Standard Operating Procedures (SOPS) for the Indiana Corn and Soybean Innovation Center

The following SOP’s should be used to familiarize yourself with the equipment. Most of the equipment at ICSC will also require hands on training.

Below is a list of contacts in case of an emergency.

Emergency Contacts for Indiana Corn and Soybean Innovation Center (ICSC)

Dial 911 for Red Light Emergency

Facility Address:
Indiana Corn and Soybean Innovation Center (ICSC)
Agronomy Center for Research and Education (ACRE)
4750 US Hwy 52 West
West Lafayette, IN 47906

If you’re not sure, you can call Purdue Police non-emergency number and tell them the problem 494-8221.

Jason Adams, Facility Manager
Office: 494-2007
Cell: 765-491-1264

Purdue Dept. of Radiological & Environmental Management, REM (Safety and spills): 494-6371

For a serious problem with the building that you can’t contact Jason about, call Purdue Police non-emergency number 494-8221. They will page a maintenance person who is on-call.
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Standard Operating Procedure – Reserving Equipment

1. **Purpose**

   The purpose of this SOP is to give instruction on how to reserve certain pieces of equipment at the Innovation Center.

2. **Scope**

   Anyone who may need to reserve equipment in the Innovation Center.

3. **Prerequisites**

   Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

   PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

   - none

6. **Procedure**

   1. You will first need to be trained on ICSC safety procedures as well as equipment specific procedures
   2. After completion of all training procedures. The facility manager will send an email outlining the steps to set up iLabs. Which is the platform for reserving equipment

Documents: SOP short-form
To register for an account:
To get started, you must register for an account:
1. Navigate to the core page:
   https://purdue.ilabsolutions.com/service_center/show_external/4110
2. In the upper-right-hand corner of the screen where it says, ‘Welcome Purdue
   user, please click here to login or register,’ select the click here link
3. You will be directed to an authentication page where you will need to enter your
   Purdue credentials
4. Once you have entered your credentials, click the ‘Login’ button
5. You will be directed to an iLab Registration page where you will need to select
   your PI/Lab, and verify your contact information
6. Once your registration has been submitted, your PI will receive a notification
   that you have requested membership to their lab in iLab. They will need to
   approve your membership and assign any Account String for your use.

To Create an Equipment Reservation:
Once you have been accepted into your PI’s lab and assigned Account String, you can
schedule equipment time.
1. Navigate to the core page:
   https://purdue.ilabsolutions.com/service_center/show_external/4110
2. At the upper right hand of the page where it says, ‘Welcome Purdue user, click here to log in or register,’ select click here.
3. Enter your Career Account and password, and sign in.
4. Select the Schedule Equipment tab and click on the ‘View Schedule’ button next
   to the instrument of interest. Click and drag on the time frame you would like to
   schedule your reservation for.
5. A window will pop up that will allow you to verify your reservations details and
   provide payment information before saving the reservation.

To Create a Service Request:
Once you have been accepted into your PI’s lab and assigned Account String, you can
create service requests.
1. Navigate to the core page:
   https://purdue.ilabsolutions.com/service_center/show_external/4110

Documents: SOP short-form
2. At the upper right hand of the page where it says, ‘Welcome Purdue user, click here to login or register,’ select click here.
3. Enter your Career Account and password, and sign in.
4. Select the Request Services tab and click on the ‘Request Service’ button next to the service of interest.
5. You will be asked to complete a form before submitting the request to the core.
6. Your request will be pending review by the core. The core will review your request and either Agree to the work or they will ask for more information if needed.

7. References

Please watch the instructional video or see Innovation Center Facility manager.

8. Definitions

ACRE – Agronomy Center for Research and Education
PI – Principal Investigator
Seed Counter – A piece of equipment used for counting seed
SOP – Standard Operating Procedure
Standard Operating Procedure – Camfil Dust Collector Filters

1. **Purpose**

The purpose of this SOP is to give instruction on how to change the Camfil Dust Collector Filters at the Innovation Center.

2. **Scope**

For those qualified to change the filters.

3. **Prerequisites**

Must be knowledgeable enough with the Camfil dust collectors to change the filters.

4. **Responsibilities**

Innovation Facility staff, facility staff, farm staff, Purdue Building Maintenance personnel

5. **Safety Concerns**

- Falls
- Dust
- Pinch points
- Electrical shock
- Compressed air

6. **Procedure**

Documents: SOP short-form
1. Disconnect electrical power to the fan and control box. Disconnect compressed air service from the compressed air header. Bleed all air from the air header. Perform an OSHA approved LOTO procedure on these or any other energy source.
2. Open the access door at the front of the unit, swinging it out of the way.
3. Rotate the left side clamp bar counter clockwise and pull toward you until it clears the clamp bar clockwise until it resets on the bottom of the HEPA filter module.
4. Rotate the right side clamp bar clockwise and pull toward you until it clears the clamp bar latch bracket. Then rotate the clamp bar counter clockwise until it rests on the bottom of the HEPA filter module.
5. Pull the first filter out by sliding it off the clamp bar tubes.
6. Pull the second filter out.
7. Remove a new filter from the shipping carton, taking care not to cut or otherwise damage the filter. With the gasket side up, place the bottom edge of the filter on the clamp bar tubes. Push the filter in until it reaches the filter stop at the end of the clamp bar tube.
8. Slide the filter spacer onto the clamp bars, the “tag” must be down (if equipped).
9. Install the second filter, push the filter in until the spacer is tight against the back filter and the front filter is tight against the spacer.
10. To seal the filters, repeat steps 2 and 3 in reverse order. Visually check the gasket to make sure it is compressed when the clamp bars are latched.

7. **Lockout Tagout Procedures**

The electrical lock out is done at the front panel of the individual dust collection unit. Turn the large red switch counter clockwise to disconnect the power then place your lock on the switch. The shut off to the compressed air is located near the gutter by the dust collectors. Or on the north wall of ICSC just behind the exterior threshing line.
8. References

Please see Innovation Center Facility manager for instructions or owner's manual.

9. Definitions

ACRE – Agronomy Center for Research and Education

LOTO – Lockout Tagout. The act of locking a machine or device so it may not be energized during maintenance

SOP – Standard Operating Procedure
Standard Operating Procedure – Outside Collection Bins

1. Purpose

The purpose of this SOP is to give instruction on how to empty the large dust and ground plant material bins at the Innovation Center.

2. Scope

For those needing to empty the large bins. The preferred method would be to contact the facility manager. If that is not an option. Any Purdue forklift trained operator may empty the bins.

3. Prerequisites

Must be Purdue forklift certified.

4. Responsibilities

PIs, Technicians, grad students, undergrads, faculty, farm staff, university employees.

5. Safety Concerns

- Pinch points
- Falling Bin from forklift
- Heavy Lifting

6. Procedure

1. Shut the dust collector hopper by pushing in the long black handle on the bottom of the dust collector cone. This prevents debris from coming out
while bin is being rolled away and the dust collector will remain operational for a small amount of time while bin is being emptied.
2. Remove the connecting tube by releasing the large gray snap ring.
3. Use small chains to hold up the connecting tube.
4. Unlock dump hopper wheels and roll it away from the dust collector
5. Release the two large binders and open the lid to the dump hopper
6. Use the large chain to hold the dump hopper lid open
7. Release the safety latch at the back of the bin
8. Pick up the dump hopper with the forklift from behind the dump hopper
9. Lift the dump hopper over the large roll off trash bin.
10. Either release the rocking mechanism by pulling on the cable or by lightly tapping the paddle on the front of the dump hopper to the roll of dumpster
11. Reverse steps to place the dump hopper under the dust collector

7. References

Please see Innovation Center manager for instructions.

8. Definitions

ACRE – Agronomy Center for Research and Education
SOP – Standard Operating Procedure
Standard Operating Procedure – Phenomics Vacuum System

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Vacuum System at the Innovation Center.

2. **Scope**

Anyone who has a need to run the vacuums.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- none

6. **Procedure**

1. The central vacuums are located in rooms 1168 and 1136.
2. Retrieve the vacuum lines from the wall mount
3. Obtain the desired attachment from the accessory basket
4. Hook the hose to one of the vacuum ports
5. Turn the green “Systems on Button” Located on the wall
6. Proceed to vacuum

Documents: SOP short-form
7. When complete press the red “Systems off” button
8. Return the hose and accessories to the wall brackets

7. **Lockout Tag out Procedure**

   1. Locate the blue switch on the main vacuum electrical panel located outside under the back porch
   2. Place appropriate lock and tag the device

8. **References**

   Please see Innovation Center manager for instructions or access to the owner’s manual.

9. **Definitions**

   ACRE – Agronomy Center for Research and Education
   LOTO – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance
   PI – Principal Investigator
   SOP – Standard Operating Procedure
Standard Operating Procedure – High Bay Radiant Heat

1. **Purpose**

The purpose of this SOP is to give instruction on how to run the high bay radiant heat at the Innovation Center.

2. **Scope**

Anyone who may need to operate the high bay radiant heat in the Innovation Center.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- none

6. **Procedure**

1. There are 8 different radiant heating units in the Highbay room of ICSC
2. Each unit is run independently with its own timer
3. To operate locate the timer that is near the heater mounted on the large steel beam

Documents: SOP short-form
4. Turn the dial to desired length of time. 30 minutes max.
5. The heater will turn off automatically at the end of the set time
6. Repeat the steps to turn it on again

7. **References**

Please watch the instructional video or see Innovation Center Facility manager for instructions or access to the owner’s manual

8. **Definitions**

- **ACRE** – Agronomy Center for Research and Education
- **High Bay** – The tall part of the Innovation Center used to work on UAVs and the Phenomobile or other field sensors
- **PI** – Principal Investigator
- **Seed Counter** – A piece of equipment used for counting seed
- **SOP** – Standard Operating Procedure
Standard Operating Procedure – Forklift

1. **Purpose**

The purpose of this SOP is to give instruction on how to start and operate the ACRE/Innovation Center facility forklift safely.

2. **Scope**

Anyone who has a need and is Purdue trained and licensed to run a Forklift. The only room at the Innovation Center facility that the forklift is allowed in is the high bay and the hard surfaces surrounding the building.

3. **Prerequisites**

Must be Purdue forklift certified to use the forklift at ACRE or the Innovation Center facility. Also, must go through Innovation Center facility guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

- Supervisors
  - Ensure that all employees under their direction who are designated to operate a forklift are trained, evaluated, and certified prior to operation of the equipment. Ensure that certification is kept current (e.g., re-evaluation/driving test and refresher training, as applicable) and notify REM of employees who are no longer employed with their department or whose job has changed and are no longer assigned to operate a forklift as part of their duties. Notify REM of accidents and near misses involving forklift operation. Ensure that forklifts and attachments are appropriate for the use conditions and maintained in safe operating condition. Immediately remove defective equipment from service until repaired or replaced. To the extent feasible, reduce operational hazards presented by the use location and loads.

Documents: SOP short-form
• Employees
  o Complete all components of training at the required intervals. Complete classroom and hands-on training, and demonstration of competency in operation. Conduct pre-operational inspections prior to start of each shift. Do not operate a forklift that does not successfully pass the pre-operational checklist. Immediately stop operating any defective forklift or attachment and report the situation to the supervisor. Read the manufacturer’s operations manual. Observe all precautions discussed in training and the recommendations of the manufacturer of the forklift.

5. Safety Concerns

• Pinch points
• Running over feet
• Falling bins, pallets
• Tipping
• Running into objects, people
• Overhead clearance
• Getting stuck in soft surfaces

6. Procedure

Before Operation

1. Only trained personnel with current authorization are allowed to operate Forklifts. Authorization requires successful completion of initial classroom training, hands-on work-area specific training (practical), and a driving test (evaluation).
2. Passengers are not permitted on or in the forklift or load.
3. Daily visual inspection must be made to ensure that the horn, lights, brakes, tires, gas supply, hydraulic lines, etc. are in safe working condition. Employees may not operate an unsafe forklift at any time.
4. Fill fuel tanks out of doors while the engine is off.
5. Operators must wear seatbelts

Picking up a load

6. Do not exceed the safe load capacity of a forklift at any time. Do not counterweight a forklift to increase its lifting capacity.
7. Forks should always be placed under the load as far as possible. Do not lift a load with one fork.
8. No load should be moved unless it is absolutely safe and secure.
9. When unloading trucks or trailers, the brakes on the vehicle must be set (locked) and the wheels chocked.
10. No person is permitted to stand or walk under elevated forks.

Moving the load

11. The operator's view should not be obstructed by the load. In the event of a high load, the forklift should be driven in reverse.
12. Operators must look in the direction of travel.
13. The forks should not be operated while the forklift is traveling.
14. When the forklift is not carrying a load, the operator must travel with the forks as low as possible (maximum of 4 inches on paved surfaces). When carrying a load, it should be carried as low as possible (consistent with safe operation, 3 to 12 inches above the surface).
15. On a downgrade, the forklift should be driven in reverse, and the forks raised only enough to clear the surface.
16. On an upgrade, the forklift must be driven in the forward direction, following the load, and the forks raised only enough to clear the surface.
17. Use extra care when handling long lengths of bar stock, pipe, or other materials.
18. Avoid sharp or fast end-swings.
19. Operators should avoid making jerky starts, quick turns, or sudden stops. The operator is not permitted to use reverse as a brake.
20. Forklifts should be driven on the right side of the road or aisle-way.
21. Forklifts must be operated at a safe speed with due regard for traffic and conditions.
22. Slow down on wet and slippery surfaces and at cross aisles or locations where vision is obstructed.
23. Operators entering a building or nearing a blind corner must make their approach at reduced speed, sound the horn, and proceed carefully.
24. Operators must give pedestrians the right-of-way at all times.
25. Operators must not drive toward any person who is in front of a fixed object or wall.
26. Operators should not put their fingers, arms, or legs between the uprights of the mast, or beyond the contour of the forklift.
27. Operators must drive with both hands on the steering wheel. Horseplay is prohibited. Do not drive with wet or greasy hands.
28. No person is permitted to ride as a passenger on a forklift or on the load being carried.

Parking

29. Forklifts must be safely parked when not in use. The controls must be neutralized, power shut off, brakes set, key removed, and the forks secured in a lowest position, flat on the surface, and not obstructing walkways or aisles.
30. A forklift may not be left on an incline
31. Forklifts may not be parked in areas that will block exits, stairways, fire extinguishers or any other emergency equipment

7. **Lockout Tag out Procedures**

1. Set parking break
2. Remove the key

8. **References**

Please see Innovation Center Facility manager for assistance or access to the owner’s manual

Documents: SOP short-form
9. **Definitions**

ACRE – Agronomy Center for Research and Education  
LOTO – Lockout Tagout. The act of locking a machine or device so it may not be energized during maintenance  
PI – Principal Investigator  
SOP – Standard Operating Procedure
Standard Operating Procedure - Walkie Stacker

1. Purpose

The purpose of this SOP is to give instruction on how to start, operate and charge the Walkie Stacker at the Innovation Center.

2. Scope

Anyone who has a need and is Purdue trained and licensed to run a Forklift or Walkie Stacker. The Walkie Stacker is only to be used in the ICSC Facility receiving room, the high bay and the hard surfaces to the north of the facility. It should not be operated in any other room within the facility.

3. Prerequisites

Must be Purdue certified to use the Walkie Stacker. Also, must go through Phenomics facility guidelines and watch facility safety and procedural videos online.

4. Users

PIs, Technicians, grad students, undergrads, faculty, university employees and farm staff.

5. Safety Concerns

- Pinch points
- Running over feet, being struck by Walkie Stacker
- Falling bins, pallets
- Running into people, building, objects, vehicles
- Falls and tip overs
- Battery explosions
6. Operating Procedure

1. Perform a general walk around to determine if Walkie Stacker is in good working order. Check the following items:
   a. Battery is charged
   b. Wheels are in good condition
   c. Check both forks to see if they are worn, bent or broken
   d. Inspect lift chains for damage
   e. Check load backrest is in place and secure
   f. Look under truck for hydraulic leaks
   g. Test the horn
   h. Check that all control levels work smoothly

2. If at any time you see a defect or have a concern, contact the ICSC facility manager.

3. Turn the truck on by placing the control handle vertical and turning the key ON (green dot).

4. Braking: Move the control handle all the way down or all the way up to apply the brake (see Brake Zone Label). When you let go of the control handle it will automatically go to the upper braking zone.

5. To Raise: Push the Raise Button and release when the forks are at the desired height.

6. To Lower: Push the lower button all the way for fast lowering. Push the button part of the way for slower lowering speed. Release the button when the forks are at the desired height.

7. To Tilt: Push the top of the Tilt switch to tilt the tip of the forks up; Push the bottom of the Tilt switch to tilt the tip of the forks down.

8. To Reach: Push of the Reach switch to extend the forks. Push the bottom of the switch to retract the forks.

9. Load: Make sure the load is secure, level and not too heavy for the Walkie Stacker to handle

10. Steering: You control the steering by moving the control handle from side to side.

11. Travel: Move either Forward/Reverse Rocker in the direction you want to move. The Farther you move the rocker from the neutral position, the faster the truck will move. For high travel speed, turn the travel speed...
12. When operating the Walkie Stacker in the forward position the recommended walking area is directly behind the control handle. While the Walkie Stacker is traveling in the reverse direction the recommended walking area is directly to the right or left of the walkie stacker to prevent being run over by the Walkie Stacker.

13. Plugging: This is another way to slow or stop the Walkie Stacker. While the truck is in motion in either direction, move the Forward/Reverse rocker to the opposite direction that you are traveling. Plugging will not hurt the Walkie Stacker.

14. Reversing Button: The reversing button is located at the end of the control handle. If you accidentally hit the reversing button while working in close quarters, the truck will move in the direction of the forks until the button is released. The reversing button cannot prevent all injuries.

15. Horn: Push the switch on the underside of either grip to sound the horn. Use the horn to warn pedestrians and other drivers. Use your horn when you come to an intersection or cross walk.

16. Charging: When the Battery Charge Display is showing a yellow light it is time to charge the Walkie Stacker. Park the Walkie Stacker in the designated spot in the receiving room. Turn the Walkie Stacker off. Do not disconnect the battery. Open the battery access panel on top of the Walkie Stacker. Use the provided extension cord. Plug one end of the cord into the charging socket in the battery compartment. Plug the other end into the AC outlet.

17. Charging Light Status:
   a. Steady Yellow Light: If the light does not come on, or goes out, make sure the AC outlet is working and the extension cord is OK.
   b. Flashing Yellow Light: Means the something is wrong with the battery or the charger. Notify ICSC manager.
   c. Flashing Green Light: Means the charger is working.
   d. Steady Green Light: Means charger is finished
7. **Lockout Tag Out Procedures**

1. Remove Key
2. Place electrical plug LOTO device over charging wall plug
3. Place LOTO lock on plug cover
4. Fill out LOTO tag and report to Facility Manager
5. Reverse process for removing LOTO device

8. **References**

Please see Phonemics Facility manager for assistance or access to the owner’s manual

9. **Definitions**

ACRE – Agronomy Center for Research and Education

**LOTO** – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance

**PI** – Principal Investigator

**SOP** – Standard Operating Procedure

**Walkie-Stacker** – Battery powered walk behind pallet jack with the capabilities to stack bins or pallets on shelves
Standard Operating Procedure – Pallet Jacks

1. **Purpose**

   The purpose of this SOP is to give instruction on how to operate a Pallet Jack at the Innovation Center.

2. **Scope**

   Anyone who has a need to move pallets, bins or skids at the Innovation Center. Please do not use Pallet Jacks in the long hallway of the facility to prevent any damage to the floors or glass walls.

3. **Prerequisites**

   Must go through Innovation Centers guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

   PIs, Technicians, grad students, undergrads, faculty, farm staff, university employees.

5. **Safety Concerns**

   - Pinch points
   - Running over feet
   - Running into something

6. **Procedure**

   1. Place forks of the pallet jack into position under or in the pallet or bin.
   2. Lift the load by pushing the lever under the handle down or in the forward position. Then pump the handle until the load is lifted of the floor.
   3. To travel with the load place the lever in the middle or neutral position. Then either push or pull the load to desired location.

Documents: SOP short-form
4. To lower the load pull the lever up toward the handle until the load has lowers to the floor.
5. Pull pallet jack from under the load and place it back into its designated area.

7. **References**

Please see Innovation Centers manager for assistance or access to the owner’s manual

8. **Definitions**

PI – Principal Investigator
SOP – Standard Operating Procedure
Pallet Jack – Manual powered equipment for lifting pallets or bins of the ground and moving them around.
Standard Operating Procedure - Bulk Dryer

1. **Purpose**

The purpose of this SOP is to give instruction on how to load, log and operate the large bin dryers at the ACRE facility.

2. **Scope**

Anyone who has a need to dry plant or seed material and is forklift licensed at Purdue University. The bins must be loaded in a way that encourages air flow. Meshed bags work better for air flow than paper bags.

3. **Prerequisites**

Must be forklift certified to load the bins on the dryers.

4. **Responsibilities**

PIs, Technicians, grad students, faculty, farm staff.

5. **Safety Concerns**

- Falling lids
- Falling drying bins
- Pinch points

6. **Procedure**

1. Contact Jason Adams at ICSC to turn on the dryers if they are not already running 765-494-2007
2. Label white drying bin with project owner and date the bin was placed on dryer with duct tape located in 5 gallon bucket near dryer

Documents: SOP short-form
3. Determine which dryers you want to use
   a. 140°F for Plant material
   b. 90°F for seed
4. Remove bin cover from the dryer.
5. Carefully place the bin onto the dryer making sure it is completely nested on the dryer.
   a. Never place the bins more than three high on the dryer.
   b. It is best to place newer/wetter material on top of multiple staked bins. If you place wetter material on the bottom and dryer material on top. The moisture from the bottom will be forced through the dryer bins on top.
6. Replace bin cover
7. On the back side of the dryer make sure the vents are open. By turning the wheeled crank.
   a. Please make sure the vents are open for at least 2 of the bin bays while dryer is running. This prevents excessive air flow backup into the blower fans.
8. If you are taking the last bin off the dryer then please contact Jason Adams to turn off the dryer 765-494-2007
9. Return all bay covers when you are done and close the vents in the back.

7. References

Please see Phonemics Facility manager or ACRE staff with any questions.

8. Definitions

ACRE – Agronomy Center for Research and Education
ICSC – Indiana Corn and Soybean Innovation Center
Drying Bins – Large white metal containers. Some are labeled AEC
PI – Principal Investigator
SOP – Standard Operating Procedure
Standard Operating Procedure - Post-Harvest Storage in East Shed

1. **Purpose**
The purpose of this SOP is to give instruction on how to store large plastic bins in the East Shed at the ACRE campus.

2. **Scope**
Anyone who has a need to store post-harvest seed or plant material at ACRE.

3. **Prerequisites**
If you will be moving bins around with a forklift than you must be trained and certified by Purdue to operate a forklift. Bins may be moved around in the East Shed by using a pallet jack if stacking of bins is not necessary.

4. **Responsibilities**
PIs, Technicians, grad students, faculty, farm staff. When you are done with the bins it is your responsibility to clean them out for the next user. Empty bins are stored in the East Shed.

5. **Safety Concerns**
- Crush hazard
- Falling bins

6. **Procedure**
1. Place plant or seed into large 48in x 45in plastic bins
   a. Do not fill past the top of the bins to prevent your material from being crushed when stacked
2. Label each bin with the owners name and date at a minimum.
3. Place bins in any available section in the east shed.

Documents: SOP short-form
a. Keep bins between the lines to be able to access the bins from all sides
4. You may place bins 2 wide between the lines
5. Do not stack bins more than 4 high. Less if the bins are heavy.
   a. When staking make sure the bins are nested properly and evenly around all sides of the bins.
6. Try to place only material from one PI in a section. This will help with keeping material sorted later
   a. If you fill a particular section then proceed to the next available section

7. References

Please see Phonemics Facility manager or ACRE staff with any questions

8. Definitions

East Shed – Building number XX located just east of the bulk dryers
PI – Principle Investigator
SOP – Standard Operating Procedure
Standard Operating Procedure – Wisconsin Oven

1. Purpose

The purpose of this SOP is to give instruction on how to operate the Wisconsin ovens at the Innovation Center.

2. Scope

Anyone who has a need to dry plant or seed material.

3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. Responsibilities

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. Safety Concerns

- Burns
- Pinch points

6. Procedure

Start Up

1. Place the Main Disconnect switch “ON”.
2. Make sure the “Blower(s) Stop/Emergency Manual Off” button is pulled out.

Documents: SOP short-form
3. Place the “Control Power” selector switch to the “ON” position. The “Control Power” light will be lit.
4. Push the “Alarm Silence/Reset” button.
5. Push the “Blowers(s) start” button.
6. The “Safe Guards Met” light will be lit.
7. Adjust temperature controller to desired setting.
8. Place the “Heat” selector switch to “On” position. The “Heat On” light will be lit.
9. When the process timer is in the “Alarm” position, the “Process Complete” light will turn on and the horn will sound. When the process timer is in the “Shutdown” position, the “Process Complete” light will turn on and the oven will shut down.

**Shut Down**

1. Place the “Heat” selector switch to the “Off” position.
2. Allow the blower to run until the oven cools to below 200°F/93°C.
4. Push the “Alarm Silencer/Reset” button.
5. Place the Control Power Switch “Off”.
6. Place the Main Disconnect switch “Off”.

**Process Timer**

Turn the (3) position switch to one of the following modes.

**OFF**

1. Start up the oven according to the startup instructions.
2. Shutdown the oven according to the shutdown instructions.

**Process Alarm**

1. Place load in oven.
2. Select the amount of process time required for your product and set the timer accordingly.
3. Adjust the temperature controller to the desired setting.
4. When the temperature in the oven has reached the point temperature the process timer will start timing.
5. When the process timer times out, the alarm will sound. The oven heat will continue to stay on.
6. To restart the timer, turn the selector switch momentarily to the “Off” position.

**Shutdown**

1. Place load in oven.
2. Select the amount of process time required for your product and set the timer accordingly.
3. Adjust the temperature controller to the desired setting.
4. When the temperature in the oven has reached the set point temperature, the process timer will start timing.
5. When the process timer times out, the heat will shut off.
6. After the heats shuts off and the oven begins to cool (when oven cools to 150°F) the circulation blower will shut down.
7. To restart the timer, turn the selector switch momentarily to the “Off” position.

**Removal of shelving**

1. Pull the shelving out until it reached the safety latch on the right side of the railing
2. Reach in and flip the safety latch up
3. Temporally store the shelving on the side of dryer A or behind dryer B

**7. Lockout Tag out Procedures**

To properly Lockout either dryer. Place the main disconnect switch in the “Off” position. Each dryer has its own disconnect switch.

**8. References**

Please see Innovation Center Facility manager for instructions or owner’s manual.

Documents: SOP short-form
9. **Definitions**

ACRE – Agronomy Center for Research and Education

LOTO – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance

PI – Principal Investigator

SOP – Standard Operating Procedure
Standard Operating Procedure – Almaco Trunk line

1. Purpose

The purpose of this SOP is to give instruction on how to operate the Almaco Trunk Line at the Innovation Center.

2. Scope

Anyone who may need to run plant material through the Threshing and Shelling Room.

3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety and procedural videos online. ICSC 101 and ICSC 140, 150, 160, 170 or 180 depending on the crop you will be processing.

4. Responsibilities

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. Safety Concerns

- Pinch points
- Hearing protection
- Eye protection

6. Procedure

Start Up

Documents: SOP short-form
1. In the Threshing and Shelling room go to the **Threshing Line Control Panel**. Located on the large gray box on the north wall.

2. Navigate to the **Main Screen**. Then start the line by touching the **Auto Start up Screen** in the lower left of the display.
   a. Hit **Start**. This will start the Grinder, inside conveyor and Dust Collector C.

3. Next determine what station you are working at. If the station is labeled with an “A” then you will need to turn on dust collection “A”. If the station is labeled with a “B” then you will need to turn on dust collection “B”. If you are working outside you will only need to turn on the outside conveyor.

4. To turn on the individual dust collectors or outside conveyor. Return to the **Main Screen** by touching **Goto Main Screen** in the lower right corner.

5. Then touch **Goto Equip Screen**. This will take you to the **Equipment Overview** screen.

6. To start either “A” or “B” dust collector touch **Start up Dust Collector** button. Then either start dust collector “A” or “B”. Whichever one is needed to run your work Station.

7. If you will be working outside and need to start the outside conveyor return to the **Equipment Overview** screen. Then touch the **Start Up Grinder & Conv** button. Then press **Outside Conveyor Start**.

8. To shut down the threshing and shelling line. Return to the **Main Screen** by touching **GOTO Main Screen button**

9. Then press **Auto Start Up**.

10. Then Press **Stop**.

11. **NEVER RUN IN MAINTENACE MODE**

E-Stops

If at any time the E-Stops are used to turn equipment off. (These are the large red push buttons all around the equipment). The following steps will need to be done to get the equipment functional again.

1. Determine which E-Stop was engaged by either one of these two ways.
   a. Walking around and seeing which one has the red indicator light on the button. Then to disengage, push down and turn clockwise.
   b. Or on the Threshing Line Control Panel. Navigate to the **Main Screen**.
      i. Touch **Goto Estop Screen**
ii. Navigate to either the Station Estop Screen button or the Equip Estop button. In either screen if the dot next to the station or equipment is colored in black. Then that signifies that that Estop has been engaged. You will then need to go to that Estop and disengage it by pushing down and turning clockwise.

2. Then on the Threshing Line Control Panel. Press the red Emergency Stop Reset button to the left of the touch display.

3. The final step to reset the Estops will be to go outside to the large dust collectors on the north side of the building. You will need to look at each dust collector and make sure the Control Power On button is on. If the green indicator light on that button is not lit then press the button until the green light comes on.

7. **Lockout Tagout Procedure**

1. Place one lock on the throw off switch on the Threshing Line Control Panel.
2. Place one lock on either or both of the air lines to the east of the Threshing Line Control Panel.

8. **References**

Please see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**

ACRE – Agronomy Center for Research and Education

Almaco Trunk Line – This is the piece of equipment in the Threshing and shelling room that all the threshing and shelling components dock up to. It is used to transport waste material away from the threshers and shellers and conveying dust out of the room.

Documents: SOP short-form
The plant waste plant material is then ground up and the dust will go to the filters.

**LOTO** – Lockout Tagout. The act of locking a machine or device so it may not be energized during maintenance

**PI** – Principal Investigator

**SOP** – Standard Operating Procedure
Standard Operating Procedure – Almaco Maizer

1. **Purpose**

   The purpose of this SOP is to give instruction on how to operate the Almaco Maizer at the Innovation Center.

2. **Scope**

   Anyone who may need to shell multiple ears of corn through a sheller in the Threshing and Shelling Room.

3. **Prerequisites**

   Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

   PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

   - Pinch points
   - Hearing protection
   - Eye protection

6. **Procedure**

   1. You will want to confirm that the screens in the Seed Boss are the appropriate screens for the product you are cleaning. If the screens need
to be changed. Please find the facility manager or exchange them with a small Allen Wrench.

2. Start the Trunk line and Dust Collection System. Please refer to SOP ICSC011.

3. Start the Maizer by pressing the black button at the front of the Maizer.

4. Start the Air Transfer Sheller to Grader by pressing the black button under the transfer conveyor.

5. Start up the conveyor by pressing the green button on the side of the conveyor.

6. Start up the Seed Boss by pressing the green button toward the back of the Seed Boss.

7. Feed ears into the front of the Maizer either by using the bulk shoot at the lower front of the Maizer. Or by feeding them in one at a time through the plexi-glass access panel toward the top of the Maizer.

8. To transfer the shelled grain to the Seed Boss. Throw the lever on the back of the Seed Boss to the “Transfer” position.

9. After the grain has transferred, throw the lever to the “Dump” position.

10. Clean grain will transfer to the bucket to the side of the Maizer. The Dirty or miss-sized material will go to the bucket at the end of the Seed Boss.

11. To turn everything off just hit the Stop buttons on each of the four components.

7. **Lockout Tagout Procedures**

   Either place a plug cover and lock the equipment or turn off everything at the control panel and lock the throwswitch.

8. **References**

   Please see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**

   ACRE – Agronomy Center for Research and Education

Documents: SOP short-form
Almaco Maizer – This is the piece of equipment in the Threshing and shelling room that is used to shell bulk ears of corn. It may be attached to a gravity table for cleaning seed and the cobs will be conveyed to the trunk line.

Alamco Seed Boss – This piece of equipment is used to clean and size grain.

LOTO – Lockout Tagout. The act of locking a machine or device so it may not be energized during maintenance.

PI – Principal Investigator

SOP – Standard Operating Procedure
Standard Operating Procedure – Almaco BT-14 Soybean Thresher

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Almaco BT-14 Thresher at the Innovation Center.

2. **Scope**

Anyone who may need to thresh single soybean plants or small grains through a thresher in the Threshing and Shelling Room.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- Pinch points
- Hearing protection
- Eye protection

6. **Procedure**

1. Dock the thresher to the truck line.
2. Start up the trunk line and dust collection system. Please refer to SOP ICSC011
3. Turn on thresher
4. Place plant into thresher. If plant material is Soybean than insert the plant with the top of the plant going in first
5. The seed will drop to the collection basin at the bottom of the thresher. Clean out any large debris if necessary
6. Using the foot pedal. Transfer the seed to the aspirator.
7. Press on the actuator gate to release the seed into your container.
8. If you are getting splits in the soybeans or not enough of the seeds being shelled from the pods. Then ask the facility manager to help adjust the belt tension.
9. If you are getting too much debris in your sample or think you are losing too much seed out the conveyor. Then see the facility manager to adjust the winnowing fan speed.

7. **Lockout and Tagout Procedures**

1. Unplug the thresher
2. Obtain a lock from the LOTO kit by the thresher and sheller control panel
3. Place a plug cover over the electrical plug and use a padlock to lock the cover
4. Fill out the tag and ziptie it to the lock.
5. Report to the facility manager that you have locked out a piece of equipment

8. **References**

Please see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**

ACRE – Agronomy Center for Research and Education

Documents: SOP short-form
**Almaco BT-14 Thresher** – This is the piece of equipment in the Threshing and shelling room that is used to thresh single soybean plants or small grain heads

**LOTO** – Lockout Tagout. The act of locking a machine or device so it may not be energized during maintenance

**PI** – Principal Investigator

**SOP** – Standard Operating Procedure
Standard Operating Procedure – Agriculex Single Ear Sheller

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Agriculex Single Ear Sheller at the Innovation Center.

2. **Scope**

Anyone who may need to shell single ears of corn in the Threshing and Shelling Room.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- Pinch points
- Hearing protection
- Eye protection

6. **Procedure**

1. Turn on the main trunk line and the dust collector that corresponds to the station you are working at. Refer to SOP 011
2. Turn on the sheller
3. Turn on the small conveyor if you will be discarding your cob
4. Place an ear into the sheller
5. If you did not get all the kernels of the ear or the ear became lodged in the rollers, you can adjust the roller pressure by turning the roller gauge on the side of the sheller
6. If you ever need to remove the side panels to clean out debris you must first unplug the machine.
7. The keys to open the panels are located on the end of the plug
8. After the seed is shelled and falls into the funnel, press the foot transfer pedal
9. Adjust the air flow in the transfer line if there is too much or too little air to deliver the seed
10. Remove seed from the actuator tube then proceed to the next sample
11. After the day or job is complete, turn off the sheller and conveyor and clean the equipment and the surrounding area for spills

7. **Lockout Tag Out Procedure**

   1. Remove the plug from the power
   2. Place a plug cover over the plug
   3. Place the proper lock and tag on the cover
   4. Try to energize the sheller
   5. Reverse order at the end of the repair

8. **References**

   Please see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**

   ACRE – Agronomy Center for Research and Education

Documents: SOP short-form
**Agriculex Single Ear Sheller** – This is the piece of equipment in the Threshing and shelling room that is used to shell single ears. 

**LOTO** – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance.

**PI** – Principal Investigator

**SOP** – Standard Operating Procedure
Standard Operating Procedure – Almaco Head Thresher

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Almaco Head Thresher at the Innovation Center.

2. **Scope**

Anyone who may need to thresh sorghum or wheat heads in the Threshing and Shelling Room.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- Pinch points
- Hearing protection
- Eye protection

6. **Procedure**

1. Turn on the main trunk line and the dust collector that corresponds to the station you are working at. Refer to SOP 011
2. Dock the thresher to the truck line.

Documents: SOP short-form
3. Plug thresher in.
4. Turn on thresher.
5. Place head into the thresher.
   a. Do not place hand to deep into shoot. Make a fist while holding the stem to keep from putting your hand in to deep
   b. Consider leaving a long stem on the head while harvesting
6. Use the white lever to the left of the threshing shoot to clean the threshing drum.
7. Use the compressed air lever to clean out any seeds that may have been held up.
8. Check the grate at the bottom of the unit to see if any large head parts fell down.
   a. If you are getting to much large material at the bottom, consider turning up the winnowing fan.
   b. If you are losing, too much seed consider turning down the air.
9. Use the foot pedal to run the seed through the aspirator.
   a. Use the air control knob on the clear tube to adjust the air pressure. You want just enough air to force the air up but not too much that you lose too much seed.
10. Use the hand control lever at the bottom of the clear tube to empty the seed.
11. At the end of the day, use the compressed air to clean the machine.

7. **Lockout Tagout Procedures**
   1. Remove the thresher's plug from the power
   2. Place the plug cover over the plug
   3. Place the proper lock and tag on the cover
   4. Try to energize the Thresher
   5. Reverse the order to the end of the repairs

8. **References**
   Please see Innovation Center manager for instructions or owner's manual.

Documents: SOP short-form
9. **Definitions**

- **ACRE** – Agronomy Center for Research and Education
- **Almaco Head Thresher** – This is the piece of equipment in the Threshing and shelling room that is used to thresh sorghum to wheat heads
- **LOTO** – Lockout Tagout. The act of locking a machine or device so it may not be energized during maintenance
- **PI** – Principal Investigator
- **SOP** – Standard Operating Procedure
Standard Operating Procedure – Almaco Down Draft Table

1. Purpose

The purpose of this SOP is to give instruction on how to operate the Almaco down Draft Tables at the Innovation Center.

2. Scope

Anyone who may need to work with dusty plant material in the Innovation Center.

3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. Responsibilities

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. Safety Concerns

- Pinch points

6. Procedure

1. Turn on the trunk line as described in SOP 011
2. Turn on the appropriate dust collection unit that corresponds with your work station
3. Place plant material or bags on the downdraft table
   a. There will be a slight downdraft of air to help control the dust

Documents: SOP short-form
4. Occasionally the sump at the bottom of the down draft table will need to be cleared of debris
   a. To do this place a bucket under the table and pull on the slide gate under the downdraft table
5. Be sure to clean the table after each use

7. **References**

Please see Innovation Center manager for instructions or owner’s manual.

8. **Definitions**

**ACRE** – Agronomy Center for Research and Education  
**Almaco Down Draft Table** – This is the piece of equipment in the Threshing and shelling room that is used remove dust from bundles of plants.

**PI** – Principal Investigator  
**SOP** – Standard Operating Procedure
Standard Operating Procedure – Root Washing Station

1. **Purpose**

   The purpose of this SOP is to give instruction on how to operate the Root Washing Stations at the Innovation Center.

2. **Scope**

   Anyone who has a need to wash roots

3. **Prerequisites**

   Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

   PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

   - Slips
   - Eye Hazard

6. **Procedure**

   1. The preferred space for the root washing stations is outside under the porch. In the event of unsuitable weather the root washing station may be used inside room 1168 but cleaning up will need to be a big priority.
   2. Hook water line up to the hydrant. If working outside a hydrant key may be acquired from the facility manager.
3. Make sure sediment catch bins are placed under the root washing station.
4. Wastewater outside may be allowed to drain to the parking lot drains. Wastewater inside is not allowed to drain into interior facility drains. A hose will need to be attached to drain the waste water outside.
5. If there is only a small amount of waste sediment then you can dispose of it in the green roll off dumpster in the ICSC back parking lot. If there is a lot of waste soil generated then the facility manager may choose to obtain the back hoe from the farm to save the waste soil.
6. To wash roots run water over your sample until the desired results are met.
7. At the end of the day or project the root washing station must be cleaned and returned to its proper location.

7. **References**

Please see Innovation Center manager for instructions.

8. **Definitions**

ACRE – Agronomy Center for Research and Education
PI – Principal Investigator
SOP – Standard Operating Procedure
Standard Operating Procedure – Carter Day Aspirator

1. **Purpose**

The purpose of this SOP is to give instruction on how to run Carter Day Aspirator at the Innovation Center.

2. **Scope**

Anyone who may need to operate the Carter Day Aspirator in the Innovation Center.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- dust

6. **Procedure**

1. To start the aspirator, power up both the fan and feed roll by pressing the green run button, then adjust the control knobs on the rights side of the aspirator
2. Set the air valve control "K" to 3 initially
3. Fill the feed hopper with material

Documents: SOP short-form
4. Look into the feed hopper to make sure the feed roll is covered over the entire length of “A”

5. Gradually increase the feed rate to the desired capacity. This is achieved by spinning the dial on the Feed roll control knob “J”. (Increasing/decreasing the frequency increases/decreases the speed from 2-20 RPM).

6. Inspect the product discharging under the feed roll at “B”. If all the material is being lifted, reduce the air velocity using the dial on the fan control knob. (As before with Feed roll control knob “J”, Increasing/decreasing the frequency increases/decreases the speed from 1400-1800 RPM). If product contains light material, increase air velocity “H”. Check for an even curtain of material across the length of the machine. If the curtain is not uniform, decrease air velocity “H” or adjust the feed gate spring tension “P” until a uniform curtain is achieved.

7. Continue adjusting the feed rate via “J” and the air control dial “H” and air valve control “L” until the primary separation results are satisfactory; the duct control “N” has very little effect on the primary separation. When satisfactory results are obtained, note the settings on the air valve control pointers “K” as well as the Fan/Feed roll motor frequencies for future reference.

8. Check intermediate separation results in lifting is pans “C” and “D” and air settings discharge in pan “E”.

7. **Lockout Tagout Procedures**

Place a plug cover over the outlet then lock and tag the cover.

8. **References**

Please watch the instructional video or see Innovation Center Facility manager for instructions or access to the owner’s manual
9. **Definitions**

ACRE – Agronomy Center for Research and Education

Aspirator – Device that uses air to separate material of different weights

PI – Principal Investigator

SOP – Standard Operating Procedure
Seed Tray Shaker

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the seed tray shaker at the Innovation Center.

2. **Scope**

Anyone who wants to use the seed tray shaker to clean, sort, or size seed.

3. **Prerequisites**

Must go through Innovation Centers guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, graduate students, undergrads, faculty, farm staff, university employees.

5. **Safety Concerns**

- Pinch points

6. **Procedure**

<table>
<thead>
<tr>
<th>Size</th>
<th>Shape</th>
<th>Recommended for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/64</td>
<td>Round</td>
<td>Durum Wheat</td>
</tr>
<tr>
<td>7/64</td>
<td>Round</td>
<td>Soy</td>
</tr>
<tr>
<td>8/64</td>
<td>Round</td>
<td>Soy</td>
</tr>
<tr>
<td>9/64</td>
<td>Round</td>
<td>Barley</td>
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<tr>
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<td>Round</td>
<td>Soy</td>
</tr>
<tr>
<td>11/64</td>
<td>Round</td>
<td>Popcorn/Soy</td>
</tr>
</tbody>
</table>

Documents: SOP short-form
Operating Instructions

1. Strap the desired trays to the shaker
   a. Be sure to place the bottom tray in to catch the seed or debris
2. Place the product in the top tray
3. Turn on the switch
4. To reset the time press the “reset’ button
5. Adjust the times with the arrow buttons
6. Once the time is set, press “reset” again
7. Press the white start button

7. Lockout Tagout Procedures

Place a plug cover over the plug. Then lock and tag the cover.

Documents: SOP short-form
8. **References**

Please see Innovation Centers manager for assistance or access to the owner's manual

9. **Definitions**

PI – Principal Investigator  
SOP – Standard Operating Procedure
Standard Operating Procedure – Almaco Seed Bed Cleaner

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Almaco Seed Bed Cleaner at the Innovation Center.

2. **Scope**

Anyone who may need to clean seed in the Threshing and Shelling Room.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- Pinch points
- Hearing protection
- Eye protection

6. **Procedure**

For cleaning gran coming of the Maizer:

1. Obtain the correct screens

Documents: SOP short-form
a. To change the screens remove the side panels with the Allen wrench, wrenches are located in magnetic tray on cleaner
b. Remove the screens
c. Add the desired screens
d. Replace the side panels
2. Place bins to catch the grain under the side and end chute
3. Turn on the main trunk line and dust collectors “A” and “B” see SOP 011
4. Turn on the cleaner
5. After the seed is shelled in the Maizer transfer the seed to the aspirator by moving the lever switch to transfer
6. After the seed is transferred empty the seed to the cleaner by moving the lever to “dump”
7. Adjust gate to control the speed of the grain. Many times the cleaner works better if there is a substantial amount of grain moving over the screens.
8. Clean seed will dump put the side. Debris and odd sized seed will dump out the end
9. Be sure to clean the screens between the samples
10. Turn off the machine after you are done and clean up any spills.

Cleaning Bulk Seed

1. Obtain the correct screens
   a. To change the screens remove the side panels with the Allen wrench, wrenches are located in magnetic tray on cleaner
   b. Remove the screens
c. Add the desired screens
d. Replace the side panels
2. Place bins to catch the grain under the side and end chute
3. Turn on the main trunk line and dust collectors “A” and “B” see SOP 011
4. Turn on the cleaner
5. Poor the seed at the upper end of the cleaner or transfer the seed form either the Maizer of through a vacuum tube located in the cabinets in room 1124
6. Adjust gate to control the speed of the grain. Many times the cleaner works better if there is a substantial amount of grain moving over the screens.
7. Clean seed will dump out the side. Debris and odd sized seed will dump out the end
8. Be sure to clean the screens between the samples
9. Turn off the machine after you are done and clean up any spills.

7. **Lockout Tag out Procedures**
   1. Remove the plug form the outlet
   2. Place a plug cover over the plug
   3. Place the appropriate lock and tag on the plug cover
   4. Try to start the seed bed cleaner to see if it is energized
   5. Reverse order at the end of the repairs

8. **References**
   Please see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**
   ACRE – Agronomy Center for Research and Education
   Almaco Seed Bed Cleaner – This is the piece of equipment in the Threshing and shelling room that is used to clean seed
   LOTO – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance
   PI – Principal Investigator
   SOP – Standard Operating Procedure

Documents: SOP short-form
Standard Operating Procedure – Agriculex Seed Counter

1. Purpose

The purpose of this SOP is to give instruction on how to operate the Agriculex Seed Counter at the Innovation Center.

2. Scope

Anyone who may need to count seeds coming off any of the equipment in the threshing and shelling room.

3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. Responsibilities

PIs, Technicians, graduate students, undergrads, University employees, faculty, farm staff.

5. Safety Concerns

- Pinch points
- Hearing protection

6. Procedure

Basic Operation of Counting

1. Replace the seed collection funnel for the counter with the one currently on the machine. This may take assistance from the facility manager
2. Attach the air supply line from the reels in the Threshing and Shelling room to the seed counter
3. Turn on the seed counter and let it boot up
4. You may need to navigate to the main menu with the arrow keys

**Totalize Mode**

1. To run totalize mode press “1” on the main menu
2. Run the sample through the thresher or sheller
3. Hit the up arrow button to transfer the seed
   a. You may need to adjust the airflow on the black knob near the funnel. If you are losing too much seed in the collection bag then the airflow needs turned down. If the air is not delivering the seed to the counter then you need to turn the air up
4. The total seed count will be displayed on the screen
   a. Be sure to check the first few samples and adjust the sensitivity on the black dial on the counter
5. Place an envelope or tray under the forward silver shoot to collect the seed

**To count and cut seed**

1. Navigate to the main menu
2. Press “2” to count and cut
3. You have the opportunity to enter a number to discard before the seed goes through the counter
   a. Enter a number then press ok
4. Then enter the number of seeds in the sample then press
5. Run the sample through the thresher or sheller
6. Press the up arrow to deliver the seed to the counter
   a. You may need to adjust the airflow on the black knob near the funnel. If you are losing too much seed in the collection bag then the airflow needs turned down. If the air is not delivering the seed to the counter then you need to turn the air up
7. The total seed count, initial discard, and the seed count will be displayed on the monitor
a. Be sure to check the first few samples and adjust the sensitivity on
the black dial
8. Be sure to place a packet or container under the discard or back silver
shoot
9. Then when you place packet under the forward shoot it will discard the
counted seeds in the front and the discarded seeds in the back

To count using scanner and computer spreadsheet

7. **Lockout Tag out Procedure**

   1. Remove the plug from the power
   2. Place a plug cover over the plug
   3. Place the proper lock and tag on the cover
   4. Try to energize the sheller
   5. Reverse order at the end of the repair

8. **References**

   Please see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**

   **ACRE** – Agronomy Center for Research and Education
   **Agriculex Single Ear Corn Sheller** – This is the piece of equipment in the
   Threshing and shelling room that is used to shell single ears
   **LOTO** – Lockout Tag out. The act of locking a machine or device so it may not be
   energized during maintenance
   **PI** – Principal Investigator
   **SOP** – Standard Operating Procedure

   Documents: SOP short-form
Attachment 1

Copy the file "SDSC1.xsm" to your computer. It is available on the memory stick provided, and updated versions will be available on our website.

The machine communicates with a Windows® computer using Bluetooth®. It requires the third-party software “Modbus Puli®” to be installed on the computer. This is available from modbus-tunnel.com. After installing this and licensing it, plug the Bluetooth dongle into a USB port on the computer. It should automatically install its own driver. You should get a message that the driver has installed successfully.

Click on the Bluetooth icon in the lower task bar. It may be on the "show hidden icons" button. It may also take time to appear after the dongle has been installed or your computer re-booted. Click “add a device”. If required, check "my device is set up and ready to be found". It should find your machine, with a name like SDSC1201501, which is the serial number of your unit, listed on the nameplate.

Double click or right click the icon. Click on the pairing code (or passkey) option, and enter a code of the last 6 digits of the serial number (no space). For example, the pairing code for SDSC1201501 is...
201501.

You should get a message that your device has been added. You may also get an option to “look for it in devices and printers”. If so, click that. If not, open “devices and printers” from the control panel. Either way, right click on the SDSC1 icon that should be there and select properties. Go to the hardware tab. Note the number of the com port the machine is on.¹ Don’t worry if the status of the device says “not connected”. Often, it will reconnect itself when there is a demand for it.

Open a copy of the workbook “SDSC1.xlsm” in Excel. You need to enable Excel Macros. A control box for the SDSC1 will also appear. Probably, there will be a message at the bottom saying “no communication.” If so, it is probably because the com port number is wrong. To correct it, follow this procedure:

Click the stop button in the control box. Then, click on the tab at the bottom which says “settings” to change to the settings worksheet. You need to change the number labelled “Communications port” to the number of the appropriate bluetooth com port, which you should have found earlier. For example, if your SDSC1 is on the bluetooth serial port com5, enter 5 here. If you could not see for sure which bluetooth serial port your machine is on, you may need to use trial-and-error. After changing the com port number, return to sheet 1 of the workbook. Save the file and shut down Excel (if you just close the file without closing Excel, it may not work. Excel seems to need to re-start to detect the com port.) Re-open SDSC1.xlsm. If communication is established, there will be no warning in the line at the bottom of the window, and the communications warning light on the SDSC1 should go out. If unsuccessful, repeat this procedure with a different Bluetooth serial port number. If still unsuccessful, try re-starting Excel (after saving the workbook with the new port number), or restarting the computer and/or the SDSC1. You can also try removing the SDSC1 on the bluetooth button of the task bar and re-pairing with it.

To edit the workbook you always need to either click “STOP” in the control box or close it. Otherwise, the program is running and trying to enter counts and barcodes in the spreadsheet.

After setting up, we recommend that you create a template workbook with the name of your choice, and always take a copy of this template file for each new workbook. You can also customize this template workbook by adding titles, instructions, etc. The program starts recording in the line where the active cell is at start-up, so when you save your template file, position the active cell where you

¹ Different computers behave differently, so here are some other things to try if the above gives problems. The Bluetooth dongle should have created virtual com ports on your computer. To see these, open the device manager and select “ports-CONSULT”. You should see a number of “Bluetooth Serial Ports”. Take note of the port numbers. Another way to see the virtual serial ports is to open Modbus Poll. Click Connection -> connect. The connection should be “Serial port”. If you then click for the drop-down list “Serial Settings”, you get a list of available ports, including the virtual Bluetooth ports. This may be an easier way to do it in Windows 8. Because the Bluetooth dongle can create several virtual com ports and only one of them will work, this can require trial-and-error. If you have trouble establishing a connection, try clicking on the Bluetooth icon in the taskbar, click “Bluetooth devices”. You should see the serial number of your SDSC1 listed as a device name. Double click to establish a connection. If you have trouble, it can help to remove the device and then pair with it again.
want recording to start.

You can now install the barcode reader. This also communicates with your computer by Bluetooth. It is already set up and charged. You should only need to plug the base into a USB port on the computer and position the handset on the base. It should install itself and be ready to go.

## Totalize Mode

Totalize mode will count all of the seeds in a sample and enter the result in a spreadsheet. It can be used with a barcode scanner to enter barcodes with each count. If the machine is not in totalize mode, you can select the mode either on the machine or on the computer. On the computer, select the mode and click OK. On the SDSC1, press the left arrow to get a menu and press 1 to select to select totalize. Changing the mode on the SDSC1 also changes it in the computer, and vice versa.

You are now ready to count. If using barcodes, we recommend selecting the option to warn if no barcode. Then, if you forget to scan a barcode for a sample or if, for some reason, the barcode does not get entered in the spreadsheet, the warning light on the SDSC1 will come on and a message will appear in the control box.

If you want to change the entry line, or if, at any time, you want to edit the spreadsheet to enter a title or comment or erase data, simply click stop in the control box. This halts program execution so you can edit the spreadsheet normally. When you are done editing, position the active cell where you want the first line, and click start.

You should be aware that the program needs to be running for changes made in the control box to take proper effect. You can tell if the program is running or not by looking at the stop/start button. If it says stop, the program is running.

The sensitivity knob should normally be set to the least sensitive position (10) for corn. For smaller-seeded crops, you may need a lower setting. This can be determined by count tests.

You are now ready to begin. Shell the first ear. When grain is detected in the collection unit, the pneumatic elevator will come on and blow seed up into the counter. You may wish to adjust the air flow in the elevator using the control valve on the air line. Too little flow will cause the elevator to jam up. Too much can cause seed to be lost into the dust collection bag.

In totalize mode, the seed gate is closed until an envelope is placed over the spout, lifting the envelope sensor.

Documents: SOP short-form
At any time you can place an envelope in position. When seed stops falling, remove the envelope. This causes the count to appear in the spreadsheet beside the barcode (if used). The program then advances to the next line in the spreadsheet.

**Cut Mode**

In cut mode, a certain number of seeds is allowed to pass through the gate into an envelope which must be in place. The valve then closes, retaining seeds inside it until the first envelope (the sample envelope) is removed, and a residue envelope put in place. The gate then re-opens. After the second envelope is removed and the pneumatic elevator has stopped, the counts of both the sample and residue envelopes are written to the spreadsheet. If there are too few seeds (i.e. fewer than the cut size set), it is not necessary to put the residue envelope in place, although it will do no harm if you do. The count will be written in the sample column after the elevator stops.

You can select cut mode on either the SDSC1 or the computer. Changing one will also change the other. On the SDSC1, press the left arrow to get a menu, select option 2, and punch in the number of seeds you want to cut at. Press OK. On the computer, select cut mode, punch in the number of seeds, and click OK.

As in totalize mode, a barcode scanner can be used. You can also halt the program to edit the spreadsheet or change the entry line.

Place the sample envelope on the spout so that it lifts the envelope sensor. If desired, you can use the envelope holder to hold it there. Shell an ear. After the set number of seeds has fallen, the gate will close. You can then remove the sample envelope and put the residue one in place. This will cause the valve to open again. After all the seeds have fallen, remove the residue envelope.

If there are too few seeds, placing the residue envelope is unnecessary, and it will remain empty. But you may find it easier to just place the two envelopes every time rather than checking if this is the case.

It is also possible to discard the residue seed by placing a container to collect all the residue. Simply lift and release the envelope sensor by hand instead of placing a residue envelope.
## Standard Operating Procedure – Color Sorter

### 1. Purpose

The purpose of this SOP is to give instruction on how to operate the Color/Shape Sorter and seed counter at the Innovation Center.

### 2. Scope

Anyone who may need to sort seed by color, shape or count seed in the Innovation Center.

### 3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety and procedural videos online. It is recommended to get hands on training with this machine.

### 4. Responsibilities

PIs, Technicians, graduate students, undergrads, University employees, faculty, farm staff.

### 5. Safety Concerns

- Hearing protection is required if the VMek is placed in the Threshing and Shelling Room

### 6. Procedure

1. Turn on the computer by pressing the blue button on the left side of the counter

Documents: SOP short-form
a. The Counter will automatically load in the program that does not deal with soybean hilum sorting

2. If the software does not initialize automatically. Then hit the INIT button on the bottom right then wait for it to initialize

3. Either load a “Recipe” in the drop down menu or create a new one.

For Counting:

1. Load in Ejector Test in the recipe drop down.
2. Press on to turn the lights on in the lower right.
3. Make sure there is a bin under the machine and the tray in the front of the machine to catch the material
4. Make sure the gate is down by pushing down on the black handle on the left side of the hopper.
5. Place the seed in the hopper
6. Press start on the bottom right side of the screen
7. The machine will count and display the number on the top of the screen
8. If you want information about the seed that passed you can go to the Analytics tab and hit populate
   a. This will give you data regarding the seed that passes and the information may be saved or downloaded.
9. Before you repeat the steps be sure to clear the data from the previous count by pressing clear data at the bottom of the screen on the recipe tab

For sorting

This process is the same regardless of whether are sorting for color or for shape.

1. Open the classifier tab
2. Define the classifier names by clicking on the cell and naming them. I.e. good….bad or orange….yellow
   a. You may add classifiers up to five but the lower the number the better. To do this press the Add New button.
3. Press setup. This will add a tab with each name
4. Select the desired tab then press on to turn on the lights
5. Press the capture on button the drop representative sample that you want to use for the bulk of the sample. This sample will not be ejected.

Documents: SOP short-form
6. Press capture off
7. Select add radio button to the desired channel
   a. Adjust the Min/Max sliders to isolate the desired colors
      i. This step will take some adjusting and trial and error on the
         user’s part.
8. Repeat the above steps for each tab
9. After the parameters have been set you then load the recipe and run the
   samples as listed above

7. **Lockout Tagout Procedures**

1. Turn off the machine
2. Turn large Red switch on the right of the machine to the off position
3. Place the appropriate lock and tag on the sorter
4. Try to energize the machine
5. After the work has been completed reverse the order above

8. **References**

Please watch the instructional video or see Innovation Center manager for
instructions or owner's manual.

9. **Definitions**

**ACRE** – Agronomy Center for Research and Education

**LOTO** – Lockout Tagout. The act of locking a machine or device so it may not be
energized during maintenance

**PI** – Principal Investigator

**SOP** – Standard Operating Procedure

Documents: SOP short-form
Standard Operating Procedure – Seed Counter

1. Purpose
The purpose of this SOP is to give instruction on how to operate the Seed Counters at the Innovation Center.

2. Scope
Anyone who may need to count seed in the Innovation Center.

3. Prerequisites
Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. Responsibilities
PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. Safety Concerns

• none

6. Procedure

***First choose the desired seed counter. We have five that count and package and one that counts and weighs. The counter with the scale underneath is the one that weighs***
The Packaging Counter

This counter maybe used to count the total lot of seed or count a desired amount and place in a package.

To Totalize:

1. Turn on the counter
   a. Place the “Count/Hold” switch to **hold**
   b. Turn the feeder switch to **off**
2. Place the seed in the upper bowl
3. A bag will need to be placed at the bulk discharge as well as the packet discharges
4. With the arrow pointing at Totalize, press set
5. Flip the “Count/Hold” Switch as well as the feeder switch
   a. If at any time you want to pause the counter just flip to **Hold**
6. The counter should run and count the entire lot
7. Adjust the speed as needed
8. Adjust the ribbons on the bowl to line up the seed in a single file, single layered fashion

To count and package

1. Turn on the counter
   a. Place the “Count/Hold” switch to **hold**
   b. Turn the feeder switch to **off**
2. Place the seed in the bowl
3. A bag will need to be placed at the bulk discharge as well as the packet discharges
4. Press **next** to place the arrow to lot size then press set
5. Enter number of lots you want to run. If you are not sure just put in a large number then press **next**
6. Enter the number of seeds you want per envelope then press **set**
7. Then press **run**
8. Flip the “Count/Hold” Switch to **count**. Then flip the Feeder “on/off” switch to **on**.
9. The seed will be counted into the packet with the green light…When that packet reaches the desired seed count it will automatically switch to the next packet
10. Remove the first packet and replace it with an empty one
11. The counter will cycle back and forth between packets until done
12. Adjust the speed as needed and the ribbons on the bowl to align up the seed
13. If at any time you need to pause just flip the switch to Hold
14. At any time you can return to the main menu by pressing mode
15. When you are done you can empty the seed bowl by dumping it into the silver chute then into your discard bag

The Weighing Counter
This counter maybe used to count the total lot of seed or count a desired amount and weigh the sample.

To Totalize and weigh:

1. Turn on the scale and zero
   a. Note: If at any time you are running this counter and you receive an error. Most of the time it is due to the scale not being at zero. Press zero on the scale and reset on the counter to clear the error.
2. Turn on the counter
   a. Place the “Count/Hold” switch to hold
   b. Turn the feeder switch to off
3. Place the seed in the upper bowl
4. Press menu to get to the main screen if needed
5. Press enter at the operation selection
6. Press reset twice at Totalize…This will count your entire lot
7. Flip the switch to Count
8. Adjust the speed dials and ribbons on the bowl as needed to get the correct flow coming out of the bowl
9. At any time you may place the switch to hold to pause or press menu to go back to the beginning
To Count and weigh:

1. Turn on the scale and zero
   a. Note: If at any time you are running this counter and you receive an error. Most of the time it is due to the scale not be at zero. Press zero on the scale and reset on the counter to clear the error
2. Turn on the counter
   a. Place the “Count/Hold” switch to hold
   b. Turn the feeder switch to off
3. Place the seed in the upper bowl.
4. Press menu to get to the main screen if needed
5. Press enter at the Operation selection
6. Press next to advance to the Default # of seeds selection
7. Press enter
8. Press enter to change the number of seeds to count
9. Type in the number you want counted and press enter
10. Press reset twice and flip the switch to count
11. Adjust the speed and ribbons on the bowl to desired speed
12. Once the sample is counted, record your weight
13. When finished empty the bowl by tilting it to the right and collecting it in a container

7. **Lockout Tagout Procedures**

To lockout this piece of equipment you will need to place a cord lock over the cord and lock. Then tag it with your name, date and phone number.

8. **References**

Please watch the instructional video or see innovation Center manager for instructions or owner's manual.
<table>
<thead>
<tr>
<th><strong>Seed Counter</strong></th>
<th><strong>Agronomy Department</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACRE</strong></td>
<td><strong>Innovation Center</strong></td>
</tr>
</tbody>
</table>

**SOP #**  
ICSC CT003

**Revision #**  
1

**Implementation Date**  
10/5/16

**Page #**  
5 of 5

**Last Reviewed/Update Date**  
7/21/17

**SOP Owner**  
ICSC

**Author**  
Jason Adams

### 9. Definitions

- **ACRE** – Agronomy Center for Research and Education
- **LOTO** – Lockout Tagout. The act of locking a machine or device so it may not be energized during maintenance
- **PI** – Principal Investigator
- **Seed Counter** – A piece of equipment used for counting seed
- **SOP** – Standard Operating Procedure
Standard Operating Procedure – Seed Treater

1. **Purpose**

   The purpose of this SOP is to give instruction on how to operate the Seed Treaters at the Innovation Center.

2. **Scope**

   Anyone who may need to treat seed in the Innovation Center.

3. **Prerequisites**

   Must go through Innovation Center guidelines and watch facility safety and procedural videos online. Also must have gone through Purdue WPS training.

4. **Responsibilities**

   PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

   - Inhalation
   - Dermal
   - Chemical exposure
   - Pinch points
   - ALWAYS WEAR THE APPROPRIATE PPE AS SUGGESTED BY THE CHEMICAL LABEL. Since there are two seed treaters in the small room. You will also want to consider the PPE requirements on the seed treatment being used on the adjoining seed treater.
6. **Procedure**

1. Bring in the appropriate seed treatment.
   a. It is the user’s responsibility to bring in their own seed treatment. The seed treatment must be in a sturdy container (preferably the original labeled container). Or a properly labeled secondary container.
   b. A lab mixer is part of the seed treating equipment. You may consider putting in a mixing bar in your container to aid in agitation.
   c. An SDS sheet must be presented to the facility manager before seed treatment begins.
2. Place the labeled chemical container on the agitator.
3. Turn on the power to the equipment by flipping the switch on the wall near the door. It’s the switch with the little red light.
4. Turn on the agitator.
5. Turn on the power to the treater,
6. On the Touch screen F1 will take you to the “Home Screen”. F2 will take you to the “Adjustments Screen.”
7. Press F2
8. Adjust your pump time, coat time and door open time accordingly.
   a. The pump time is the amount of time that seed treatment is delivered to the mixing drum.
   b. Coat time is how long the seed rotates in the drum.
   c. Door open time is how long the door stays open.
9. You may make adjustments anytime to these settings to get the proper seed coat in the most efficient way. In the end. All you seed should be properly covers without excessive seed treatment. If at any time you have seed treatment coming out of the spout you are putting too much treatment on.
10. Press F1 to return to the “Home Screen”.
11. Turn on the Rotor
12. Turn on the Atom.
13. Adjust the drum speed at any time as needed.
14. Dump the seed into the upper chamber.
15. Press the foot pedal.
16. Place package under the exit spout. If this is not done seed will spill onto the floor.
17. Repeat

Clean up

1. Clean up all equipment at the completion of the task or at the end of the day.
2. You may either follow the cleanup directions on the drum.
3. Or you may use the cleaning supplies on site to clean up the equipment.
4. Be sure to pump fresh water through the lines.

7. **Lockout Tagout Procedures**

1. To lock out the equipment unplug the machine and place a cord cover over the outlet.
2. Obtain a look from the box in the Threshing and Shelling room near the control panel.

8. **References**

Please watch the instructional video or see Innovation Center manager for instructions or owner's manual.

9. **Definitions**

ACRE – Agronomy Center for Research and Education
LOTO – Lockout Tagout
PI – Principal Investigator
PPE – Personal Protective Equipment
SDS – Safety Data Sheet
Seed Counter – A piece of equipment used for counting seed

Documents: SOP short-form
SOP – Standard Operating Procedure
WPS – Worker Protection Standards. This training gives you vital safety information in regards to agricultural pesticide usage at the ACRE farm campus.
Standard Operating Procedure – Seed and Plant Grinders

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the seed and plant grinders at the Innovation Center.

2. **Scope**

Anyone who may need to grind small lots of seed and plant material in the Innovation Center.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online. Must have hearing evaluated by the Purdue Audiology Clinic.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- Pinch points
- Noise

6. **Procedure**

Operation

1. Turn on the power

Documents: SOP short-form
2. Always start the mill before adding the samples.

3. Rotation begins by turning on the green button and selecting one of the three run modes that will be described later.

4. Rotation ends by pressing the red stop button.

5. Desired speeds are achieved by pressing the up down arrows on the keypad.

6. Materials that do not flow free may need to be forced in the chamber with the plunger.
   a. For optimum results feed material slowly to the approximate rate of ground material being delivered.
   b. Do not overload the chamber.

7. Hard or tough material should be reduced to a smaller size before feeding into the mill.
   a. If jamming occurs stop the mill immediately with the red button.
   b. Open the door and remove the jamming particles.
   c. A safety interlock prevents operation of the mill with the chamber door open.

8. After each sample is finished, clean the chamber per your lab's requirements. NEVER SPRAY CLEANING SOLUTION IN THE BACK OF THE CHAMBER. This causes solution and dust to collect behind the drum causing the drum to be jammed up and contaminated.

Run Mode:

1. Move the cursors using the up/down feature and select Run Mode.
   a. The speed shown in parenthesis (xxx) is the set speed and is controlled by the user.
   b. The speed on the right is the tachometer readout or actual speed.

2. The cursor can be moved with the up and down arrows.

3. Move the cursor to the RPM line item and press enter.

4. The speed can now be increased or decreased pressing and holding the up/down arrows.

5. Press the enter button once more to move the cursor again.

6. To pause the mill move the cursor to the Pause and press the enter button.

7. To resume select resume and press the enter button.

8. To go back to the main menu move the cursor to the Exit item and then press the enter button.

Documents: SOP short-form
Timed Run Mode:

1. Move the cursor using the up/down feature and select Timed Run Mode
2. The up/down arrows can be used to move the Cursor between parameters
3. Press the enter button to adjust setting
4. Now the up/down arrows can be used to change the parameters values
5. Press the enter button once more to move the Cursor again
6. Once the time is set move the Cursor to the RPM line item
7. Press the enter Button.
8. The speed can be set using the up/down arrows
9. Press the Enter Button once more to move the Cursor again
10. Now that the data is set navigate the Cursor to the START line item and press the Enter Button
11. After selecting START the mill will begin at the selected speed and the timer will begin counting down
12. The speed can be adjusted in real time using the same procedure as outlined in Run Menu section
13. The mill and countdown timer can be paused and resumed

Speed Run Mode:

1. Move the cursor using the up/down feature and select Speed Run Mode
2. Select the Speed Run Mode form the menu and press Enter Button
3. You will be prompted to with the Speed Run Mode Setup Menu
4. Navigate the Cursor to the RPM line item and press Enter Button
5. Adjust the speed with the up/down arrows
6. Press the Enter Button
7. Move the cursor between Start and Exit
8. Exit will take the cursor back to the main menu
9. Keep the Cursor next to the Start line item and press the Enter Button
10. You will now be taken to the Speed Run Menu The mill will begin at the speed selected
7. **Lockout Tag out**

1. Turn off the grinder
2. Unplug the grinder
3. Place plug cover LOTO device over the plug
4. Try to energize the grinder by turning it on
5. Reverse the order at the completion of the repairs

8. **References**

Please watch the instructional video or see Innovation Center manager for instructions or owner's manual.

9. **Definitions**

ACRE – Agronomy Center for Research and Education

**LOTO** – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance

PI – Principal Investigator

**SOP** – Standard Operating Procedure
Standard Operating Procedure – UDY Grinder

1. **Purpose**
   Coming Soon.

2. **Scope**
   Coming Soon

3. **Prerequisites**
   Coming Soon

4. **Responsibilities**
   PIs, Technicians, grad students, faculty, farm staff.

5. **Safety Concerns**
   - Coming Soon

6. **Procedure**
   1. Coming Soon

7. **References**
   Please see Phonemics Facility manager or ACRE staff with any questions.

8. **Definitions**

Documents: SOP short-form
Standard Operating Procedure – Scales

1. Purpose

The purpose of this SOP is to give instruction on how to operate the scales at the Innovation Center.

2. Scope

Anyone who may need to weigh seed in the Innovation Center.

3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. Responsibilities

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. Safety Concerns

- none

6. Procedure

Table Top Scales: Either 2200g max weight or 10,000, max weight

1. Retrieve desired scale from cabinets in Plant and Seed Processing room
   a. Scales may be moved throughout the building
2. Turn scale on

Documents: SOP short-form
3. Zero or tare scale
4. If scale does not seem to be working properly then turn scale over to see if it is in lock mode
5. Scales may be hooked up to PC with connecting cables located in the drawers near where the scales are stored
6. Scales must not leave the ICSC facility
7. Return scales back to shelves when finished

Floor Scale: 250lb max

1. Turn on the scale
2. Zero or tare the scale
3. Place material to be weighed on the platform
4. Turn off the scale when you are done

7. References

Please watch the instructional video or see Innovation Center Facility manager for instructions or owner’s manual.

8. Definitions

ACRE – Agronomy Center for Research and Education
PI – Principal Investigator
Seed Counter – A piece of equipment used for counting seed
SOP – Standard Operating Procedure

Documents: SOP short-form
Standard Operating Procedure – PhenoRover

1. Purpose

The purpose of this SOP is to give instruction on how to operate the PhenoRover at the Innovation Center.

2. Scope

Anyone who may need to operate the PhenoRover at the Innovation Center or ACRE campus.

3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety videos. As well as hands on training by Innovation Center facility manager or designee.

4. Responsibilities

PIs, Technicians, grad students, University employees, faculty, farm staff.

5. Safety Concerns

• Falls
• Rollovers
• Pinch points
• Burns
• Electrical shock
• Hydraulic Pressure

6. Procedure

Documents: SOP short-form
Purdue University 
Agriculture 
Agronomy Department 
ACRE 
Innovation Center 

PhenoRover 
SOP # 
ICSC M002 

Revision # 
2 

Implementation Date 
5/10/17 

Page # 
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Last Reviewed/Update Date 
7/20/17 

SOP Owner 
ICSC 

Author 
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Prestart 

1. Refer to operator’s manual for complete details. 

2. Check tire inflation (60 psi) LF____ RF_____ RR_____ LR_____ and lugnut torque (107 lbs./ft.). 

3. Grease center pivot (use only special grease for PhenoRover) 50 hrs. 

4. Check for leaks around hoses, engine, fuel tank, hydraulic cylinders, etc. 

5. Check Fluids: 
   a. Engine Oil 
   b. Coolant 
   c. Hydraulic fluid 
   d. Fuel (diesel only) 
   e. Generator fuel and oil 

6. Check belt tension on fan/alternator/AC. 

7. Check boom pivots and lift cylinders, bolts tight. 

8. Check that boom is properly mounted and secured. 

9. Check that each sensor is properly attached. 
   a. Grab each sensor and wiggle each direction. 
   b. Grab each sensor mount and wiggle each direction. 
   c. Check sensor mounting bolts are tight. 
   d. Check electrical connections and cords are clear and have enough movement for all machine operations. 

10. Check that batteries are secured and charged. 

11. Check that data cord is detached and removed from the machine. 

12. Check that any other cords or battery chargers are unhhooked and removed from machine. 

13. Start generator: 
   a. Turn on the fuel 
   b. Turn the key 
   c. Choke as needed 

14. Turn key to first position and check that all warning lights are operational. Wait for glow plug light to extinguish before starting engine. 

15. Start engine, check that warnings extinguish properly. 

16. Allow engine to warm up for a minute or two at idle before heavy operation. 

17. Check that hydraulics and electronics are operational before travelling to field. 

18. Raise ladder before leaving building or making sharp right turns. 

19. Increase engine speed to ~1/2 throttle when in building. 

Documents: SOP short-form
20. Maintain slow safe speed when maneuvering in or near building.
21. Be aware that moving the steering wheel when machine is not moving forward will swing the boom to the left and right in an arc that may strike people/objects.
22. Refer to Phenorover operation protocol for field operations.
23. Refer to Phenorover post operation protocol for end of day operations.

Special Notes:
- If any questions, please contact Jason Adams or Andy Linvill

Field Operation

1. Refer to Operators Manual for complete details.
2. Refer to Phenorover prestart protocol and checklist before starting.
3. Absolutely no riders on phenorover!
4. At all times check around machine to be clear of people, other equipment or objects that might damage or be damaged by moving the machine.
5. Be aware that moving the steering wheel when machine is not moving forward will swing the boom to the left and right in an arc that may strike people/objects.
6. Raise ladder before leaving building and making sharp right turns.
7. Lifting/lowering machine (Manual page 30):  
   a. Only raise/lower machine on level surface.  
   b. Check overhead clearance before raising machine.  
   c. Set parking brake.  
   d. Increase engine speed to full throttle.  
   e. Use “up/down” switch to raise/lower machine.  
   f. Machine should be in lowered position for transport to and from field.  
   g. Boom should be at its highest limit before raising the chassis of machine to keep center of gravity as low as possible.
8. Adjusting machine width (Manual page 31):  
   a. Only change width on level surface, preferably grass or gravel, not pavement or cement.  
   b. Only change width while driving forward at a safe speed (~3-10mph).  
   c. Increase engine speed to full throttle.  
   d. Use “in/out” switch to adjust width.  
   e. Machine should be at widest setting for transport to and from field.  
   f. Limit speed when machine is at narrowest setting to prevent tip over.
9. If any warning lights come on, cease operation; reduce engine speed as long as safely possible before shutting off. Diagnose and fix problem before resuming operation. If unable to diagnose or fix, contact Jason Adams or Andy Linvill.

10. GPS autosteer operation:
   a. Turn on Trimble system with button on back of monitor on the top right.
   b. Select Trimble GPS on right of main desktop screen. Agree to all warnings from Trimble.
   c. Touch tractor icon in upper right of start screen. Use the pre-setup Phenorover settings.
   d. If field has already been set up, select field from dropdown menu. Select “enable auto steering”. Select correct line for the field and nursery to be used. Engage auto steer with “steering wheel” icon in lower right corner.
   e. Touch “wrench” icon to exit field and open another field or to back out of program to shut down.
   f. Touch “shutdown” to shutdown Trimble program.

11. Computer operation: *to be written after installation in conjunction with Ed Delp*
   a. Starting computer
   b. Connecting to sensors
   c. Infield operation (is machine receiving and recording data)
   d. Pause recording data? (If we need to stop for a few minutes or on turn around?)
   e. Stop recording at end of field before transporting back to buildings

12. Continuously watch machine for loose or broken parts. Ensure sensor operation and attachment

13. Keep an eye on the weather. Return to building if threat of rain or lightning. Sensors are not water resistant!

14. Refer to Phenorover Post Operation protocol and checklist for end of day procedures.

Special Notes:
- If any questions, please contact Jason Adams or Andy Linvill

Post Operation

1. Refer to operator’s manual for complete details.
2. Before entering building, be sure that machine is in lowered position.
3. Reduce engine speed to ~1/2 throttle when in building.
4. Maintain slow safe speed when maneuvering in or near building.

Documents: SOP short-form
5. Be aware that moving the steering wheel when machine is not moving forward will swing the boom to the left and right in an arc that may strike people/objects.
6. At all times check around machine to be clear of people, other equipment or objects that might damage or be damaged by moving the machine.
7. Allow engine to cool for a few minutes before shutting off. This allows oil to cool the turbocharger to a safe temperature that will prevent damage.
8. Lower boom to lowest position, set parking brake and turn off hydraulic drive system before shutting engine off.
9. GPS Shut down:
   a. From run screen, touch “wrench” icon to back out of field to start screen.
   b. Touch “shutdown” icon to shutdown Trimble system.
10. Computer download and shutdown *to be written in conjunction with Ed Delp*
11. Turn key to shut off engine.
12. Turn switch on generator to off position then turn valve on fuel cap to off to keep fumes in tank and prevent them accumulating in building.
13. Walk around machine and inspect for broken/loose pieces, fluid leaks, flat tires, etc. Notify Jason Adams or Andy Linvill immediately if anything is not right. Do not leave it broken for the next person to fix.

Special Notes:
- If any questions, please contact Jason Adams or Andy Linvill

7. **Lockout Tagout Procedures**

1. Remove Key from ignition
2. Remove positive cable from batter and place a plug cover over the cable
3. Place the appropriate lock and tag over the cable
4. Try to start the PhenoRover
5. Reverse the procedure at the end of the process
8. **References**

Please watch the instructional video or see Innovation Center Facility manager for instructions or owner's manual.

9. **Definitions**

ACRE – Agronomy Center for Research and Education

LOTO – Lockout Tagout

PhenoRover – High clearance sprayer chasse equipped with sensors used for collecting data from the field.

PI – Principal Investigator

Seed Counter – A piece of equipment used for counting seed

SOP – Standard Operating Procedure
Standard Operating Procedure – Dickey John

1. Purpose

The purpose of this SOP is to give instruction on how to operate the Dickey John at the Innovation Center.

2. Scope

Anyone who may need to measure seeds at ACRE or ICSC.

3. Prerequisites

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. Responsibilities

PIs, Technicians, graduate students, undergrads, University employees, faculty, farm staff.

5. Safety Concerns

- none

6. Procedure

Running the sample

1. Turn on the Dickey John
   a. Wait for it to boot up. This make take a minute or two
2. Select analyze and pick the product that you are sampling

Documents: SOP short-form
a. The last 4 that have been run through the machine will be displayed

3. Once you select your product, press the “green” button
4. Place the product in the hopper. Be sure to add enough to go break the beam at the sensors at the top of the bowl. We you have added enough the tallow light will go form yellow to red
5. At this screen, you may enter a sample ID and customer ID. Or just press the “green” button through the selections until the sample cycles through
6. After the sample has run through empty the tray at the bottom the replace the tray
7. From here you can quit or run the next sample

**Downloading the results**

1. Return to the main menu
2. Press view results
   a. You can download the results from the view results screen

   1. Be sure to place a packet or container under the discard or back silver shoot
   2. Then when you place packet under the forward shoot it will discard the counted seeds in the front and the discarded seeds in the back

**7. Lockout Tag out Procedure**

1. Remove the plug from the power
2. Place a plug cover over the plug
3. Place the proper lock and tag on the cover
4. Try to energize the sheller
5. Reverse order at the end of the repair

**8. References**

Please see Innovation Center manager for instructions or owner’s manual.

Documents: SOP short-form
9. **Definitions**

ACRE – Agronomy Center for Research and Education

Agriculex Single Ear Corn Sheller – This is the piece of equipment in the Threshing and shelling room that is used to shell single ears

LOTO – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance

PI – Principal Investigator

SOP – Standard Operating Procedure

Attachment 1
Standard Operating Procedure – Root Scanner

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Root Scanner at the Innovation Center.

2. **Scope**

Anyone who may need to measure roots samples at ICSC.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, graduate students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- none

6. **Procedure**

Note – This SOP will only give the very basic procedures on running the Root Scanner. Please refer to the Software Manuel for a more in depth description on how to analyze the samples.

1. Log into the computer using your Purdue Credentials
2. Turn on the scanner
3. Click the WiRhizo Icon
Running the Software

1. WinRHIZO has two built-in methods of scanning. The first one, called our *Simple interface method*, is selected by default. As its name implies, it is very simple to use and was designed for washed roots extracted from soil placed directly or in our trays on the scanner glass. This is the method we suggest to try first unless you have a special application. To scan with it you must deactivate (turn off) *Use Scanner TWAIN Interface (THA IN)* in Image Acquisition Parameters. This method is optimised for use with our positioning system and scanners. When it is used, WinRHIZO takes some decisions for you and it is fast because the preview step (used to select the area to scan) is bypassed. For example, by default it will scan in grey levels (our recommended settings unless you have a special application) using the scanner's TPU (cover) lighting system (the one that gives better contrasts). If you indicate it to scan in color (make sure you have a good reason to do so), then it will use the *Reflective lighting system* because it produce better colors (you will then have to install the proper background behind the roots if they are not in an opaque media).

2. WinRHIZO's other built-in scanning method is more complex and is for users who want more control over the scanner settings. The latter is made possible by using the preview step to select the area to scan, adjust the contrast, *colors, filters and other parameters*. To use that method, you must activate *Use Scanner TWAIN Interface (THAIN)* in Image Acquisition Parameters. When it is used, the scanner manufacturer TWAIN interface is displayed before each scan and you must select in that window all the scanning parameters (dpi, grey vs. color image type, light source, pixel depth...).

3. It is also possible to scan using other programs (such as *Photoshop*) or stand alone applications (such as *Epson Scan*) which come with scanners. With this approach, images are scanned from these programs, saved to disk then later loaded in WinRHIZO for analysis. Some reasons for using this method can be: 1) to allow scanning of images on one computer and analysis on another or 2) to use high-end scanning features not provided in WinRHIZO such as scanning multiple selections at once (one per Petri dish for example). Scanning using stand alone applications varies in function of the program used and is described in the program/scanner documentation. If you use this scanning method, you will have to make sure the file format you use is supported by WinRHIZO (see "WinRHIZO'S SUPPORTED IMAGE TYPES AND FILE FORMATS" on page 31). The most common error we've seen in selecting a format is using a tiff *compressed* format (only *uncompressed* can be used and the selection of using or not compression is an option when saving files).

4. Whatever the scanning software or method, if you work with a scanner purchased with WinRHIZO, make sure that at analysis time the *Scanner.cal* calibration file is installed as described in "THE SCANNER.CAL FILE" on page 8 to get more precise measurements. This is located in the software manual.
5. To scan from WinRHIZO, you must select the source name corresponding to your scanner and click *Select*. This name can be found in the scanner manufacturer manual and in Regent's manuals shipped with our scanners (Ex: *STD4800 Scanner For WinRHIZO*). It is important to **never** scan with a source which name begins with *WIA*. Click *Caned* to analyse images stored on disk.

### Scanning with our Simple Interface

6. To scan with our simple interface which we recommend to try first (see previous page), you must turn off *Scanner After Image/Acquisition Parameters* in *Image/Acquisition Parameters* then set the other scanning parameters in that window according to one of the next two sections.

### SCANNING WITH THE RECOMMENDED SETTINGS {GR EY LEVELS}

7. Unless you have specific reasons to scan in color (see next section), select the *Grer n·els* image type. WinRHIZO will use the scanner TPU light for such images. When that light is used, you must not place a background behind the root, simply close the scanner cover light. Then enter the resolution in dpi (400 is a good starting point). You might need to increase this value up to 600 or 800 for thin or very thin roots but this will produce larger images that takes a longer time to analyse and occupy more space on your hard disk (if you decide to keep them).

8. Assuming you use our positioning system and trays, verify that *Ril!l!f<:nl 11osiriong s_Fsten7* and *r11h Jru_r* are activated. Select a tray size (click the width and length buttons corresponding to the tray size in cm) that can hold your sample and place it on the scanner glass. Keep in mind when selecting a tray and placing roots in it that there is a gap of approximatively 0.5 cm that is not scanned near its edges.

9. Close the scanner TPU cover and click the disk icon to do the scan. If this is the first scan it might take longer because of the light warm up. If it takes an abnormal amount of time to scan, it can be because the dpi is extremely high (1200 or 2400) or that an object is present in the TPU calibration slit area. Some examples of objects that should not be there are: the positioning system frame, tray, roots, dust or debris. In addition to producing extremely slow scan, the presence of such objects often results in vertical lines or bands in the image.

### Scanning with our Simple Interface in Color
Although we do not recommend scanning in color, there are times when this is required such as:

1) to get root morphology in function of root color (length of beige vs. brown roots),
2) to analyse roots in a non translucent growing media (pouch,...),
3) to analyse non root samples
4) to quantify an object diseased areas based on color (red or yellow vs. green leaf areas)

10. Only the WinRHIZO Pro and Arabidopsis versions can use color information. The other versions always convert a color image to grey levels before analysing it (you will not see it though) so it is a waste of resource to scan this way because: 1) color images takes up to seven more time the memory during its analysis compared to a grey levels image, 2) they occupy three more times the space when saved as a tiff uncompressed file and 3) are much slower to analyse.

11. When you select Cu/or as the image type in Image/Acquisition Parameters, WinRHIZO automatically uses the scanner's reflective lighting system (below the glass) instead of the TPU light because it produces much better color contrasted images (the TPU light will produce good color images of translucent objects only). With this lighting system, you must place a contrasting background behind the roots. By "contrasting" we mean of a color NOT present on the roots. The blue background we provide with our scanners is a good choice.

12. You must also set the other image acquisition parameters (dpi, scan area...) as described in the previous section. Note that when the reflective light is used for scanning instead of the TPU light, the scan area is slightly larger and you do not have to care about objects in the calibration slit area (light calibration is done under the glass).

13. Once the background is positioned and parameters are set, click WinRHIZO's scanner icon to do the scan. If you have just turned on the scanner or changed the image type from grey to color, the first scan will take a longer time to complete (to warm up the lamp).

Scanning with the Scanner Twain Interface in WinRHIZO

Scanning with the TWAIN interface gives you greater control than the previous two methods over the scanner settings and parameters, but slightly less than the next one. As it is a more complex method, it requires more experience from you. To scan with this interface you must activate \se Scun1111r . ia111: j1ct unr \ntf \\se r TTf \-{1}\}* in Image/Acquisition Parameters then set the other scanning parameters in the TWAIN window displayed before each scan. Among them there will be the dpi, image type (grey levels vs. color), bits per pixels, light source (TPU vs. Reflective) and many others such as filters and contrast and color enhancements. The same important remarks about these settings
14. made in "SCANNING WITH OUR SIMPLE INTERFACE" on page 29 also applies, so it is worth reading it. Note that only one image can be scanned at a time (per TWAIN window display) with this method. If you need to scan more than one image at a time, you must use the next method.

15. "o: e: WinRHIZO can only scan the following two types of images; 8 bits per pixel grey levels images (256 grey levels) and 24 bits per pixel color images (millions of colors). If you encounter problems after acquiring an image (if it is not displayed correctly on screen), it is worth verifying that it has one of these two formats. Grey levels is recommended unless your application needs color (for examples of color applications see "COLOR ANALYSIS" on page 41). These images analyse faster and take less space when they are stored.

Scanning in another Program

16. When you scan in other programs you must pay attention to use an image type (bits per pixels) supported by WinRHIZO as described next. We recommend to store images in tiff files over jpeg or bmp because it retains 100% of the image details and information. If you use it, you must pay attention to save the files as uncompressed (this is an option at saving time in most programs).

WinRHIZO's Supported Image Types and File Formats

17. WinRHIZO can load the following three types of images stored in tif,jpeg or bmp files;
   - 8 bits per pixel grey levels images (256 grey levels). This is the recommended format.
   - 24 bits per pixel color images (millions of colors). Use it only when doing a color analysis.
   - 1 bit per pixel black and white images. These images contain only 2 light intensities, black and white and are not recommended for their lack of information. If you choose to work with this type of image, the analysis will be faster if you use a \hspace{1mm} threshold of 128 in Analysis/Root & Background Distinction.

If you use the tiff format, make sure these are saved as "uncompressed" otherwise they won't open in WinRHIZO.

18. If you use the tiff format, make sure these are saved as "uncompressed" otherwise they won't open in WinRHIZO.

256 grey level's images are recommended unless your application requires color. You can scan in color if for example you need to measure root morphology in function of color or when your roots are in a media other than water or air.
For examples of color applications see "COLOR ANALYSIS" on page 41.

7. **Lockout Tag out Procedure**

1. Remove the plug from the power  
2. Place a plug cover over the plug  
3. Place the proper lock and tag on the cover  
4. Try to energize the sheller  
5. Reverse order at the end of the repair

8. **References**

Please see Innovation Center manager for instructions or owner's manual.

9. **Definitions**

ACRE – Agronomy Center for Research and Education  
Root Scanner – This is the piece of equipment used for scanning root images  
LOTO – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance  
PI – Principal Investigator  
SOP – Standard Operating Procedure

Documents: SOP short-form
Standard Operating Procedure – Leaf Area Indexer

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Leaf Area Indexer at the Innovation Center.

2. **Scope**

Anyone who may need to measure leaf samples in the Innovation Center.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- entaglement

6. **Procedure**

**Instrument Activation**

1. Move the ON/OFF switch to ON
2. Press the “Lamp Start” button and hold for 2 seconds
3. Press the Zero button to clear the display

Refer to manual if any errors occur

Documents: SOP short-form
Calibration Procedures

1. Start the lamp and allow it to warm up for 5 minutes or more.
2. Make sure the camera position and lens settings match the marks indicated for .1mm².
3. If there are belt flaws or debris on the belt causing spurious counts, then you may need to clean or replace the belt.
4. Run the edge-intensive standard through the meter at least 10 times. Repeat over all areas of the belt.
5. If the error ever exceeds 2%, carefully turn the CAL screw clockwise to increase or counter-clockwise to decrease. See owners manual.
6. As a confirmation, perform the same 10 measurements with the 10 cm² round calibration disk.

Choosing the Resolution

The Leaf Area Indexer utilizes 2 different resolutions, .1 and 1.0mm². .1mm² is more accurate and better suited for complex leaves. 1.0mm² may be preferred for large volumes of leaves where debris on the belt may be an issue. To change calibration, please refer to the owners manual.

Cleaning the Transparent Belts

Clean belts with water and cloth or absorbent paper. Try to keep water off the mirrors. Access to lower belt is achieved by turning the machine on and off.

Operation Procedures

1. Recording LAI may be done in two ways.
   a. You may choose to use a Windows connection. If so please refer to owners manual.
   b. Recording information by hand may also be done.
2. Once everything is set up. Simply run the leaf sample into the machine and record the data on the readout.
3. Repeat the process.

Documents: SOP short-form
7. **References**

Please watch the instructional video or see Innovation Center Facility manager for instructions or owner’s manual.

8. **Definitions**

ACRE – Agronomy Center for Research and Education  
PI – Principal Investigator  
LAI – Leaf Area Indexer  
SOP – Standard Operating Procedure
Standard Operating Procedure – Mobile Seed Lab

1. **Purpose**
   Coming Soon.

2. **Scope**
   Coming Soon

3. **Prerequisites**
   Coming Soon

4. **Responsibilities**
   PIs, Technicians, grad students, faculty, farm staff.

5. **Safety Concerns**
   - Coming Soon

6. **Procedure**
   1. Coming Soon

7. **References**
   Please see Phonemics Facility manager or ACRE staff with any questions.

8. **Definitions**

Documents: SOP short-form
Standard Operating Procedure – NIR

1. Purpose

Coming Soon.

2. Scope

Coming Soon

3. Prerequisites

Coming Soon

4. Responsibilities

PIs, Technicians, grad students, faculty, farm staff.

5. Safety Concerns

• Coming Soon

6. Procedure

1. Coming Soon

7. References

Please see Phonemics Facility manger or ACRE staff with any questions.

8. Definitions

Documents: SOP short-form
Standard Operating Procedure – 3D Scanner

1. **Purpose**
   Coming Soon.

2. **Scope**
   Coming Soon

3. **Prerequisites**
   Coming Soon

4. **Responsibilities**
   PIs, Technicians, grad students, faculty, farm staff.

5. **Safety Concerns**
   - Coming Soon

6. **Procedure**
   1. Coming Soon

7. **References**
   Please see Phonemics Facility manger or ACRE staff with any questions.

8. **Definitions**

Documents: SOP short-form
Standard Operating Procedure – Packet Printer

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Packet Printer at the Innovation Center.

2. **Scope**

Anyone who may need to print seed packets in the Innovation Center.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- Pinch points
- Entanglement

6. **Printer Procedure**

1.) If packet feeder is not attached, attach them before starting.
   a. make good contact with the belt and packets will not “get-up-to-speed”. This can
2.) Use Very Black ink ONLY. Put 4 cartridges in the imager.

Documents: SOP short-form
3.) Keep the cartridges in an upright position once the protective caps are removed. You want to prevent air from entering into the jets on the bottom of the cartridge!!
4.) Align imagers so the Packet will pass directly under the imager.
5.) Adjust knobs on top of imagers so there is enough clearance for packets to travel through. Test this by manually sliding a packet under the imager with the machine off.
6.) Load packets into the feeder.
7.) Turn printer on with power switch on back of machine. This should light up the orange Printer Ready light on top of the machine. Press the red button to turn on the printer feeder, it will light up and belts will begin to move. The packet feeder has its own set of controls.
8.) Before you begin to print test feed some packets to ensure that they feed through consistently without catching on anything. After testing, you can shut off both feeders until you are ready to print. Consistency is important to ensure a good print job.
9.) Open Launch Jet Engine GUI
   a. Select “Run as Administrator”
   b. For User name type “.\printer”
   c. For password type “AccufastP4”
10.) THIS STEP IS ESSENTIAL! Open the “Pen Status” tab. Hover your mouse over each bar individually. A box should pop up that says “Very Black” if it says anything else, you need to shut the machine off, take the cartridges out, make sure they are right and then put them back. Reopen the software and check it again. It needs to read the proper ink. The two PrimeX and Very Black inks operate at different volts and they will burn up if they machine is not reading it right. Each cartridge is $75. (The number of jets should be close to or 300) If not remove cartridge and wipe on clean “lint free” cloth or “Kem-wipe”.
11.) Open a packet template. If you do not have a packet template, refer to Supplimenatary Packet Printing Tips section following this set of instructions. This will walk you through how to properly set everything for printing packets. I recommend saving this template and using it each time. When you print next, you can use the same template as long as the data sheet uses exact same heading names.
12.) Open the Form Design Tab. Load you data source, press the Load Data Source button. It is cream colored with a blue arrow pointing to the right. ALL DATA FILES MUST BE IN .CSV FORM.
13.) Open the Data drop down menu. Click on Modify Schema. In that menu, make sure the box with “First Record Contains Field Names” is checked. Click Ok.

14.) Place data on the form design using the Field Block Button ((F)). The parentheses are blue around the F.

15.) Right click the field block and open properties. Add data field desired and rotate the field block how you would like. Resize and position on the form design.
   a. If you are using barcodes, do not overlap them over fields.
   b. If you overlap between pens, it will not always line up properly and the barcodes will not read.

16.) Place rest of your Data on the form design.

17.) When ready to print, press the red square button on the printer to turn the feeder on. **DO NOT HAVE THE PACKET FEEDER ON.** Open the print manager tab. Select desired fields to print. Right click and click “Add Fields.” I recommend purging 1-2 packets to ensure cartridges are working properly. To do this, set “Initial Pages to Purge” to 1 or 2.

18.) Click the Green **Start Print Job** button on the Print manager tab. It will turn gray for about 8-10 seconds. Once it turns red, turn on the packet feeder. Packets will feed through machine and be printed on.
   a. The packet feeder will not stop once the data source is done printing so you will need to shut off by pressing the red button. It will keep sending packets through the machine, but it will not print on them.

19.) Once you are done printing you can save your Job. Remove the Ink and place the covers back on them so they do not dry out. Shut the machine off and fill out the form with your information.

20.) It is very important when you remove the ink cartridges please keep them upright until the protective caps are replaced. This prevents air from entering into the jets!

**Supplementary Printing Tips**

P4 Packet Printing basic setup.
   1. Setup Screen for Packet Printing

Documents: SOP short-form
Documents: SOP short-form
2. Form Design setup screen using the (F) button.

3. Double click or right click on the “Field Block” w/blue border to open properties
4. Properties opens then select Data Field you wish to print. Click on “Add Field” button.
5. Once selected it is highlighted, click on the “Add Field” button and the dialogue box displays the Field Name inside <<...>>. You can then add a label by typing in front of the << characters.
6. View of Data after print job is created.

7. Each Record Block you wish to print, corresponds to a column within your data file. (Item with blue border is Range)
8. Each Record Block you wish to print, corresponds to a column within your data file. (Item with blue border is Row)

9. Print Manger showing Data that Record Block has available to print.
10. Item with Blue border is the Bar Coded item. Use same process as above only make it a Barcode.
11. To make these modifications to the data being printed simply right click on the object. (See window that opens)
12. Pen Status Tab. Used to check health of the Ink Cartridges (Pens as software refers to them)

13. Each should be at 300. If not clean using lint free cloth/tech wipe. Do not use any water on Very Black Ink!
14. This is an example without Pens in Print head.
15. Always stop Print Job before removing or inserting Pens (Ink Cartridges).

7. **Lockout Tagout Procedures**

Place a plug cover over the plug and lock and tag the cover.

8. **References**

Supplemental manuals found in drawers near the printer

9. **Definitions**

ACRE – Agronomy Center for Research and Education

**LOTO** – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance

PI – Principal Investigator
Stake Printer - Used to print information on to field packets
SOP – Standard Operating Procedure
Standard Operating Procedure – Stake Printer

1. **Purpose**

The purpose of this SOP is to give instruction on how to operate the Stake Printers at the Innovation Center.

2. **Scope**

Anyone who may need to print field stakes in the Innovation Center.

3. **Prerequisites**

Must go through Innovation Center guidelines and watch facility safety and procedural videos online. **Must Use specific MIDCO stakes,**

4. **Responsibilities**

PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

- Pinch points
- Entanglement

6. **Printer Procedure**

1.) If stake feeder and catch tray are not attached, attach them before starting.
   
   a. The Stake feeder has two cords that need to be plugged in. The gray cord goes into the **Control Cable** port and the side of the machine. The black cord goes into the **Accessory Power** port on the back of the machine.

Documents: SOP short-form
b. Check adjustment of pressure roller to assure proper feeding of the stakes from the feeder to the transport belts. (Too tight stakes won’t feed too loose will not make good contact with the belt and stakes will not “get-up-to-speed”. This can cause miss aligned printing.)

2.) Use **PrimeX Black** ink ONLY. Put both cartridges in the imager closest to the feeder.

3.) Keep the cartridges in an upright position once the protective caps are removed. You want to prevent air from entering into the jets on the bottom of the cartridge!!!

4.) Set feeder speed (knob on top of Printer) to a slower speed than packets. You will need to adjust this to a faster speed as you begin testing.

5.) Align imager so the **Stake** will pass directly under the imager. (This is the top imager closest to the feeder. Move the lower imager off to the side next to the control panel).

6.) Adjust knobs on top of imagers so there is enough clearance for stakes to travel through. Test this by manually sliding a take under the imager with the machine off.

7.) Load stakes into the feeder with the top of the stake towards the printer. **USE ONLY THE STAKES PROVIDED! DO NOT BRING YOUR OWN STAKES TO PRINT ON.**

8.) Turn printer on with power switch on back of machine. This should light up the orange **Printer Ready** light on top of the machine. Press the red button to turn on the printer feeder, it will light up and belts will begin to move. The stake feeder has its own set of controls. The red square button will need to be lit up. If it is not, press it. To start the feeder, press the round green button, to stop it press the round red button.

9.) Before you begin to print test feed some stake to ensure that they feed through consistently without catching on anything. After testing, you can shut off both feeders until you are ready to print. Consistency is important to ensure a good print job.

10.) Open Launch Jet Engine GUI
   a. Select “Run as Administrator”
   b. For User name type “.\printer”
   c. For password type “AccufastP4”

11.) **THIS STEP IS ESSENTIAL!** Open the “Pen Status” tab. Hover your mouse over each bar individually. A box should pop up that says “PrimeX Black” if it says anything else, you need to shut the machine off, take the cartridges out, make sure they are right and then put them back. Reopen the software and check it again. It needs to read the proper ink. The two PrimeX and Very Black inks operate at different volts and they will burn up if they machine is not reading it right. Each cartridge is $75. (The number of
jets should be close to or 300. If not remove cartridge and wipe on clean “lint free” cloth or “Kem-wipe”.

12.) Open a stake template. If you do not have a stake template, refer to P4 Stake Printing Basic Setup section following this set of instructions. This will walk you through how to properly set everything for printing stakes. I recommend saving this template and using it each time. When you print next, you can use the same template as long as the data sheet uses exact same heading names.

13.) Open the Form Design Tab. Load you data source, press the Load Data Source button. It is cream colored with a blue arrow pointing to the right. ALL DATA FILES MUST BE IN .CSV FORM.

14.) Open the Data drop down menu. Click on Modify Schema. In that menu, make sure the box with “First Record Contains Field Names” is checked. Click Ok.

15.) Place data on the form design using the Field Block Button ((F)). The parentheses are blue around the F.

16.) Right click the field block and open properties. Add data field desired and rotate the field block how you would like. Resize and position on the form design. Place in fields 1 and 2 only. Fields 3 and 4 will not work because we are only using #1 and #2 ink cartridges to print on stakes. I recommend not placing any data above the ½-inch mark.
   a. If you are using barcodes, do not overlap them over fields. (Keep them on either pen 1 or pen 2 only)
   b. If you overlap between pens, it will not always line up properly and the barcodes will not read.

17.) Place rest of your Data on the form design.

18.) When ready to print, press the red square button on the printer to turn the feeder on. DO NOT HAVE THE STAKE FEEDER ON. Open the print manager tab. Select desired fields to print. Right click and click “Add Fields.” I recommend purging 1 stake to ensure cartridges are working properly. To do this, set “Initial Pages to Purge” to 1.

19.) Click the Green Start Print Job button on the Print manager tab. It will turn gray for about 8-10 seconds. Once it turns red, turn on the stake feeder by pressing the round green button. Stakes will feed through machine and be printed on.
   a. The stake feeder will not stop once the data source is done printing so you will need to shut off by pressing the red button. It will keep sending stakes through the machine, but it will not print on them.
20.) Once you are done printing you can save your Job. Remove the Ink and place the covers back on them so they do not dry out. Shut the machine off and fill out the form with your information.

21.) It is very important when you remove the ink cartridges please keep them upright until the protective caps are replaced. This prevents air from entering into the jets!

**Supplementary Printing Tips**

P4 Stake Printing basic setup.

1. Setup Screen for Stake Printing (can be used for paper strip/row bands also.)
2. Form Design setup screen using the (F) button.

3. Double click or right click on the “Field Block” w/blue border to open properties

Documents: SOP short-form
4. Properties opens then select Data Field you wish to print. Click on “Add Field” button.

![Properties window with 'Add Field' button highlighted]
5. Once selected it is highlighted, click on the “Add Field” button and the dialogue box displays the Field Name inside "<<…>>". You can then add a label by typing in front of the "<<" characters.
### SOP # ICSC P002

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| Revision #                        | 1       |
| Implementation Date               |         |

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<td>Jason Adams</td>
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6. View of Data after print job is created.

![Image of print job](image1.png)

7. Each Record Block you wish to print, corresponds to a column within your data file. (Item with blue border is Range)

![Image of print job](image2.png)

Documents: SOP short-form
8. Each Record Block you wish to print, corresponds to a column within your data file. (Item with blue border is Row)

9. Print Manager showing Data that Record Block has available to print.
10. Item with Blue border is the Bar Coded item. Use same process as above only make it a Barcode.
11. To make these modifications to the data being printed simply right click on the object. (See window that opens)
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</table>
12. Pen Status Tab. Used to check health of the Ink Cartridges (Pens as software refers to them).

13. Each should be at 300. If not clean using lint free cloth/tech wipe. Do not use any water on PrimeX Ink!
14. This is an example without Pens in Print head.
15. Always stop Print Job before removing or inserting Pens (Ink Cartridges).

For setup of printing on paper, envelopes or any other paper products follow the same basic procedure. Only difference is you will be using the “Very Black” ink, which is water, based, number of Ink Cartridges and the size of your form.

7. **Lockout Tagout Procedures**

Place a plug cover over the plug and lock and tag the cover.

8. **References**

Please watch the instructional video or see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**

ACRE – Agronomy Center for Research and Education

LOTO – Lockout Tag out. The act of locking a machine or device so it may not be energized during maintenance

PI – Principal Investigator

Stake Printer- Used to print information on to field stakes

SOP – Standard Operating Procedure

Documents: SOP short-form
Standard Operating Procedure – 3D Printer

1. **Purpose**

   The purpose of this SOP is to give instruction on how to operate the 3D Printer at the Innovation Center.

2. **Scope**

   Anyone who may need to print three-dimensional objects for use in the Innovation Center research building or on their grant project.

3. **Prerequisites**

   Must go through Innovation Center guidelines and watch facility safety and procedural videos online.

4. **Responsibilities**

   PIs, Technicians, grad students, undergrads, University employees, faculty, farm staff.

5. **Safety Concerns**

   - none

6. **Procedure**

   1.
7. **Lockout Tagout**

Place a plug cover over the plug and lock the cover.

8. **References**

Please watch the instructional video or see Innovation Center manager for instructions or owner’s manual.

9. **Definitions**

**ACRE** – Agronomy Center for Research and Education  
**3D Printer** - Used to print three dimensional objects  
**LOTO** – Lockout Tagout. Protocol used for safely disabling equipment to be able to safely service equipment.  
**PI** – Principal Investigator  
**SOP** – Standard Operating Procedure