with cutterbar.



**RDF:**



**HD:** With the wings in the down, measure 45mm at the outer reel fingers and 15mm at hinge.



### **Drum Height Position**

The drum height can be raised for higher capacity feeding of high-volume crops.

*HD heads have a jack bolt on the sides of the drum for height adjustment.*

### **Feed Drum Finger Timing**

With the center feed section in neutral, spin drum until the middle finger has the lowest clearance to the feed floor, this gap should be 40mm. Use handle on RH side of drum to adjust.



## Draper Inspection and Adjustments

The following adjustments are critical to ensure that the RD/HD Draper performs to its optimum:

- Sickle Sections
- Knife Guards
- Dual Knife Timing
- Reel Finger Timing

**For Optimal performance and durability of cutting components:**

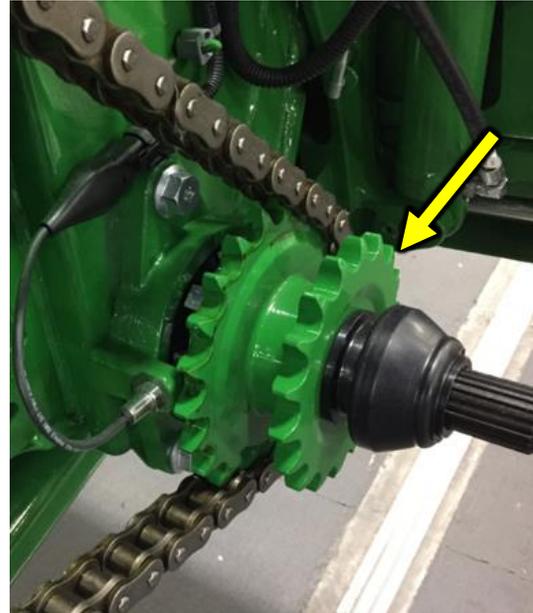
### **Coarse Tooth Sections recommended for Soybean harvest.**

- Inspect for broken or improperly adjusted hold downs. Repair or replace as required.
- Inspect for dull or broken knife sections. Repair or replace as required.
- Inspect for dull or worn or broken guard cutting edges. Repair or replace as required.
- Inspect for excessive binding between top of knife sections and top of guard slot. Binding can be caused by bent guards, bent cutterbar or improper position of guards. Repair or replace as required.
- Inspect knife head and knife drive alignment with first guard slot to ensure binding is not present in areas. Repair or replace as required.
- Verify knife hold downs are tight. Knife gap should be the thickness of a business card.
- Verify that complete cutting system turns freely by rotating the drive by hand (drive shaft removed). **Keep hands and fingers away from cutting components while rotating!**

## Combine Configuration and Setup

### Feeder House Drive Chain Speed

Slow 18T small diameter sprocket



### Feeder House Drive Chain Tension



18 - 25mm  
Check every 50hrs

Replace chain when Idler has  
reached the end of adjustment slot.

## Back Shaft Speed Feeder House Variable Drive

- Operate the cutterbar slow  
X9 - 520rpm  
S-series – 490rpm



## Rotor Speed

- 2<sup>nd</sup> Gear (420-800rpm range)

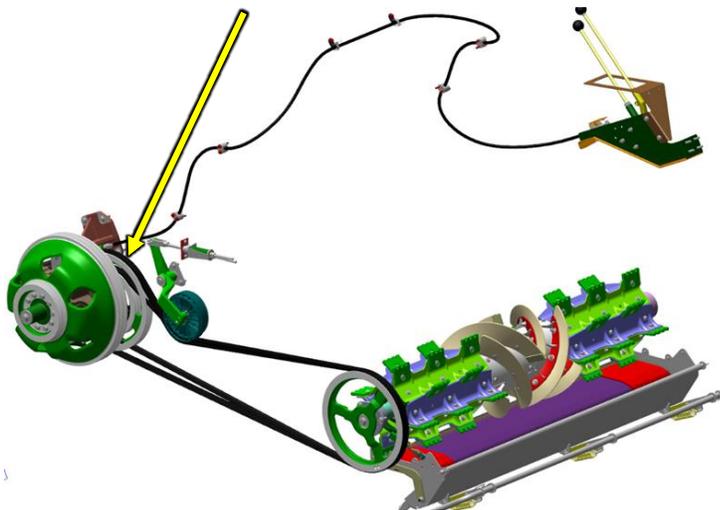
## Feed Accelerator Speed

- Low speed 1<sup>st</sup> Gear – 440rpm
  - W/optional Slow Speed Kit – 310rpm
    - *The Slow Speed Kit recommended for improved grain quality in corn.*
    - *2<sup>nd</sup> Gear may be required in though green stem soybeans.*



## Optional Slow Speed Kit

New Pulley & Belt



## Concaves Configurations

**Round Bar** is the recommended concave in all three locations for soybeans since its overall performance is very good in all moisture conditions.

The open areas between the concave bars allow the beans to fall through the concave faster to reduce grain damage.



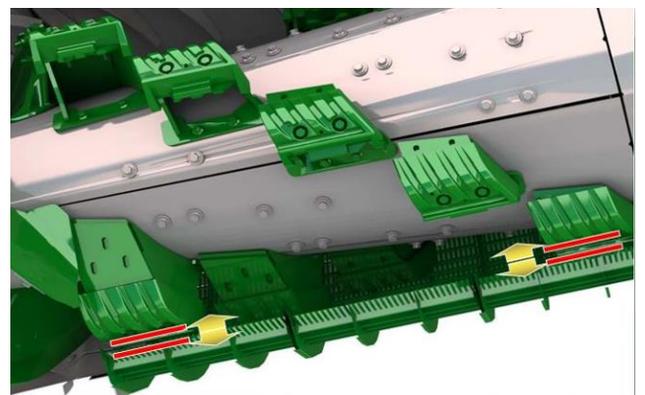
**Large Wire** Concaves may also be used but are a risk for hairpin plugging in green stem beans.

- Large wire concaves also come in lighter weight Half width sections for easier handling when changing concave configurations.



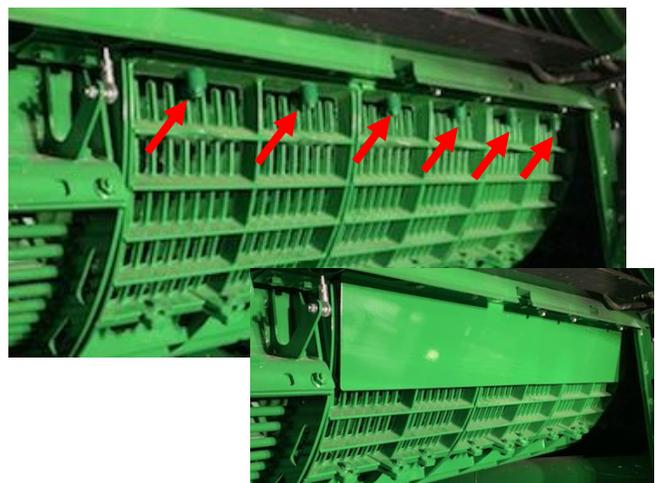
## Zero Concaves

Refer to your Operators Manual for how to Level Concaves (from front to rear) and calibrated to “Zero” for clearance to the rotor threshing elements. *(Misadjusted Concaves that are tight in the rear or too tight in the front, causes poor threshing and grain damage.)*



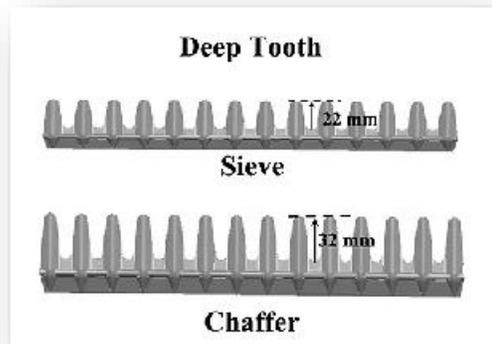
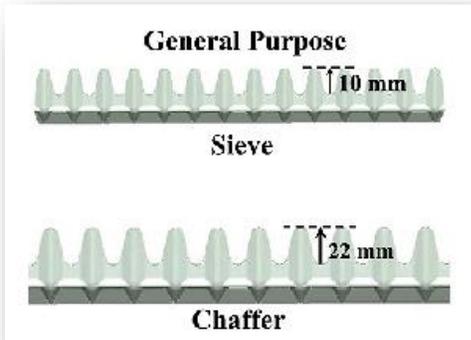
## Separator Grates

The separator grate spacers are recommended to be in the storage position but can also be operated with the spacers in between the grates and the rails as recommended in corn. *(This will need to be done on both sides of the machine for both rotors to match. Also make sure to reinstall deflector shields.)*



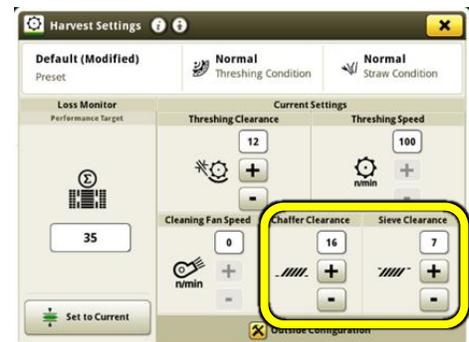
## Cleaning Shoe

Either Deep-tooth chaffer or General-Purpose chaffers can be used for Soybeans



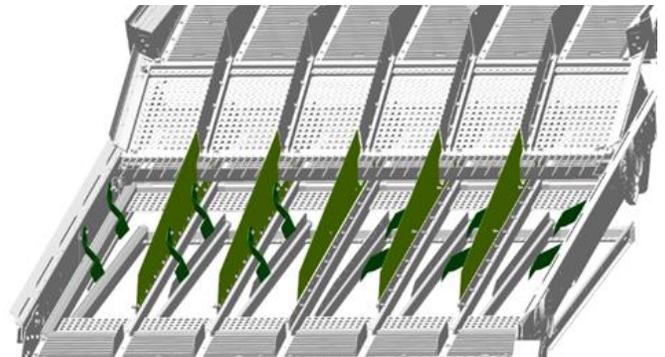
Be sure chaffer and sieve are calibrated so the opening exactly matches the cab display setting.

*If openings do not match, follow the Factory Calibration procedures.*

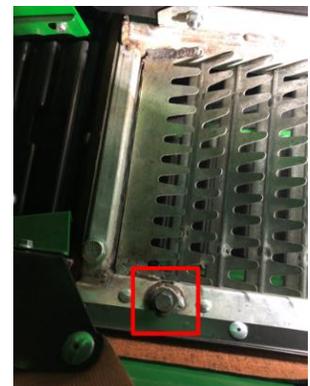


## Sidehill Performance Package

Recommended for sidehill conditions to help retain a level shoe load in sidehill conditions for proper grain cleaning and preventing grain loss from uneven and overloaded bays. Includes full-length tall chaffer dividers and crop deflectors.

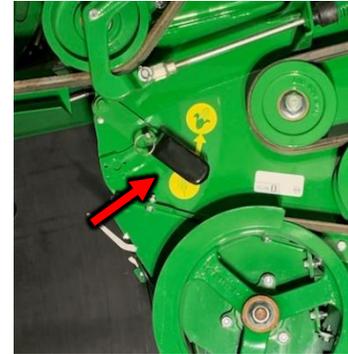


Front chaffer should be set at 25mm for ALL crops.



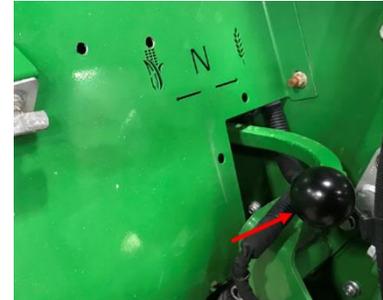
### Active Tailings System

Set the lever UP to the **CORN** position to open the concave for soybeans. Opening the concave provides less grain damage and reduces chaff load on the chaffer and sieve.



### Chopper speed in High

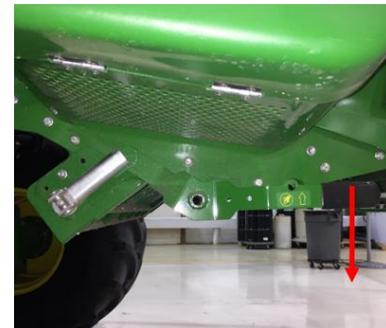
Push lever in, to small grains position.



### Adjustable Knife Bank Engagement

Depending on preferred residue size.

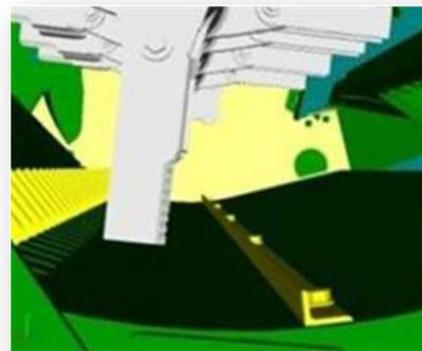
- Manual engagement
- In cab adjustment (if equipped.)



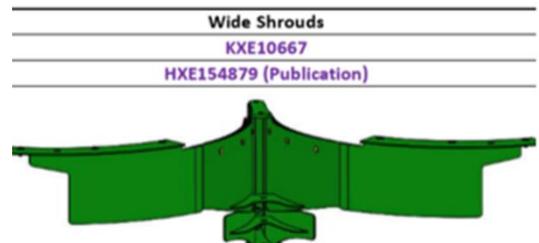
### Additional Residue Sizing Option

Adding the straw chopper controller bar reduces the stem cut length when desired. The controller bar is installed to the chopper floor.

*Risk: Controller bar increases horsepower usage.*



**Wide Shrouds:** If having trouble spreading 50ft+, these can help increase spread width.



## Soybeans Adjustment Checklist (*Outside*)

### Front End Equipment

- Reel Finger pitch set least aggressive (handle away from cutterbar)
- Center Section set on Low speed



### Feeder House

- Feeder House Drive Chain Speed = 18T
- Feed Accelerator shifted into Low Speed 1<sup>st</sup> Gear
- Rotors shifted into 2<sup>nd</sup> Gear (500-800rpm)



### Cleaning System

- Measured Chaffer and Sieve settings match display
  - Left and right side of elements match
- Front chaffer set to 25mm (All crops)
  - *Closing the front chaffer can nozzle air flow and reduce capacity*

### Separator

- Separator grate spacers in the storage position or in between the grates and the rails.
- Concaves zeroed/leveled – Round Bar recommended
- Install separator covers if needed to even out shoe load.
- Active tailings Set to the OPEN (Corn) position.

### Residue

- Counter knife engaged only as far as required
  - *Over chopping takes more power and fuel*

## Soybeans Adjustment Checklist (*In-Cab adjustments*)

- Back shaft Speed = 510rpm
- Cleaning Fan speed = 800-1000rpm
- Deep Tooth Chaffer = 12-20mm
- Deep Tooth Sieve = 4-12mm
- General Purpose Chaffer = 13-21mm
- General Purpose Sieve = 5-13mm
- Rotor Speed = 900-1300rpm
- Concave Clearance = 7-26mm

### Auto Header Controls

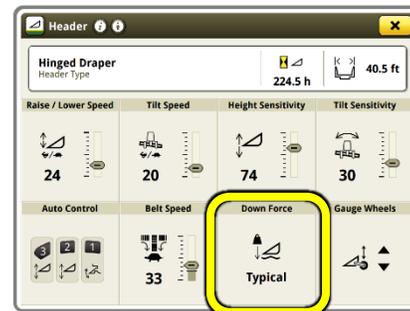
- Height Resume
- Height sensing *On-Ground*
- Lateral Tilt
- Fore/Aft Resume
- Auto Reel Speed
- Auto Belt Speed



- Set the Ground Conditions Settings (HD)

- Very Firm
- Firm
- Typical
- Soft
- Very Soft

**Note:** *The Softer the setting the more "ridged" the suspension.*



- Set the Ground Conditions Settings (RDF)

When cutting off ground, increase cutterbar pressure to Max HydraFlex pressure.



## Start of Harvest

- ❑ Rotate the left- and right-wing manual override valves clockwise to the harvesting position & verify the left and right Service wing lock safety valves are vertical in the unlocked position.



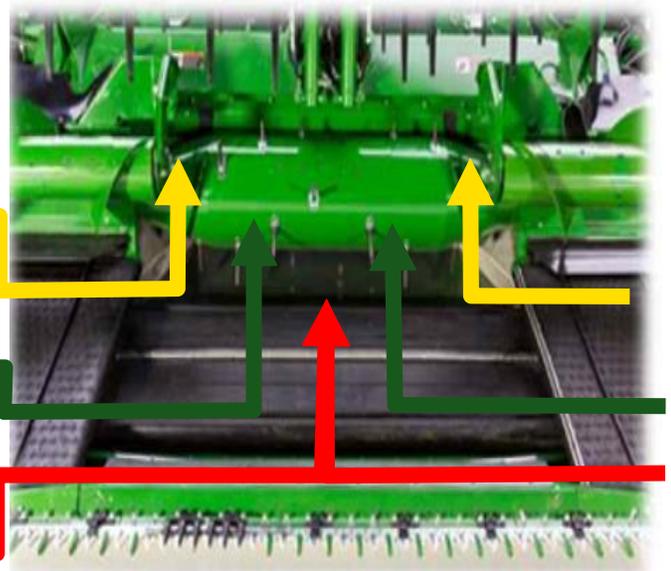
Manual Override Valve & Safety Wing Lock Ball Valve Unlocked

- ❑ Set reel position. *Reel Finger angle position for minimal disturbance to the crop, helping the crop onto the belt minimizing head shatter. Adjust reel finger angle adjustment handle away from cutterbar.*
- ❑ Set Draper Belt Speed. *Belt speed should be matched to machine ground speed and/or crop conditions for optimum feeding performance.*

**Too Slow:** Crop is feed too far on outsides, can cause crop wrapping under belts, and bunching in feed drum

**Optimal:** 2 streams from belts just barely come together making a smooth wide stream of crop entering drum. This ensures each rotor is fed evenly

**Too Fast:** Both belt streams come to together in the center intermixing the crop, creates 1 stream which is difficult to utilize the full width of the separator. Can create slug feeding and drum plugging

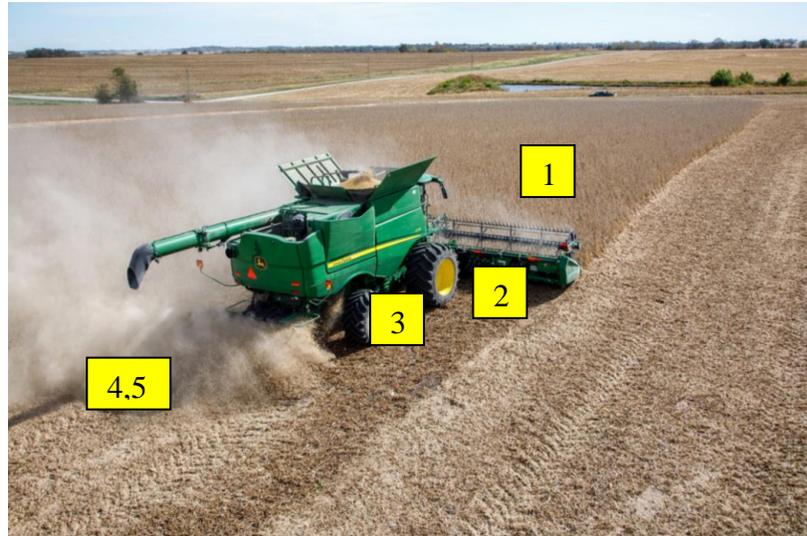


Harvest a short distance, perform a power shutdown and inspect machine/ground for leaks, grain loss, and grain tank cleanliness.

- Header to Feeder House connection
- Stone trap seals
- Shoe seals
- Auger trough and grain tank clean out closed

### Checking Harvest Loss

1. Preharvest loss
2. Header loss
3. Machine loss
4. Rotor loss
  - a. Un-threshed loss
  - b. Threshed loss
5. Shoe loss



### Calculate Loss, Equipment Plus App

1. Verify crop type
  - Change by selecting the menu at the top left of the screen
2. Identify Residue Disposal
  - Spread
  - Windrow
3. Input the Header Width
4. Input the current Yield
5. Measure and input the Seed Count grain loss found
6. Identify the Area measured for known seed count

Calculator

Instructions	Calculator	History
<b>Crop</b>	Soybeans	170.1 seeds / oz
<b>Residue Disposal</b>	Spread	
<b>Header Width</b> <small>(ft)</small>	45	
<b>Yield</b> <small>(bu / ac)</small>	75	
<b>Seed Count</b>	2	
<b>Area</b> <small>(ft<sup>2</sup>)</small>	1 x 1 ft	

Reset

0.71%     0.53 bu/ac

If losses are unacceptable, use Performance section in GoHarvest to optimize grain loss.

Outside
Inside
Grain Loss
Performance

### Grain Loss Algorithm

Starting in Model Year 2022, X Series and S Series machines will come set with the Area-based grain loss algorithm as default.

*Area-based loss display algorithm is similar in units of kernels per area. The algorithm considers machine header width, speed, and loss levels. The area based should be the most consistent display algorithm option when harvesting over a range of different speeds and crop conditions.*

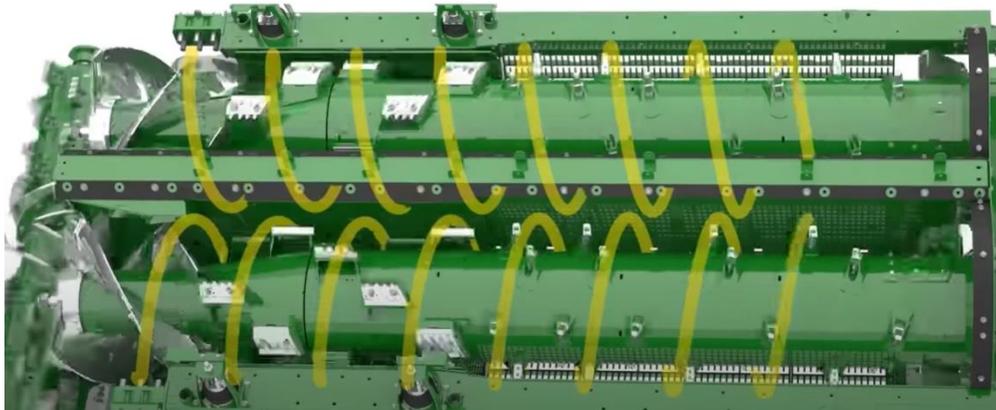


## Harvesting Productivity

Grain feed rate (bu/hr or tn/hr) is an important factor in harvest optimization that is easy to overlook. Ground speed may remain the same but as grain feed rate changes this can affect losses significantly.

- Verify losses as feed rates increase to maximize efficiency.
- Use display to monitor changes in bu/hr or tn/hr

The 3-stage rotor chamber helps crop expand as it travels through the rotors for improved separation. Slightly faster than traditional rotor speeds are necessary for the X-Series as the Dual 24in rotors are smaller than the Single 30in S-Series rotor. The increase in RPM is to match the equivalent rotor tip speed of the Single rotor. With faster speeds, more centrifugal force is applied to the heavier grain. This force helps separate the grain from the MOG as it travels through the rotor cage.



## Seed Soybean and Soybean Grain Quality

1. Investigate field conditions before harvesting. If there is a lot of variability in the crop maturity that will determine when the harvest will begin.
2. To avoid splits and seed coat cracking, start harvesting @ 14- 15% moisture. When seed drops below 10-11% moisture it will be difficult to prevent damage.
3. When beans drop to 10% moisture or drier, stop harvest and let them stand and wait overnight to the next morning or until they get a rain on them and then go back when moisture increases. When the beans get down to 10% or less, you will have splits, regardless what you do.
4. Rotor threshing speed depends on how dry the stems are. If the stems are dry, start at 500rpm. If the stems are damp or green, run up to 800rpm if necessary. If there are still splits, then open the concave 5 at a time. Leave the rotor speed alone if possible. Need to keep the rotor speed up for material handling in the separator.
5. If un-threshed pods show up in the grain tank, close the concave 1-2mm at a time until they go away. There is a fine line with concave clearance, between splits and unthreshed pods.
6. Keep the ground speed normal to keep the separator full and MOG material handling. If there is a lot of threshed/open pods and small sticks in the grain tank, increase the cleaning fan speed. **DO NOT** close the sieve. Closing the sieve will run free beans through the tailings and cause seed damage. When you do a power shut down, drop open the tailings elevator door you should NOT have any free soybeans in the tailings at all.
7. Check concaves for level front to rear. Concaves out of level may cause a pinch point increasing damage potential.
8. Calibrate and “Zero” the concave position sensor.
9. Check all the clean grain auger flighting to be sure there are no sharp edges.

***Extra measures to reduce chances of grain damage in specialty crops:***

10. Do not unload grain tank completely empty.  
Leave some grain in the tank to cover the augers to minimize damage.
11. Do not fill the grain tank over top of the loading auger  
The grain boiling up above the loading auger can add to grain damage.
12. Do not unload the grain tank at high engine RPM.

## **Grain Tank Sample**

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### **Threshed pods and sticks in the grain tank**

1. Be sure concaves are level and zeroed.
2. Be sure chaffer and sieve opening is correct and calibrated.
3. Tighten chaffer opening by 2mm to help remove sticks and pieces.
4. Increase cleaning fan in 50 RPM increments until shoe loss is observed.
5. Check setting every 2 hours as the crop dries during the day.
6. Closing the sieve to clean up the grain tank causes increased tailings and grain damage.

## Platform Troubleshooting

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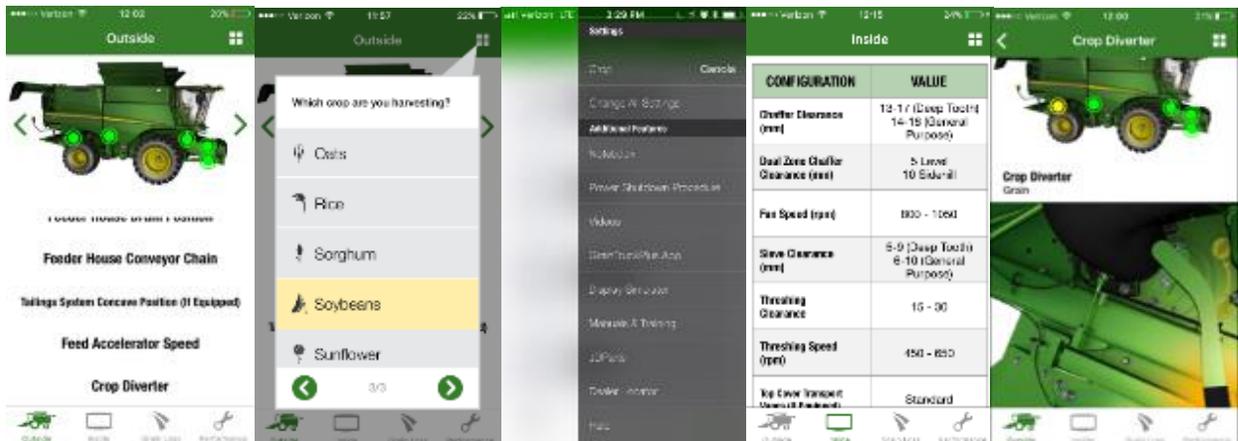
### Shatter Loss at the Cutterbar

1. **Reel speed not matched to ground speed.**
  - Adjust speed so that the reel moves the crop evenly.
  - In **standing** crop, reel speed should be equal to or slightly faster than combine ground speed. Reel should look like it is pulling combine through the field.
  - In **down and tangled** crops, reel speed should be 50% faster than the combine ground speed.
  - Too fast of reel speed results in shatter loss.
  - Running reel too low in crop causes shatter loss.
  - Be sure Reel Speed has been calibrated.
2. **Ground speed too fast.**
  - Reduce ground speed so that reel does not hit and shatter crop.
3. **Worn Cutting Components.**
  - Check knife guards and knife sections.

### Down/Tangled Crop Conditions, cannot get under or cut crop.

1. Adjust Finger Pitch back
2. Tilt the feeder house forward to nose down the cutterbar.
3. Reduce ground speed.
4. Cut beans at 45 deg. angle to the down direction.
5. Install Rod dividers.

Download the Equipment Plus App for quick information on, settings, grain loss calculator, JDParts, videos, procedures and much more.



Visit the GoHarvest YouTube channel for detailed videos on Power Shutdown procedure, CombineAdvisor, ActiveTerrain Adjustment, and many more.



<https://www.youtube.com/watch?v=3KR77OTdNKU&list=PL1KGsSJ4CWk7jzH744F1bByhwXWAixmFj>

## NOTES

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