OPERATION & MAINTENANCE MANUAL

PreRoll-Er™

Solid Packaging Robotik inc

Chapter 1 - Introduction

1. PURPOSE OF THIS MANUAL

The purpose of this manual is to provide necessary information regarding the operation and maintenance of the Preroll-Er machine.

CAUTION:

Failure to observe the instructions contained in this manual could result in personal injury and property damage, and may void the warranty. Read this manual carefully before installing and using the product.

NOTICE:

Save this manual for future reference and keep it readily available

This instruction manual covers specific information on installation, operation, and maintenance for the **Solid Packaging Robotik PreRoll-Er™ machine** and its components. This equipment is a high-quality machine of rugged design conceived to give long hours of trouble-free service. Continued performance will not be maintained unless the precautions and procedures outlined in this manual for handling, installation, initial operation, and maintenance are observed.

Should questions arise about any characteristics of this equipment or its operation which are not covered by this manual, additional information can be obtained by contacting:

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Terrebonne, QC J6Y 1X1
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Toll Free: 1-855-360-1292 (USA / CAN)

E-mail : info@preroll-er.com

www.Preroll-er.com

Chapter 2 – Safety

2. SAFETY

WARNING:

- The operator must be aware of the pneumatic and automated system and take appropriate safety precautions to prevent physical injuries.
- Risk of death, serious personal injury, and property damage. Installing, operating, or maintaining the **PreRoll-Er™** using any method not prescribed in this manual is prohibited. Prohibited methods include any modification to the equipment or use of parts not supplied with the machine
- If there is any uncertainty regarding the appropriate use of the equipment, please contact a **Solid Packaging Robotik Inc.** representative before proceeding.
- If any pneumatic cylinders or motors are damaged; electric shock, fire, explosion, physical harm, or environmental damage may result. Do not operate the **PreRoll-Er™** until the problem has been corrected or repaired.
- Running the **PreRoll-Er™** without safety devices exposes operators to risk of serious personal injury or death. Never operate a unit unless the appropriate safety devices (guards, etc.) are properly installed. See specific information about safety devices in the appropriate section of this manual.

CAUTION:

- Risk of injury and/or property damage. Operating the **PreRoll-Er™** in an inappropriate application can cause overheating, and/or unstable operation. Do not change the service application without the approval of an authorized **Solid Packaging Robotik Inc.** representative.
- Do not remove guards.

2.1. USER SAFETY

User safety is a major consideration during installation, operation, and maintenance of **the PreRoll-Er™**. Use care in selection of proper clothing, tools, and method of handling to prevent serious accidents. All personnel working on **the PreRoll-Er™** should follow basic rules of safety as well as any precautions mentioned in this manual. Operators and maintainers should have received a training on the Preroll-Er.

2.1.1. General safety rules

To protect operating personnel, the user is responsible for the following:

- Assure that all guards and safety devices (see section 2.2) are in place before starting the
  - **PreRoll-Er™.**
- Verify all tooling is properly held in position before starting any operation.
- Assure that the surrounding area around the machine is well lit, dry, and free of any obstructions.
- The personnel responsible for operation and maintenance of the equipment must be given instructions regarding safety. All maintenance and repair work should be performed by a person familiar with this **User Manual PreRoll-Er™.**
- NEVER adjust or service while the **PreRoll-Er™** is powered "ON" and controls are in "ON" position.
- The **PreRoll-Er™** should be turned OFF after the production run is completed.
- Turn the main disconnect switch to the OFF position when changing tooling or performing maintenance work.
- Use a rag or gloves to handle sharp cutting blades in station #7.
- Cutting blades must be securely fastened in the machine spindle with the proper accessory. Never try to tighten cutting bits or tools by hand.

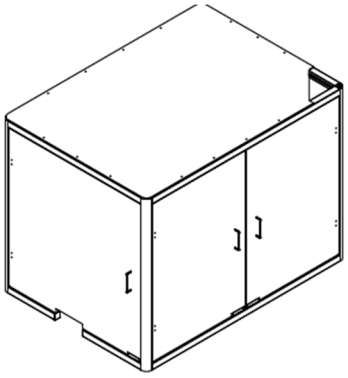
2.1.2. Safety equipment

Use safety equipment according to the company regulations. Use the safety equipment within the work area:

- Safety goggles,
- Protective shoes
- Protective gloves
- Mask
- First-aid kit

2.2. SAFETY DEVICES

The following safety equipment should **always** be in position, and in good working condition before operating the **PreRoll-Er™**.

ITEM'S NAME	DESCRIPTION	LOCATION
The status light tower 	It has a steady lighting effect, to provide signalling solutions by improving the safety and productivity of the **PreRoll-Er™.**	On the top of the HMI screen.
Safety enclosure doors 	They provide protection against moving parts, possible breakage causing flying debris, cannabis dust and noise. In the event of opening during the operation of the **PreRoll-Er™,** the machine will immediately switch to off position.	Installed all around the **PreRoll-Er™** • Twin doors at the front and back side. • Simple doors at the right and left side.
Safety Interlock switches 	They monitors the position of the Safety enclosure doors and transmit the signal to the controller.	At each opening edge of the service doors (total of six (6))

Enclosed Switch Disconnector 	It is the main disconnect to use for cutting off the power supply of the **PreRoll-Er™.**	Installed on the frame of the left service door.
Pneumatic solenoid valve 	It allows the PLC controller to shut-off the compressed air inlet into the machine. If an E-Stop or a safety enclosure door is opened, the compressed air supply will be closed.	Installed on the frame of the left service door.
E-Stop  	It is used in an emergency situation to shut off the **PreRoll-Er™** machine**.** Push to initiate the complete shutdown of the **PreRoll-Er™.** **Twist clockwise** (right) to release.	- One (1) is located on the HMI screen panel. - One (1) is located on the left side of the Enclosed Switch Disconnector.

Chapter 3 – General Description

3. GENERAL DESCRIPTION

3.1. PreRoll-Er™ DESCRIPTION

The Solid Packaging Robotik Inc. PreRoll-Er™ machine is designed to automatically fill and seal pre-roll cones/tubes with Cannabis (regular or infused) .
The PreRoll-Er is adaptable to any cone size and weight between 0.25 to 1.5 grams (special tooling might be required).

3.2. SPECIFICATION

Dimensions	Net Width	92" $^{5}/_{32}$ in [2340.9 mm]
	Net Height	79 $^{7}/_{16}$ in [2017.6 mm]
	Net Depth /Length	49 $^{47}/_{64}$ in [1263.2 mm]
	Width with open doors	147 $^{9}/_{32}$ in [3741 mm]
	Depth /Length with open doors	105 in [2667 mm]
Net Weight		2,000 Lb. [910 Kg]
Electrical Power		240V/20A/ 1Ph/ 60Hz
Compressed air requirements	Flow rate	20 CFM [565 L/min]
	Pressure	90-110 psig [6.2-7.6 bar]
Pneumatic connection		Ø1/2 in NPT
Temperature range		60-65°F [16-18°C]
Optimal humidity range		35% to 45%

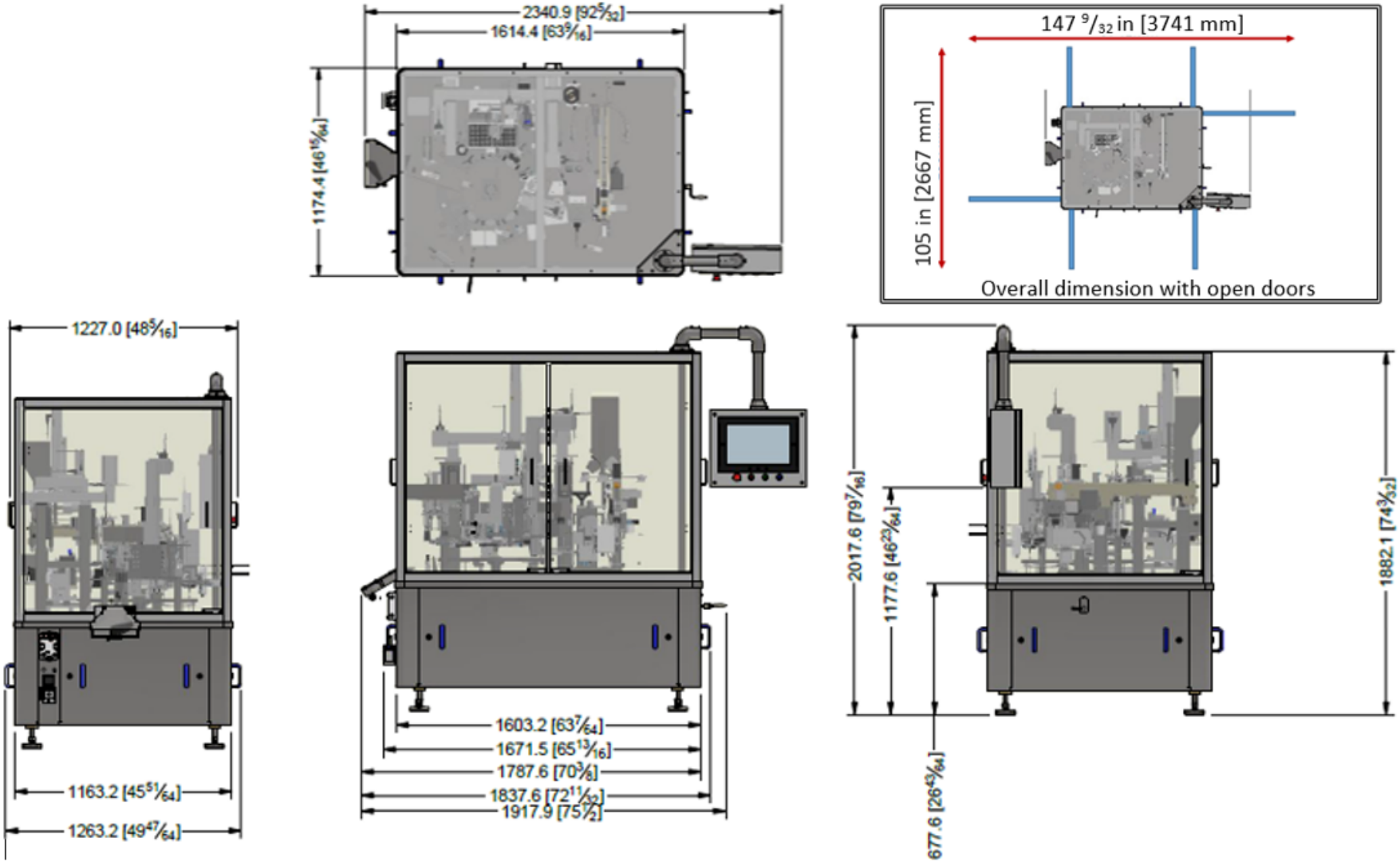


Figure 3-1 Overall dimension of the **PreRoll-Er™**

3.3. NAMEPLATE INFORMATION

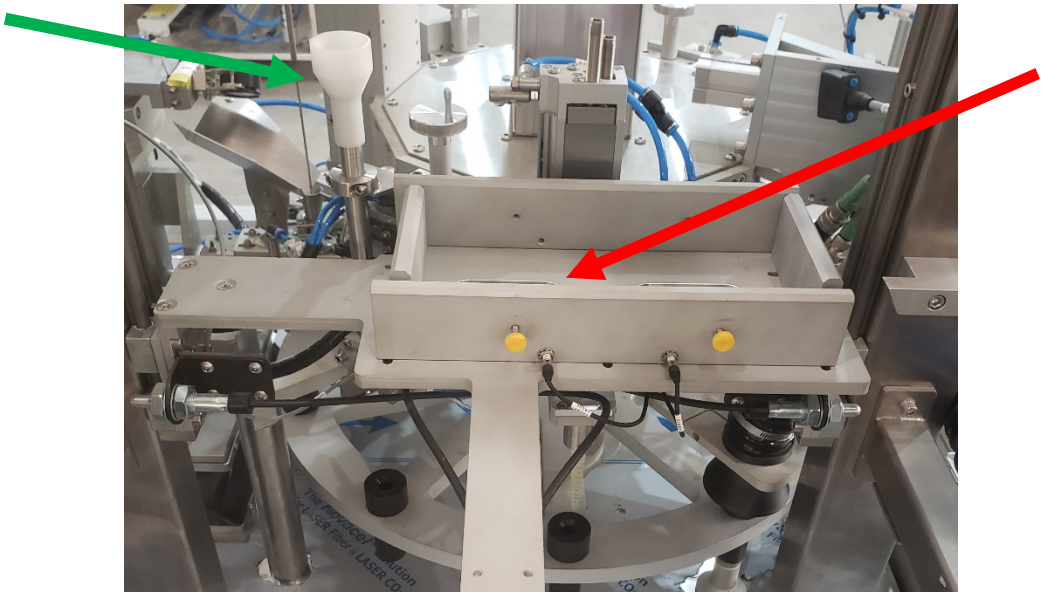
Important information for ordering

A metallic nameplate has been installed on each Preroll-Er machine. The serial number of the machine is critical when contacting the team at Solid Packaging Robotik inc. for technical assistance or when requesting spare parts. The nameplate can be found between the electrical disconnect switch and the compressed solenoid valve, in the lower left section of the left side of the machine.

3.4. SEQUENCE OF OPERATION

3.4.1. Step #1

While the machine is off, two (2) empty cones tray are to be placed on Station 2 in order for the robotic pick & place to fill the loading tube. The red arrow highlights where the empty cones tray needs to be filled, the green arrow showcases the loading tube.

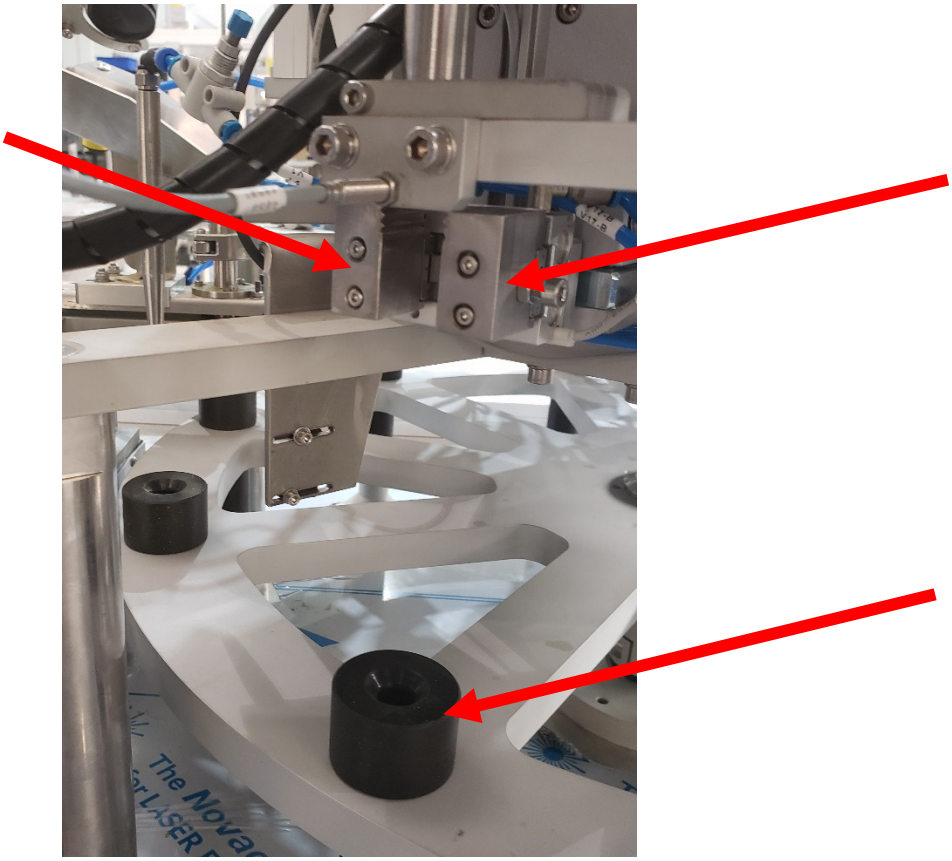


3.4.2. Step #2

If the sensor inside the loading tube does not detect any cones, the robotic pick and place (Station 2) will grab the next available row of empty cones and have them ready to be dropped inside the loading tube.

3.4.3. Step #3

The grippers at the bottom of the loading tube (station 2) will place one empty cone inside the cone holder located on the center star wheel.

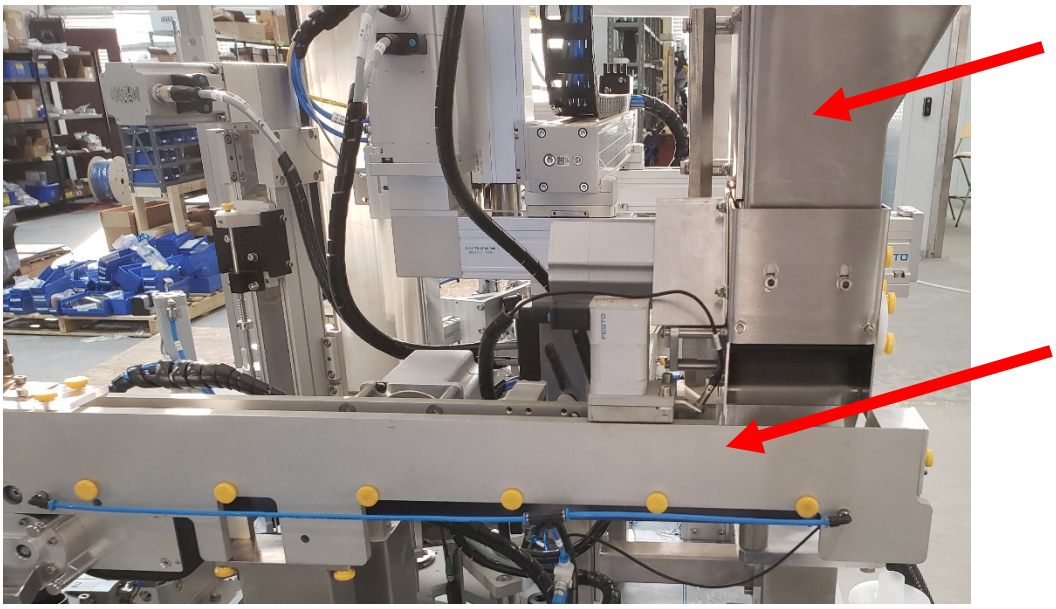


3.4.4. Step #4

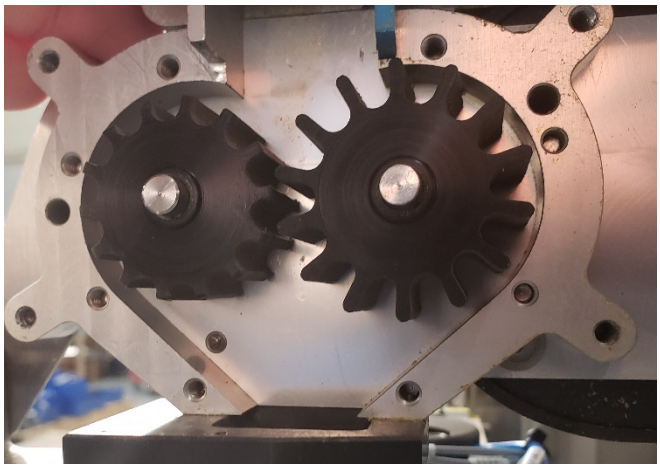
The star wheel turns and brings the empty cone to station 3. A sensor will verify if we have a double stack present inside the cone holder. If more than one is present inside the cone holder, no further actions will be taken on that cone (filling, compacting, twist, cutting and exit). An air jet nozzle will blow on the cone to ensure it is fully open and ready to be filled.

3.4.5. Step #5

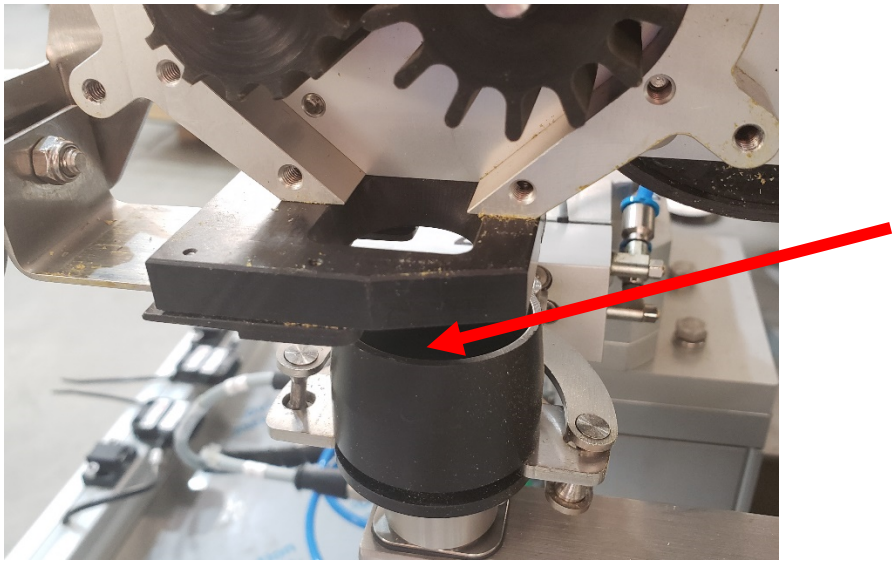
The next step consists of the weighing/filling cycle (station 4). Prior to this step, the operator filled the hopper with Cannabis, which then drops on the conveyor, creating a steady supply of product going to the weighing section.



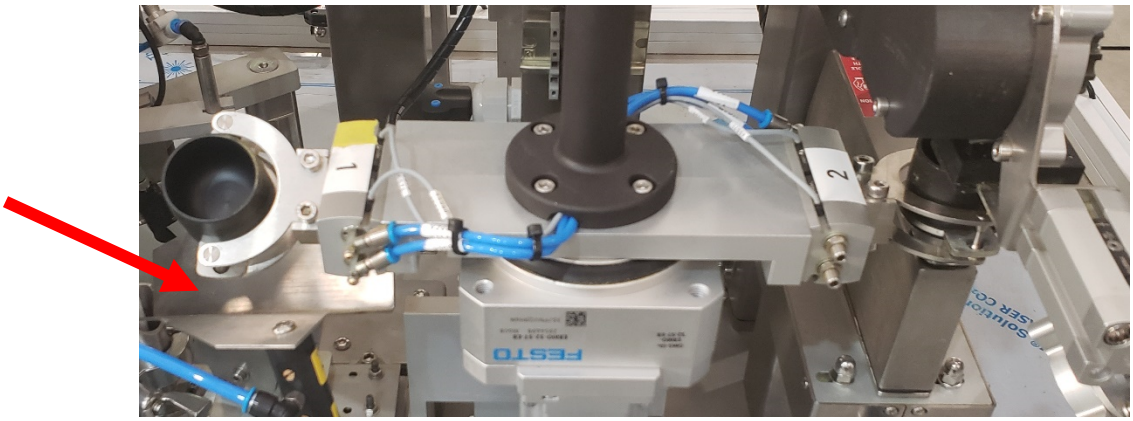
The amount of cannabis to dispense is a preset in the HMI. Cannabis is moved on the conveyor up to the feeding heart which controls to amount of cannabis going to the dosing gate.



The dosing gate opens, allowing material to fill the transport cup.

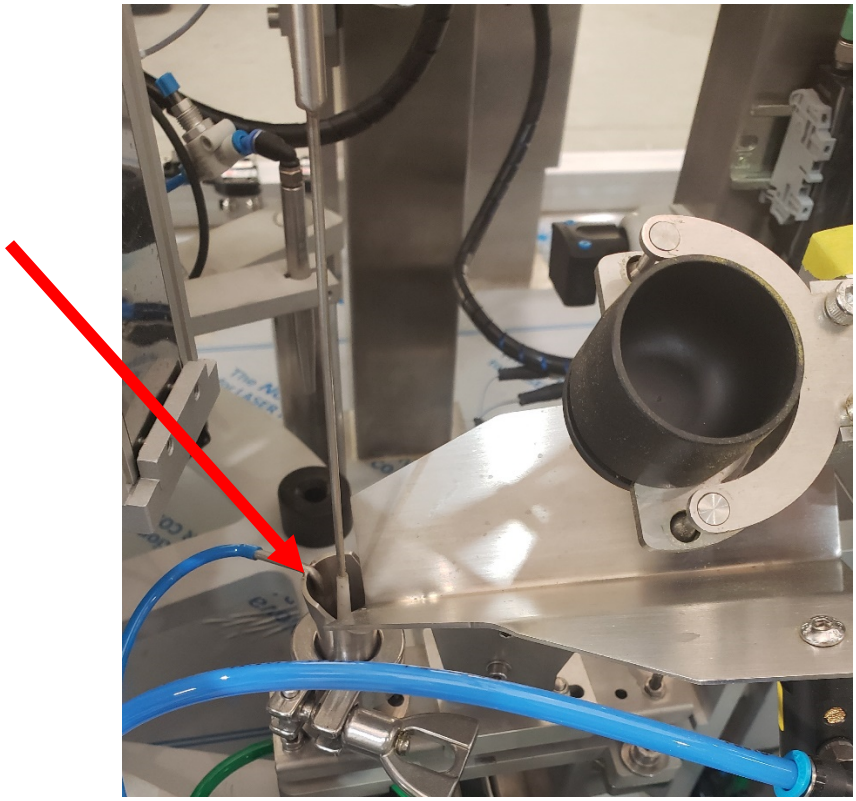


Once the proper weight of cannabis is reached the slide gate closes. Then the transport cup rotates 180° to reach the top of the vibrating discharge funnel.



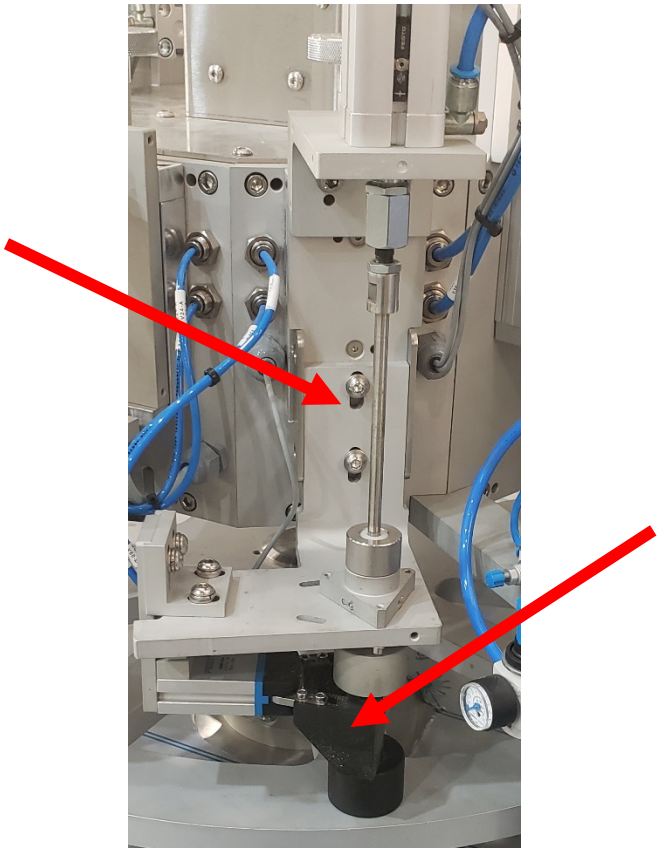
If no cone or more than one is present inside the cone holder, no further actions will be taken on that cone (filling, compacting, twist, cutting and exit). If one cone is detected, an air jet nozzle will blow on the cone to ensure it is fully open and ready to be filled.

If one cone was confirmed in station 3, the needle will drop inside the cone, ready for material to be added. The transport cup will empty the cannabis on the discharge funnel and the needle will ensure a good compaction throughout the cone.



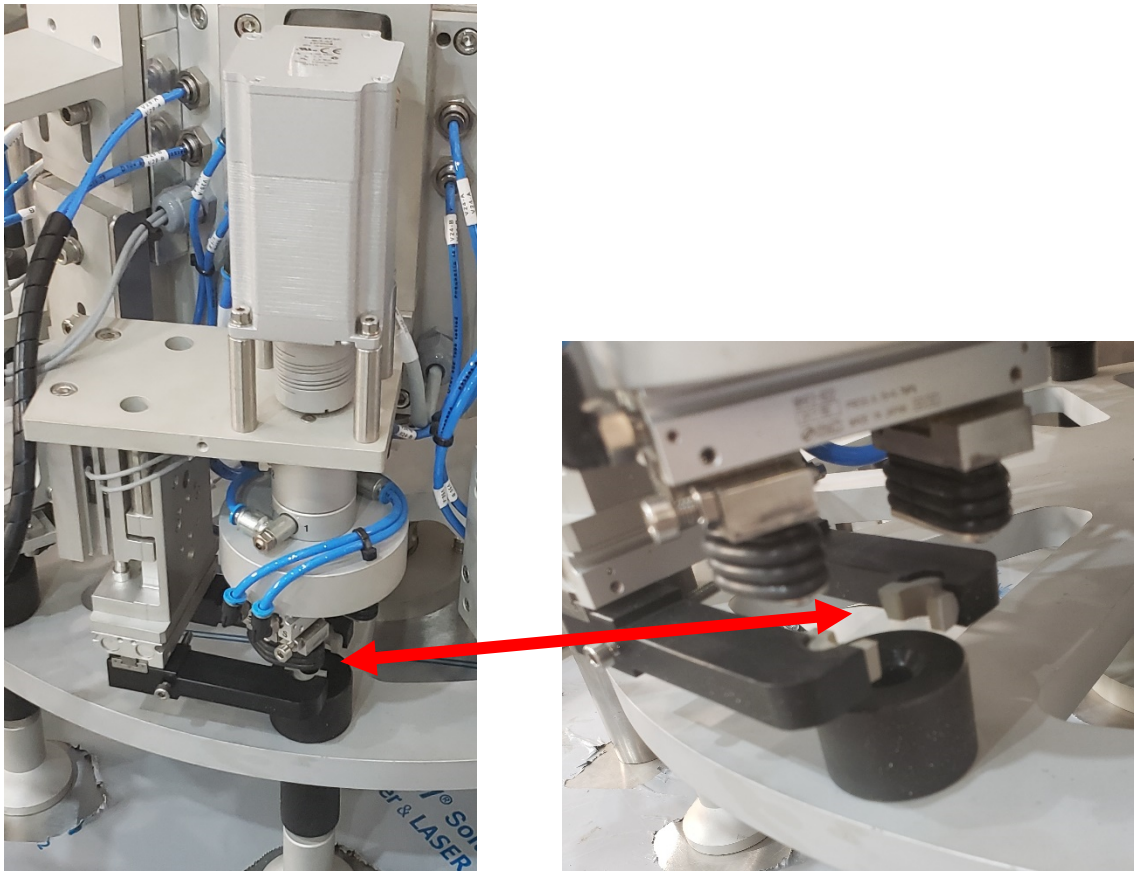
3.4.6. Step #6

The star wheel turns once more to bring the pre-roll to station 5, where a compacting rod will tap on the opened pre-roll to ensure it is fully compacted. A set of grippers will grab and hold the pre-roll in place, the rod will hit the pre-roll gently twice to ensure a successful compaction.



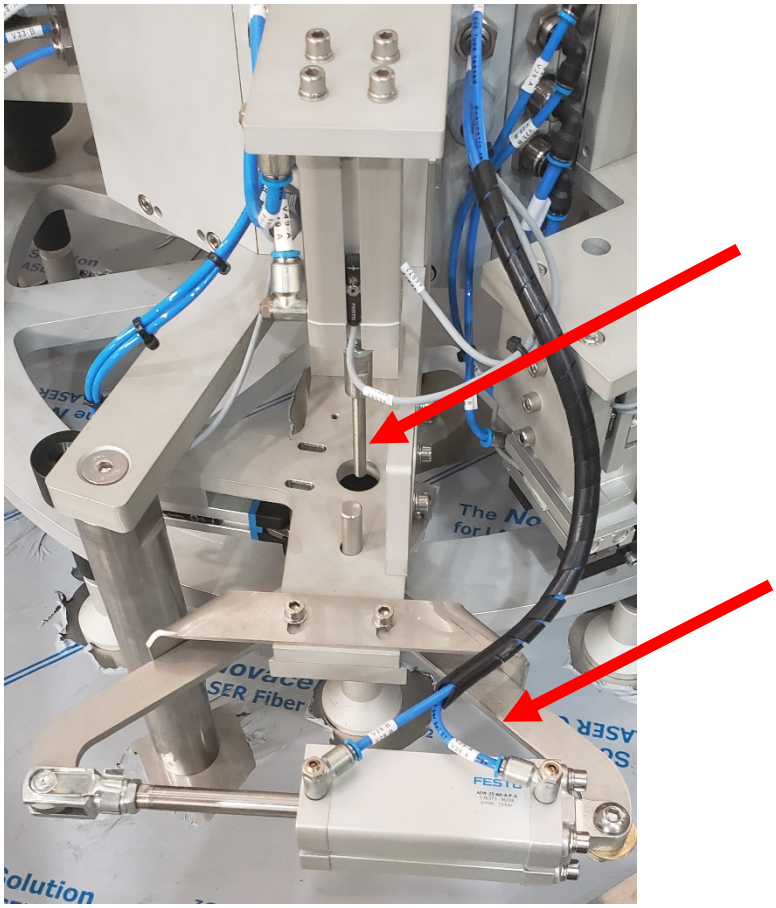
3.4.7. Step #7

A well compacted pre-roll is then moved to station 6, where the excessive paper will be twisted for proper cutting afterwards. A twisting gripper grips the loose upper-end of the pre-roll cone, while the holding gripper grasps the bottom-end of the pre-roll. The twisting sequence then starts to ensure sealing the pre-roll is tight.



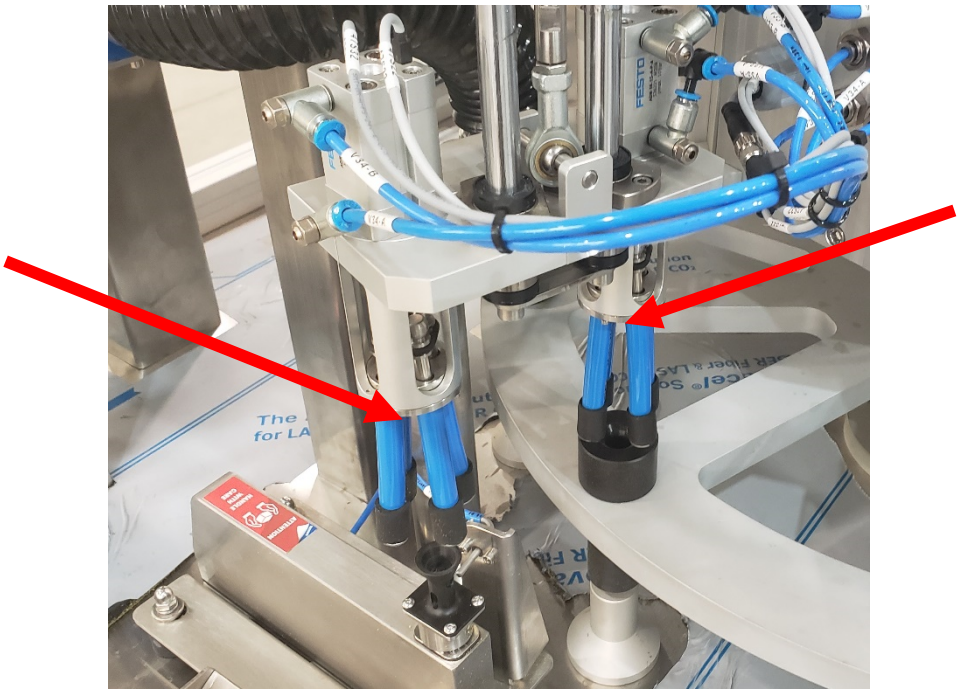
3.4.8. Step #8

At the next station (station 7), a rod pushes up the pre-roll from the cone-holder, and slides it up until the twisted tip overpass the gripper clamp. The cutting unit moves the blade which cut the twisted tip. Once the excessive twisted section is cut off, a compacting rod slides down to push on the pre-roll, forming a flat end.



3.4.9. Step #9

As the star wheel turns, station 8 is left blank for the moment, allowing more flexibility for future upgrades to the machine. The next step consists on weight verification and product release (station 9) using two (2) sets of grippers with four fingers each.

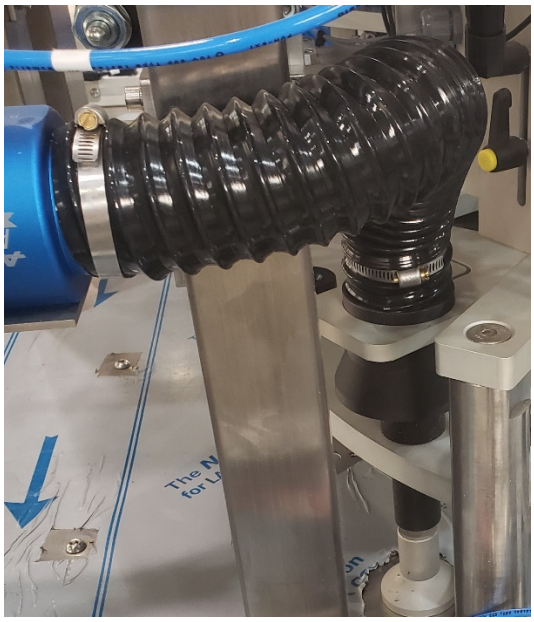


A push rod under station 9 will lift the pre-roll to be grabbed by the rear gripper. The rear gripper will then move the pre-roll on the scale for weight verification. In a simultaneous movement, the front gripper grabs the pre-roll previously placed on the scale and will drop it on the product divider. The dual grippers then slide back to repeat this sequence.

If the weight verification confirms no cannabis loss, the divider will be in the ''Pass'' position. If weight verification highlights that something happened along the way or if the product is out of tolerance for quality control, the divider will switch to the ''Fail'' position.

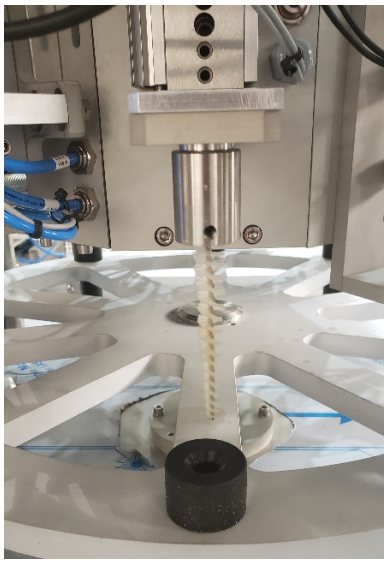
3.4.10. Step #10

Once the pre-roll is taken out of the system, the star wheel turns once more to bring the cone holder to the first cleaning section (station 10). A vacuum system will pull out any leftover cones from the cone holder. A push rod located below the cone holder will help to ensure any left-over cone is pulled out.



3.4.11. Step #11

The last step of the PreRoll-Er sequence performs a second cleaning operation. A brush will drop inside the cone holder to properly clean it and remove all potential cannabis that remained inside.



3.5. FUNCTIONAL DESCRIPTION

3.5.1. Station #1 - Base and indexer station

The Station #1, as shown in
Figure 3-2, includes the following:

- The unit structure: the table-top, the frame doors, and the service doors.
- The indexer station, which contain the carousel (also known as the star wheel) and the cone holders.
- The control panels and the HMI screen.
- The pneumatic cylinders under station 5, 6, 7, 9 and 10.
- The electric cylinder (called the shaker) under station 4.

Station 1 is the back bone of the Preroll-Er machine, it ensures the coordination all the steps of the filling and sealing process. The rotation of the carousel is synchronized by a pre-set program, ensuring precise positioning of the cone-holder at the right station at a highly precise time, to complete the filling process for each pre-roll.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

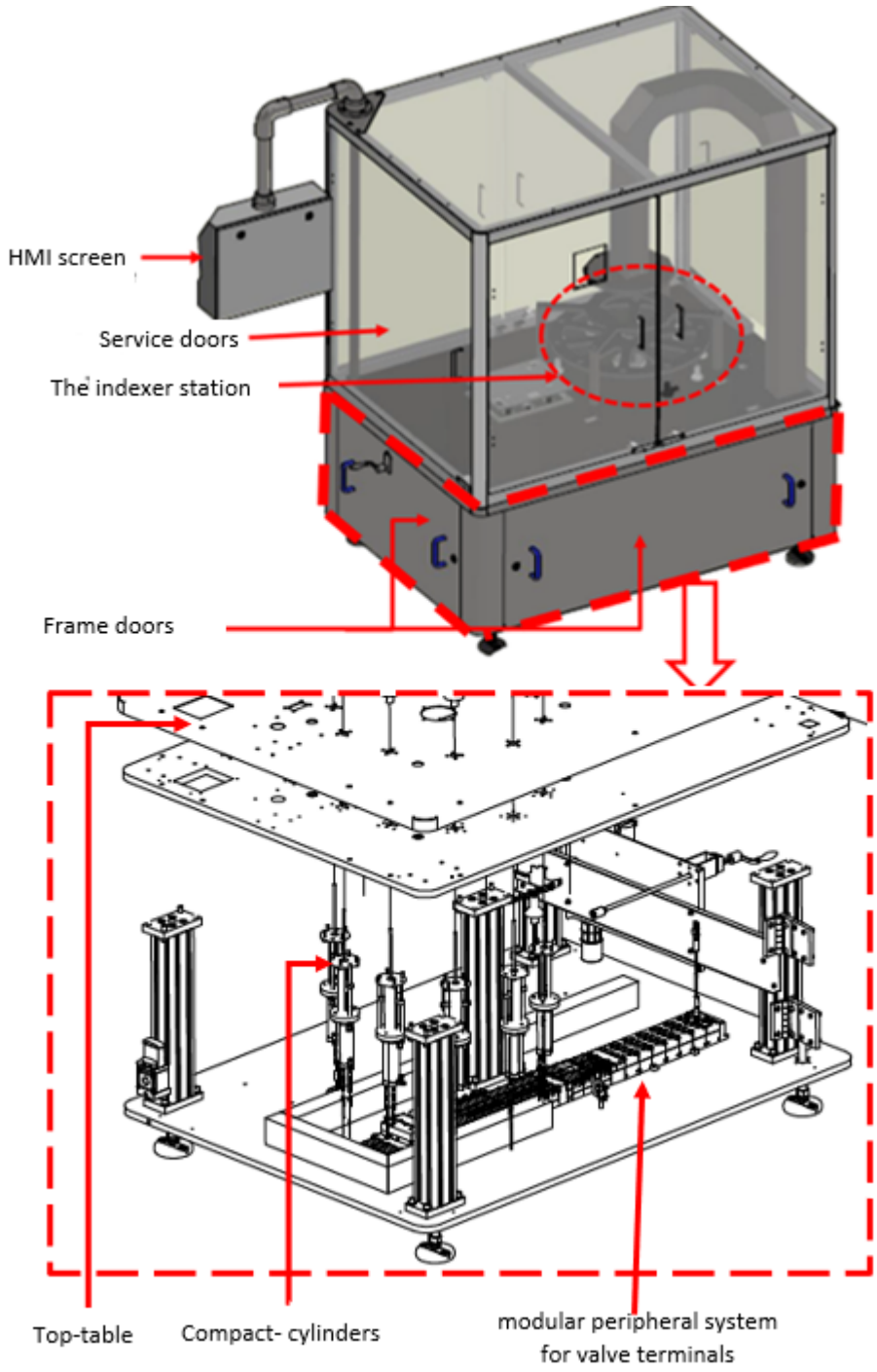


Figure 3-2 Base and indexer station

3.5.2. Station #2 - The cone distribution station

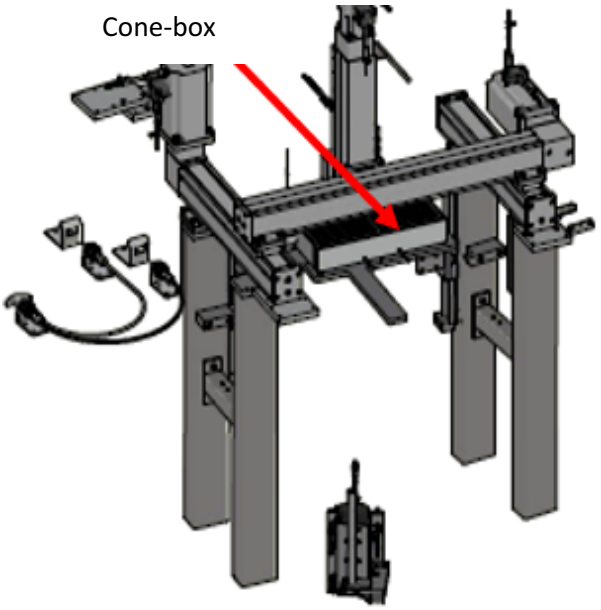


Figure 3-3 Robot Pick & Place

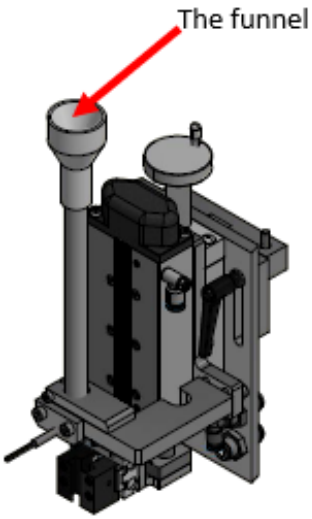


Figure 3-4 The cone distribution unit

In this station, the robotic pick & place is intended to remove a row of cones from the cone box holding tray (as shown in Figure 3-3) and precisely supplies them to the loading tube (also called the funnel) as shown in Figure 3-4.

The cone box holding tray has two (2) proximity sensors, sending a signal to the PLC confirming a box of cone is present for each of the two sections.

The pick and place robot is a 3-axes programmable mechanism designed to grip, lift, transport and drop different types and sizes of cones into the loading tube.

The robot ensures the lifting and transporting process, which is mainly composed of three (3) linear axes (X, Y, and Z) to produce linear motion, which are driven by three (3) stepper-motors.

By programming coordinates on these axes, we determine the exact position of the three linear motion mechanisms, and in addition of an automatic synchronization with the controller clock, we optimize the control loop in the drive, and thus positions the gripper with extreme accuracy.

The cone distribution unit is designed to grip one (1) cone from the loading tube and place it in the cone holder. To ensure this function, a gripper with an integrated proximity sensor mounted on a guided drive rod is installed at the bottom of the funnel.
When the gripper closes, it grasps the bottom-end of the cone, then the rod slides down above the cone holder, at that point the gripper opens, which allows the cone to fall in place inside the cone holder.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

Please see the Standard Operating Procedure (SOP) on how to program the pick and place robot in section 5.2.

3.5.3. Station #3 - The cone detection station

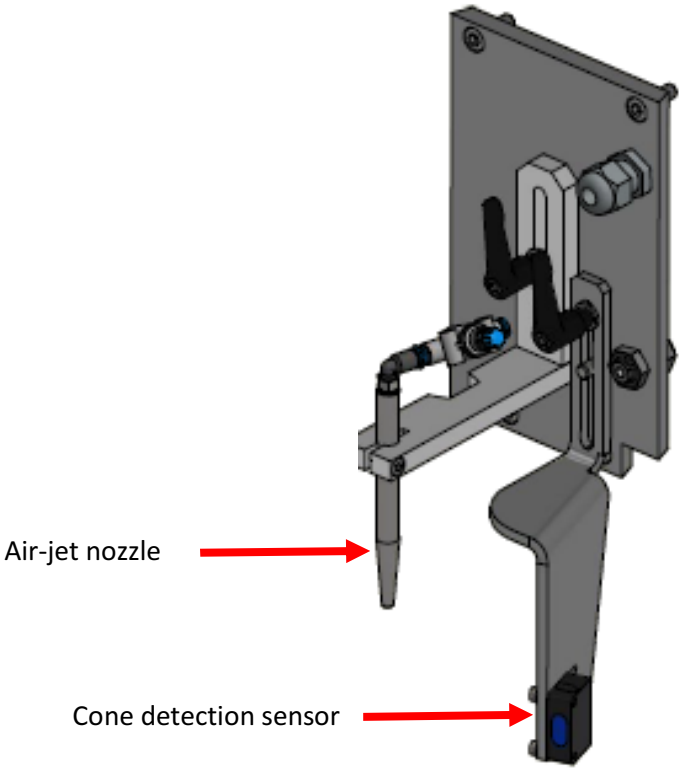


Figure 3-5 Cone forming

This station is designed to perform two tasks (see Figure 3-5):

- Using an air-jet nozzle, we fully open the cone and remove any wrinkles, making sure it is ready to be filled with cannabis at the upcoming station 4.
- Detect if we have a double stack on the cone holder, which will result in a by-pass of all further stations until station 10 to vacuum the cones out.
- The time and flow rate of the air-jet can be adjusted in the HMI screen.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

Please see the Standard Operating Procedure (SOP) on how to adjust the air-jet nozzle in section 5.3.

3.5.4. Station #4 - The cannabis filling station

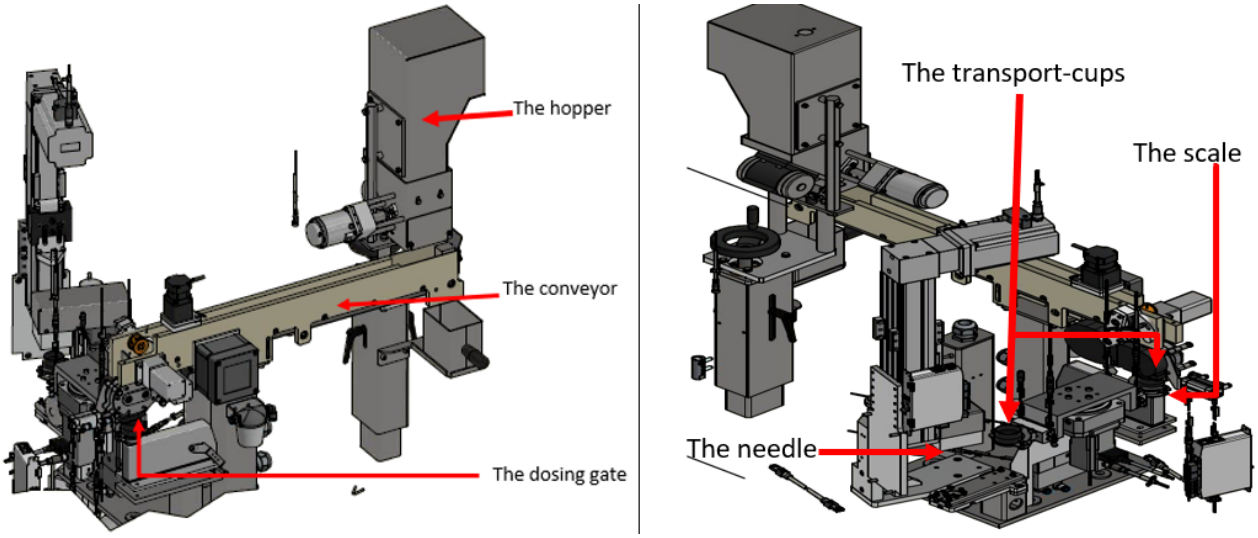


Figure 3-6 The cannabis filling station

This station is designed to feed, convey, weight, and fill the cones. As shown in Figure 3-6, many sub-systems are involved to perform all required tasks.

The hopper is the introductory point of cannabis in the Preroll-er machine. The operator fills the hopper with cannabis through the open slot in the safety door. The hopper has a bridge breaking mechanism that rotates 180° clockwise and counter-clockwise with a preset timer that can be adjusted on the HMI, reducing the chances of bridging inside the hopper.

The conveyor is designed to move cannabis with a stable flow rate to the feeding heart (located on top of the dosing gate). Once material falls on the conveyor from the hopper, a mixer breaks any large chunks before going to the flattening wheel, which helps ensuring a stable outlet.

The feeding heart uses two gears to determine the feed rate of the machine. At first, the dosing gate is closed and materiel falls on it. That step is known as the ''pre-dosing''. The amount of cannabis dropped during pre-dosing allows time savings during the ''fine-dosing''. Smaller the amount of cannabis required during fine-dosing; higher the output speed will be. If the pre-dosing is too aggressive, multiple over-weights will be generated, slowing down the machine. Multiple parameters for the pre-dosing can be adjusted using the HMI.

For further details on how to adjust the pre-dosing, please consult the standard operational procedure available in section 5.5.

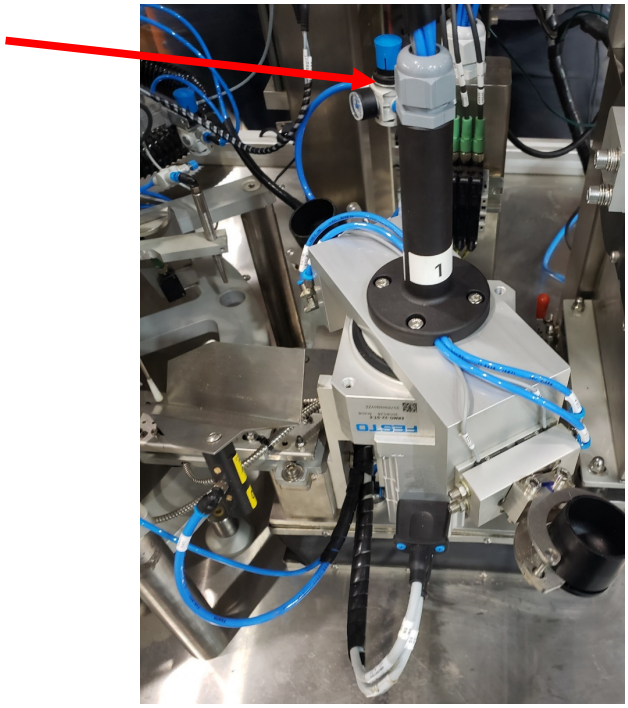
The scale unit is a high precision weighing unit that ensures proper cannabis weight is inserted in the cones. Once the dosing gate opens, material that was previously dropped during pre-dosing falls inside the transport cup that sits on the scale. Once desired weight is achieved during fine-dosing, the gate closes and the transport cup turns 180° to be ready for filling the cone.

The Turret with the two (2) transport cups is designed to transport the cannabis from the scale unit to the discharge funnel.

- Once the sliding gate closes, the turret rotates the transport cup mounting plate, at 180° to reach the top of the discharge funnel.

- A semi-rotary drive ensures to flip the transport cup, allowing the cannabis to start flowing into cone, through the funnel.

The discharge funnel is designed to ease material filling into the cone. A vibrator is installed directly on the funnel to facilitate material flow down to the cone. The vibration intensity can be adjusted using the flow control valve next to the funnel.



An electric shaker rod is employed to shake the funnel, facilitating the filling process.

For more details on the adjustments of the shaker rod, please see the Standard Operating Procedure (SOP) in section 5.6.

The needle performs an essential role in station 4 regarding the compaction of the pre-roll. The needle starts at the bottom of the empty cone. As material falls in, the needle performs a sequence of moving up and down to ensure a good compaction throughout the pre-roll.

The needle sequence is highly adjustable, more details can be found in the Standard Operating Procedure located in 5.4.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

3.5.5. Station # 5 - The compaction station

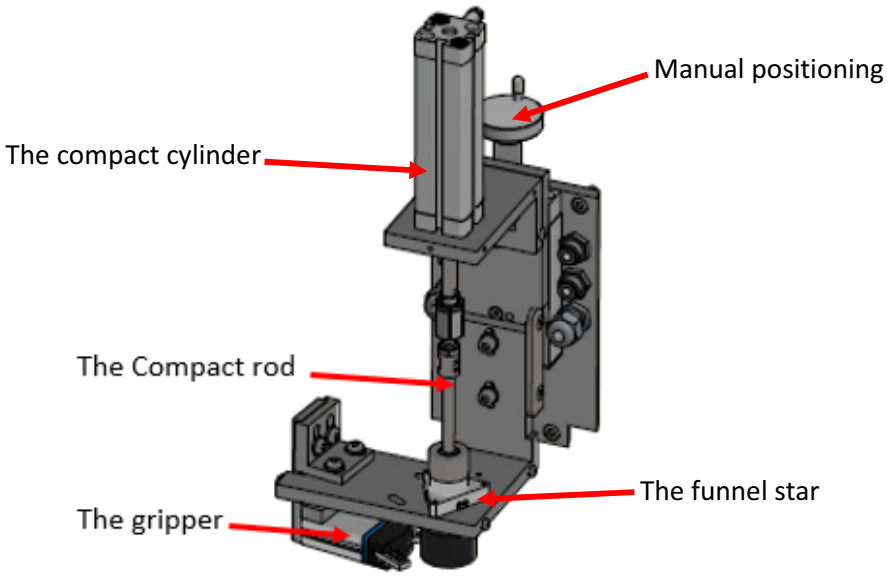


Figure 3-7 The compaction station

Once the needle in station 4 has compacted the cannabis from the bottom of the cone all the way to the top, the pre-roll moves to station 5 where a compacting rod will tap the top of the opened pre-roll to create the final desired compaction.

- **The gripper** will grab the pre-roll that has been lifted by the push rod located below station 5. The set of grippers is part of the machine's tooling and needs to be changed if a different format of cone is used.

- The compact cylinder will then activate **the compacting rod** that will tap the pre-roll.

The compaction sequence can be adjusted via the HMI screen, more details can be found in the Standard Operating Procedure located in section 5.7.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

3.5.6. Station # 6 - The twisting station

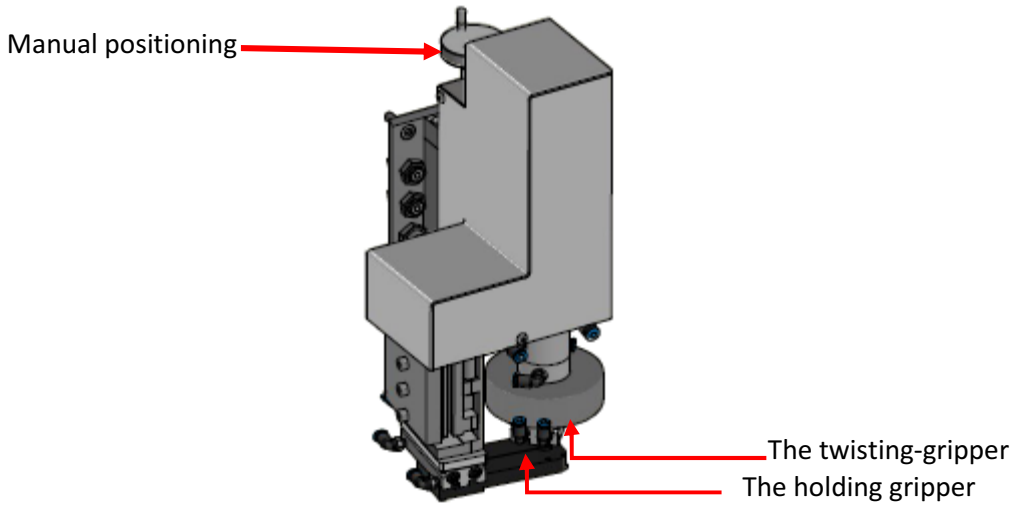


Figure 3-8 The twisting station

This station is designed to twist the top-end of the pre-roll, to seal it.

- The push rod located below station 6 will raise the pre-roll before the operation can start.
- **The holding gripper** will secure the pre-roll in place, ensure a successful twist. The holding gripper is part of the machine's tooling and needs to be changed if a different format of cone is used.
- Then **the twisting gripper** (see Figure 3-8) closes to grab the loose upper-end of the pre-roll. Afterward, the twisting gripper begins to twist using a preset sequence to ensure proper sealing of the pre-roll.
- Once the twisting sequence is completed, both grippers open and the pre-roll drops back into the cone holder.

The twist sequence can be adjusted via the HMI screen, more details can be found in the Standard Operating Procedure located in section 5.8.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

3.5.7. Station # 7 - The cutting station

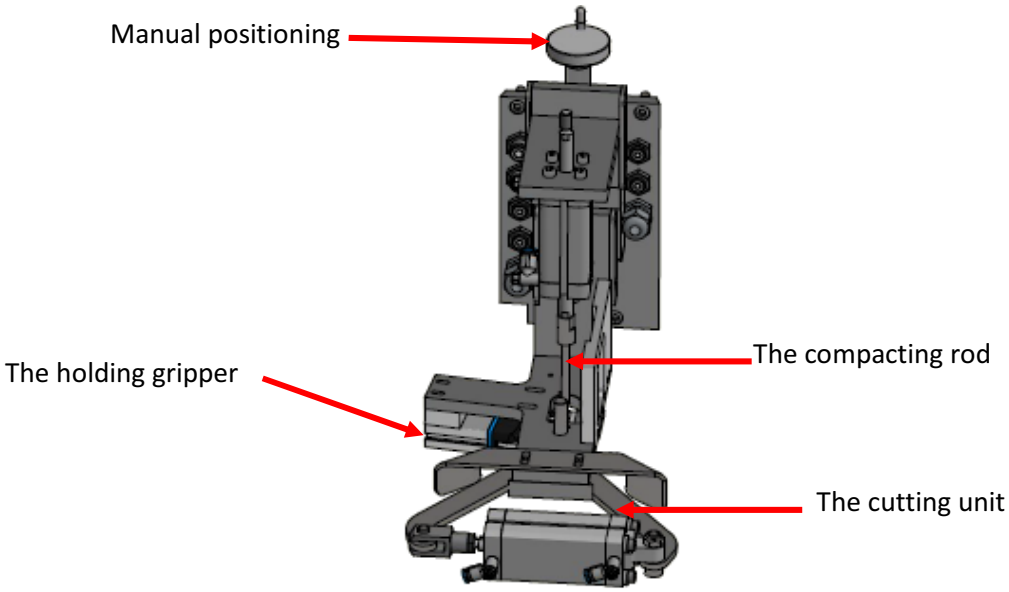


Figure 3-9 The Pre-roll twisting tip cutting and tapping station

This station is designed to finish the sealing process, by cutting and tapping the twisting tip.

- The push rod located below station 7 is activated, moving the pre-roll upwards.
- **The holding gripper** will then grab the pre-roll making sure it is secured before the cutting step.
- The cutting unit is activated, closing the scissor shaped cutter together. The knife will cut the excessive twist section of the pre-roll out.
- If desired by the customer, a **compacting rod** can tap the top of the pre-roll to create a flat surface finish.

For more details on how to activate the flat top option, please refer to the Standard Operational Procedure in section 5.9.

The cutting sequence can be adjusted via the HMI, more details can be found in the Standard Operating Procedure located in section 5.10.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

3.5.8. Station # 9 - The pre-roll exit and weight check station

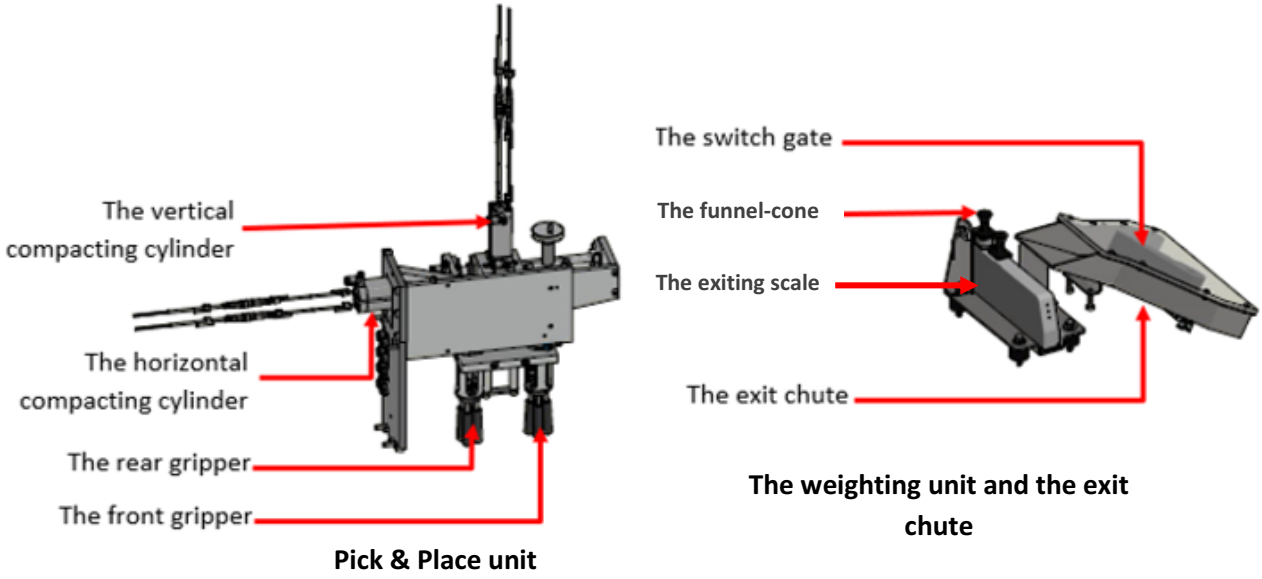


Figure 3-10 The Pre-roll exit and check weighting station

Station 9 allows the product to be removed from the machine and verifies its weight. Since we know the weight of empty cones, the machine makes sure that the pre-roll did not get damaged during the filling/compaction/ twist and cutting sequence. If the weight is below the acceptable limit or was deemed damaged, it will be rejected at the exit chute.

- A push rod located under station 9 will raise the pre-roll, allowing **the rear gripper** to grab it.
- The rear gripper will raise the pre-roll out of the cone holder and slide it on top of **the funnel cone**, installed on **the exiting scale** unit.
- The rear gripper will then drop the pre-roll on the funnel cone.
- The rear gripper will then open and move back up.
- **The front gripper** will now move back towards the top of the exiting scale.
- The front gripper will go down and grab the pre-roll from the funnel cone.

- The pre-roll is then moved on top of **the exit chute**, where the feedback from the scale will determine if the pre-roll pass or fails quality control.

- **The switch gate** is pneumatically activated to allow the material to drop at the correct location following the quality control check.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

3.5.9. Station # 10 - The cone holder vacuum cleaning

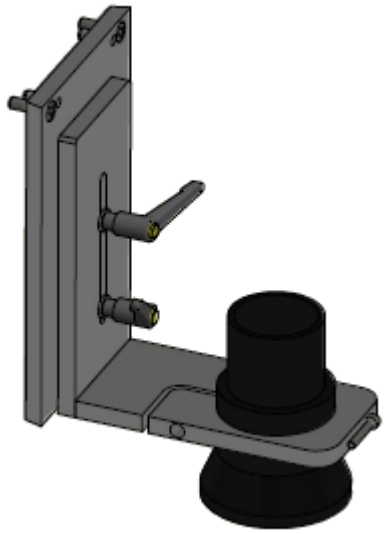


Figure 3-11 The cone holder vacuum station

Once the pre-roll is out of the machine in station 9, the star wheel brings the empty cone holder to station 10. As explained before, if the cone holder received two cones in station 2 or if there was a problem at station 4 with filling, an empty cone(s) could remain in the cone holder. The empty cone will not be filled, compacted, twisted nor cut. It will go straight to station 10 where the vacuum unit will remove it from the holder. A push rod under station 10 will help the cone to be pulled out.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

3.5.10. Station # 11 - The Top cone-box cleaning station

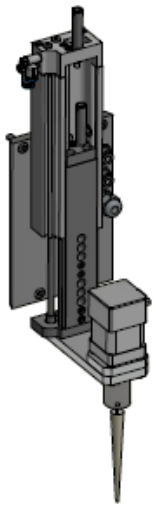


Figure 3-12 The cone holder cleaning station

It is possible during the different steps of the machine that cannabis particles fall inside the cone holders. The station 11 ensures to clean out all the residues. A brush is mounted on a compact cylinder, equipped with a proximity sensor. When the compact cylinder is activated, the brush slides down and plunges into the cone holder.

Please refer to Chapter 7 for further details on suggested spare parts of this station.

3.5.11. Station # 12 - The straight tube feeding station (optional)

The PreRoll-Er machine offers the option to install a straight tube feeder to allow cigarette style tubes to be used with the machine.

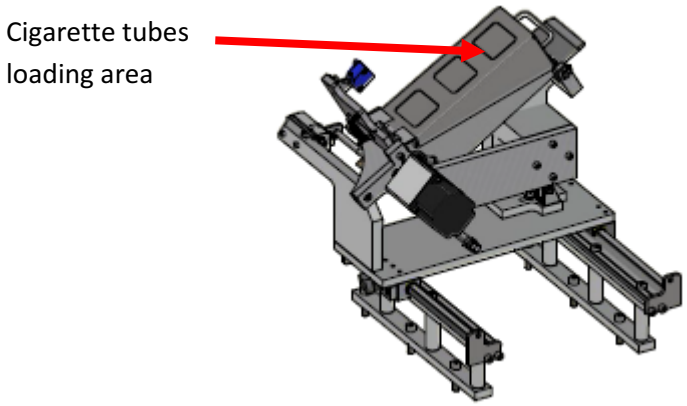


Figure 3-13 The straight tube feeder unit

Cigarette style straight tubes are supplied in small rectangular boxes, which are fed on the loading area, are picked one by one by the mechanism to be placed inside the cone holder. The station 12 replaces station 2 of machines running with regular cones.

Any Preroll-Er machine has the capacity to add this optional feature to run with cigarette straight tubes.

CHAPTER 4 – START-UP, COMMISSIONING, OPERATION, AND SHUTDOWN

4. START-UP, COMMISSIONING, OPERATION AND SHUTDOWN

Chapter 4 of the PreRoll-Er manual provides guidelines on what needs to be done prior to start-up the machine, during the commissioning, at the early stages of production (operation) and what needs proper attention before shutting down the machine.

4.1. PREPARATION FOR START-UP OF THE PREROLL-ER™

This section provides guidelines on what needs to be verified on the machine prior to start commissioning of the machine.

WARNING:

- Running the **PreRoll-Er™** without safety devices exposes operators to risk of serious personal injury or death. Never operate a unit unless appropriate safety devices (guards, etc.) are properly installed.
- Failure to disconnect and lock out driver power may result in serious physical injury or death. Always disconnect and lock out power to the driver before performing any installation or maintenance tasks.
  - Electrical connections must be made by certified electricians in compliance with all international, national, state, and local rules.

All mechanical and electrical linkages and components must be thoroughly checked before running the **PreRoll-Er™**

4.1.1. Machine physical setup on the floor

Please make sure the Preroll-Er machine is installed with enough space all around the unit to allow the operator to manoeuvre and the maintenance team to access all components inside. A minimum maintenance envelope of 48-60'' is suggested all around the machine.

The PreRoll-Er needs to be perfectly leveled by the installation crew.

Make sure the machine is stable on the ground, preferably anchored to the production floor.

A good source of light is required near the machine to allow the operators and maintainers to perform their tasks.

4.1.2. Services / room condition requirements

In order for the Preroll-Er to operate adequately, the following services and features are required:

- Compressed air
  - Using a standard ½'' connection, the Preroll-Er needs a minimum of 20 CFM of cleaned and dried compressed air at a pressure of 90-110 psig.
  - We suggest using a buffer tank which will help keep the air pressure stable and reduce the stress on the compressor.
  - If the compressor is not at close proximity of the Preroll-Er, we suggest using a ¾'' line to supply compressed air.

- Electrical power
  - The machine needs a hard-wired connection at 240V AC, single phase, 60Hz supplied on a line with a 20A circuit protection device.

- Ethernet
  - In order for the team at Solid Packaging Robotiks to support future program updates and remote technical assistance, a wired ethernet connection to the machine is required.

- Ambient temperature
  - The machine will need the room temperature to be between 60-65°F.

- Humidity level
  - In order to optimize the performance of the machine, a humidity level between 35% and 45% is suggested.

4.2. PREPARATION FOR COMMISSIONING OF THE PREROLL-ER™

4.2.1. Initial verification

You must follow these precautions before you start the **PreRoll-Er™.**

- Make sure that the unit is powered off.
- A good general inspection of the machine to spot any anomalies or components not properly installed / secured.
- Remove any objects that may obstruct the **PreRoll-Er™** during operation.
- Visually inspection of the equipment to make sure that it has been wiped and cleaned.

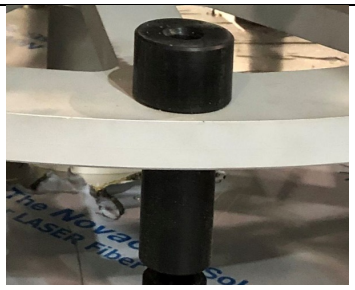
4.2.2. Tooling verification

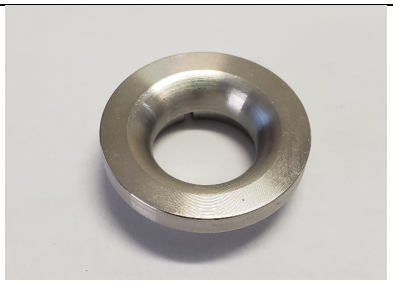
The Preroll-Er needs a set of tooling for each cone / straight tube format it is using. The tooling represents a group of components on the machine which are custom built with the type of cone to be used. Even the same size of cones (ex: 98/26mm) from two different suppliers would need a separate set of tooling.

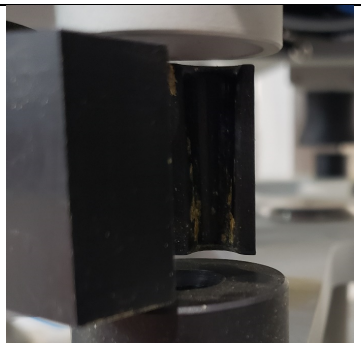
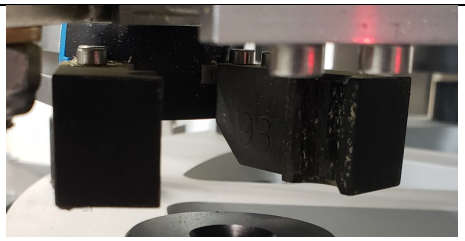
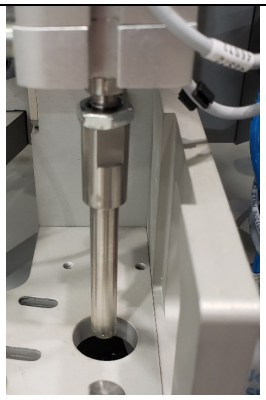
Before the machine can be started, the operator needs to make sure that all proper tooling is installed on the machine.

For more information on all steps required to change the tooling, please see the Standard Operating Procedure in section 5.1.

A set of tooling includes the following:

Ten (10) cone holders, located on the star wheel.	
One (1) cone discharge ring on Station 2	

One (1) funnel located on Station 4	 
One (1) cone former located on Station 4	
One (1) needle on Station 4	

One (1) set of two (2) grippers on Station 5	
One (1) compaction rod on Station 5	
One (1) set of two (2) grippers on Station 7	
One (1) compacting rod on Station 7	

4.2.3. Product readiness

Before the machine can start operation, we need to ensure that cannabis is available. We suggest having at least 3 lb of cannabis at a humidity level of 10-12% ready for production. The grinding size of the product should be between 1.5 to 2.5 millimeters.

Four boxes of cones should be available in order to make sure commissioning is not interrupted due to a lack of cones.

4.2.4. Machine fully connected

- Machine is connected electrically, make sure the switch is turned ON.

- Compressed air is connected to the machine, at the required pressure range.
    - Make sure to top knob is activated ON.

- Initiate the HMI screen by pressing the reset button (blue) for three (3) consecutive seconds.

4.3. PREPARATION FOR OPERATION OF THE PREROLL-ER™

4.3.1. Prepare box of cones

IMPORTANT: Select the type of cones that match the tooling installed on the machine.

Please follow the 6 steps as shown in Figure 4-1 (procedure can differentiate depending on the cone manufacturer)

- Step 1: Bring two (2) boxes of cones
- Step 2: Open the box by pulling the tab up
- Step 3: Pull the cover up
- Step 4: Let the two folded walls down
- Step 5: Carefully remove the two cross-shaped cardboards from the box, by pulling them straight up
- Step 6: Take off the folded strip from the groove

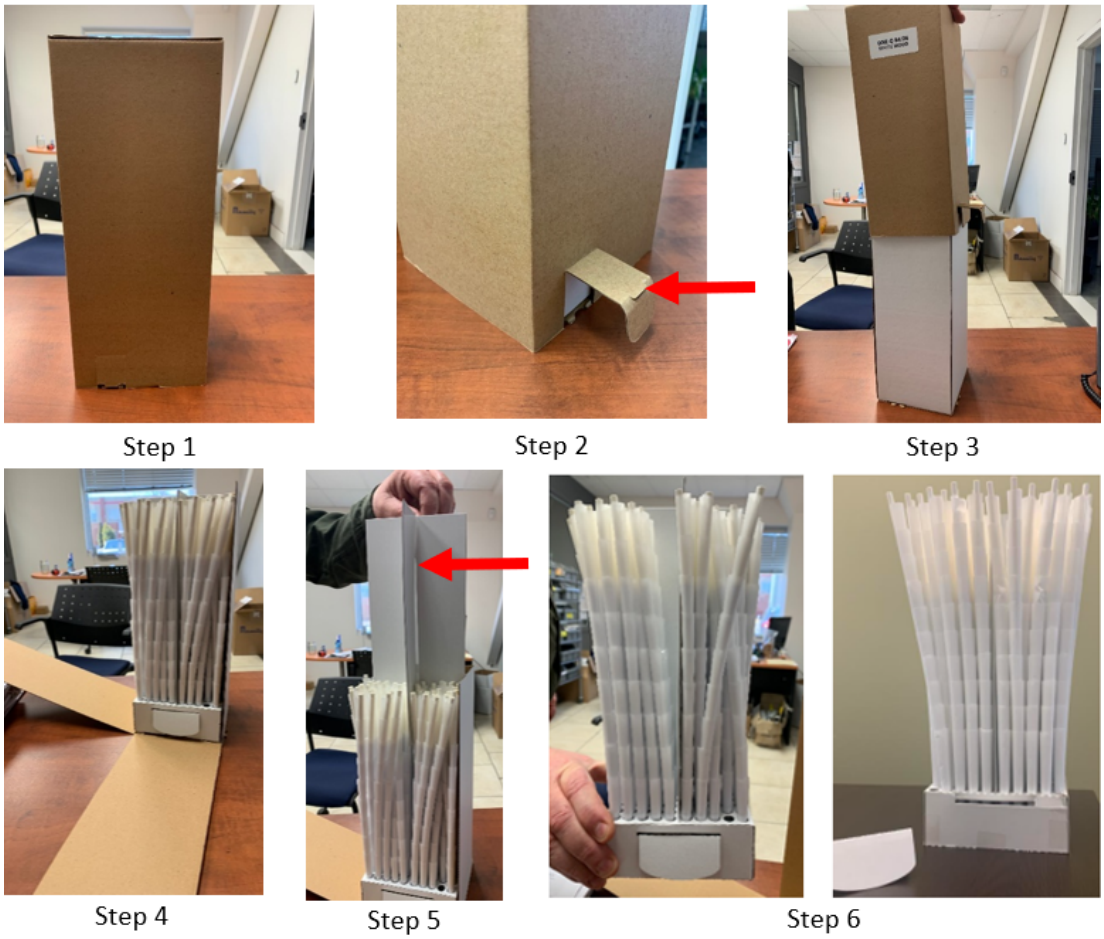


Figure 4-1 Box of cones opening

4.3.2. Insert box of cones in the machine

- Open the back service door (near station #2).
- With one hand, pull the tray-holder handle latch toward you, while allowing the tray-holder to slide down by leading it from below with the other hand (left image in Figure below).
- Make sure the four (4) locking screws located on the tray have been pulled out, allowing a box of cones to be added.
- Grab the cone cardboard base by facing the groove side inward the machine.
    - Insert the first box into the first slot (positon 1) of the tray-holder as shown in Figure 4-2.
    - Insert the second box into the second slot (positon 2) of the tray-holder.
    - If only one box is to be added, insert it at the first slot (position 1).
- Make sure the boxes are fully inserted, then tighten the four (4) locking screws, in order to keep them stable during operation.
- Slide the tray-holder up to the highest position.
- Make sure the tray-holder latch is in the lock position.
- Close the back service door.

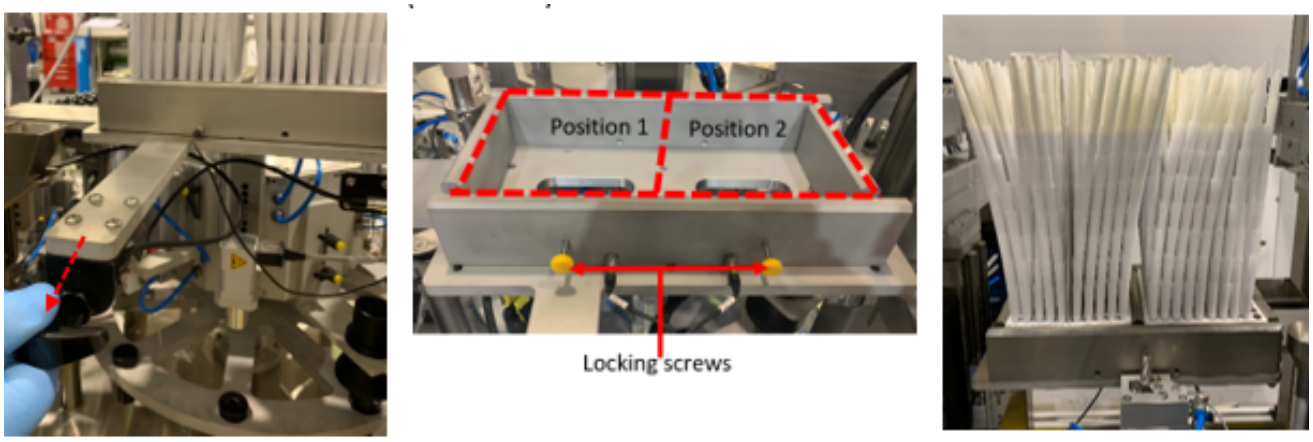


Figure 4-2 Pre-rolled cone box incertion

4.3.3. Cannabis filling

Use a stainless-steel scoop to fill from the hopper (station 4). Please make sure not to surpass the maximum suggested fill level, as shown in
Figure 4-3. It is suggested to fill the hopper more often with less material. Make sure grinding size is between 1.5 to 2.5 mm.

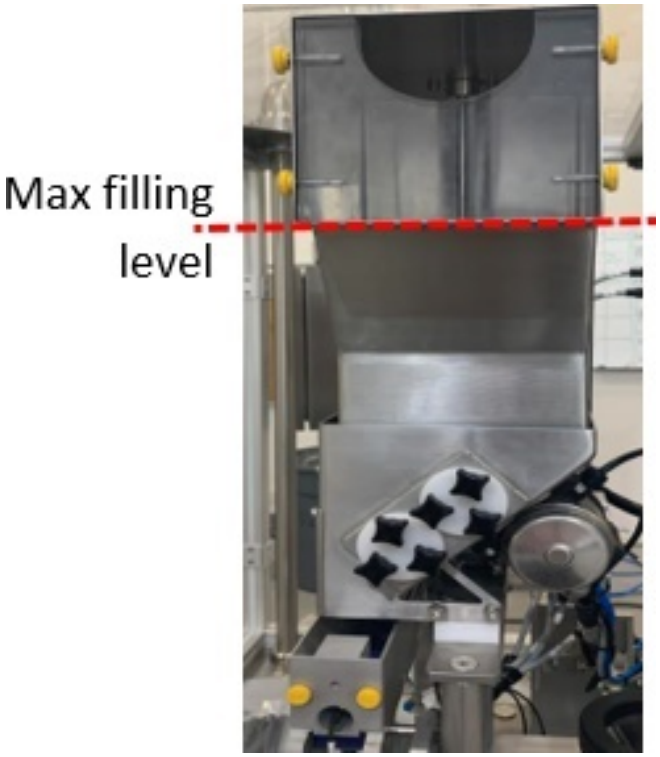


Figure 4-3 Cannabis filling in hopper

4.3.4. Product selection

To select a saved product recipe, from the HMI screen, please follow the following steps

- Step 1: Click on [Product Selection], the screen displays as shown in Figure 4-4.
- Step 2: [PRODUCT Infeed] light must be Green, otherwise, click on it.
- Step 3: Click on [PAPER SELECTION] the below screen is displayed.

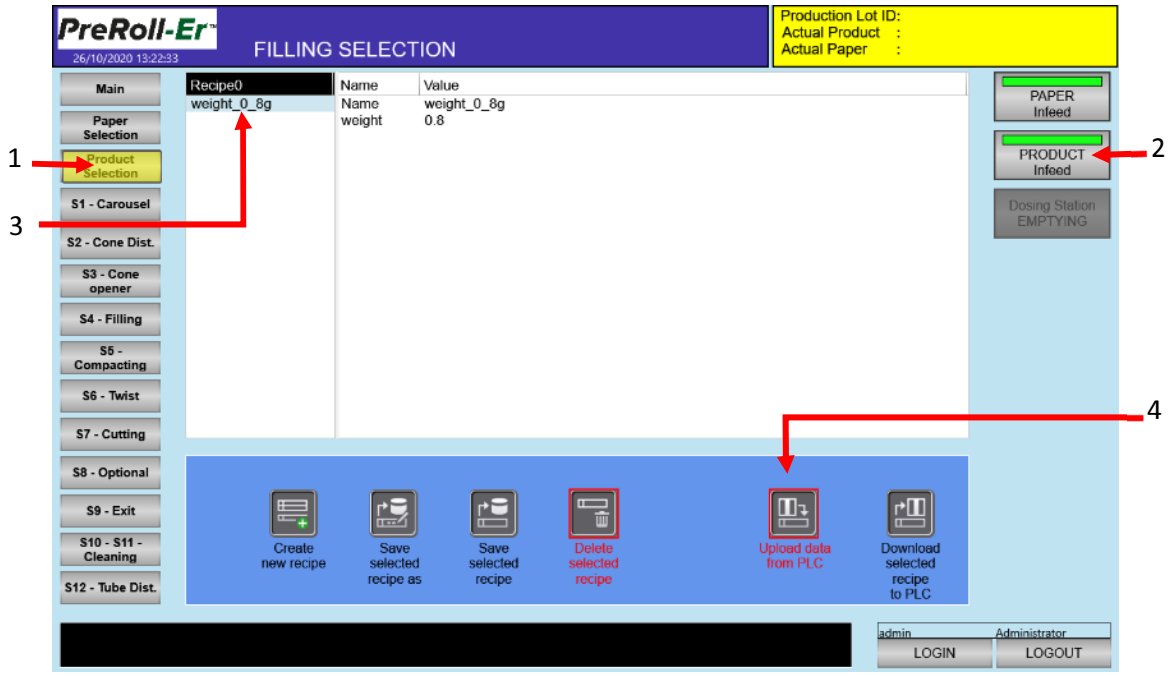


Figure 4-4 Product selection screen

- Step 4: Select the name of the saved recipe you need for your running production.
  - Please see Standard Operation Procedure in Section **Error! Reference source not found.** for more details on how to create a new recipe for product.
- Step 5: Click on Upload data from PLC, a confirmation message will pop up as shown below.

- Step 6: Click on Upload to load the product recipe configurations to the controller.

4.3.5. Paper selection

To select a saved paper recipe from the HMI screen, please follow the following steps.

- Step 1: Click on [Paper Selection], the screen displays as shown in Figure 4-5.
- Step 2: [PAPER Infeed] light must be Green, otherwise, click on it.
- Step 3: [CONES Selected] light must be Green, otherwise, click on it.
- Step 4: Click on [PAPER SELECTION] the below screen is displayed.

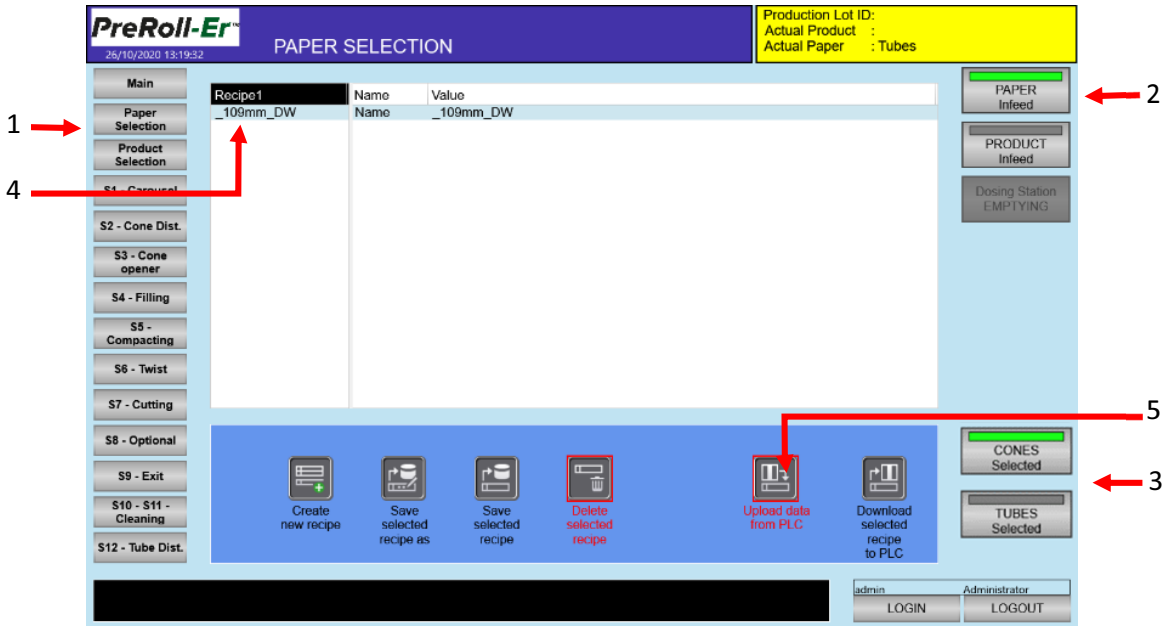


Figure 4-5 Paper selection screen

- Step 5: Select the name of the saved recipe you need for your running production.
  - Please see Standard Operation Procedure in Section **Error! Reference source not found.** for more details on how to create a new recipe for paper.
- Step 6: Click on Upload data from PLC, a confirmation message will pop up as shown below.

- Step 7: Click on Upload to load the paper recipe configurations to the controller.

Chapter 5 – Standard Operating Procedures

5. STANDARD OPERATING PROCEDURES (SOP)

This Chapter includes all critical procedures that are required to setup, adjust, troubleshoot and maintain the PreRoll-Er machine.

See in **Error! Reference source not found.** below the list of Standard Operating Procedures (SOP) available for the Preroll-Er machine.

Section	Type	Title
5.01	Setup	Complete tooling change
5.02	Adjustment	Pick and place on station 2
5.03	Adjustment	Air-jet on station 3
5.04	Adjustment	Needle on station 4
5.05	Adjustment	Heart pre-dosing on station 4
5.06	Adjustment	Shaker under station 4
5.07	Adjustment	Compacting rod for station 5
5.08	Adjustment	Twist on station 6
5.09	Adjustment	Flat top compacting rod station 7
5.10	Adjustment	Cutter on station 7
5.11	Setup	Create a paper recipe
5.12	Setup	Create a product recipe
5.13	Maintenance	Cleaning – Level 1
5.14	Troubleshooting	Station height adjustments

Figure 5-1 List of Standard Operating Procedures

5.4. STANDARD OPERATING PROCEDURES –NEEDLE ON STATION 4

5.4.1. Needle adjustments

The objective of this procedure is to determine the best way to adjust the needle position, timing and speed to achieve a compaction of the lower third or half of your **PreRoll-Er™.** It will work as a reference for operators to find the right data settings and gain consistency for all the output production.

5.4.2. Definitions

Delay sequence: this parameter is showing the number of strikes that the needle is going to do in it's routine of compaction.
Start delay needle sequence: this parameter is in millisecond. It is the time between the start of the filling process and the moment when the needle starts to move. The trigger for starting the filling process is the reading of the paper positioned on top of the funnel.
Needle moving parameters, speed/accel/decel in cycle: these parameters set the movement of the vertical strikes of the needle. Speed is in millimeters per second, acceleration and deceleration are in millimeters per square second.
Position reading: looking at left side ruler on station 4/ needle screen, you will find the real time position of the needle, shown as a black square. The reading on the ruler is also shown by number at the top right field, in red numbers, again in real time.
Step by step button: Activating this button will ask you to push STEP for each separated movement of one sequence.

5.4.3. First step

Once the right size needle is properly installed, put PAPER and PRODUCT infeed at ON, located at the right top corner of station 4 screen on the HMI. Put station 4 on STEP BY STEP mode.

Startup machine, let it run until one paper is up the funnel and all three optic sensors are lightened. With the help of the shaker's parameter, check if the position of the paper around the bottom of funnel is ok. Please consult the SHAKER SOP for setting up of the paper with the shaker. Then, machine is waiting for a step command.

On the needle page, hit jog mode on lower right side of the screen. Lower the needle slowly using the jog pad, until it reaches the carton filter of the paper inside the cone former. If you try to go lower, the yellow thumbscrew will go up as the needle assembly will go down. Read the number showing on the HMI of the needle (red numbers).

This number will be your starting position for the fist two steps for the compaction. (see Figure 1)

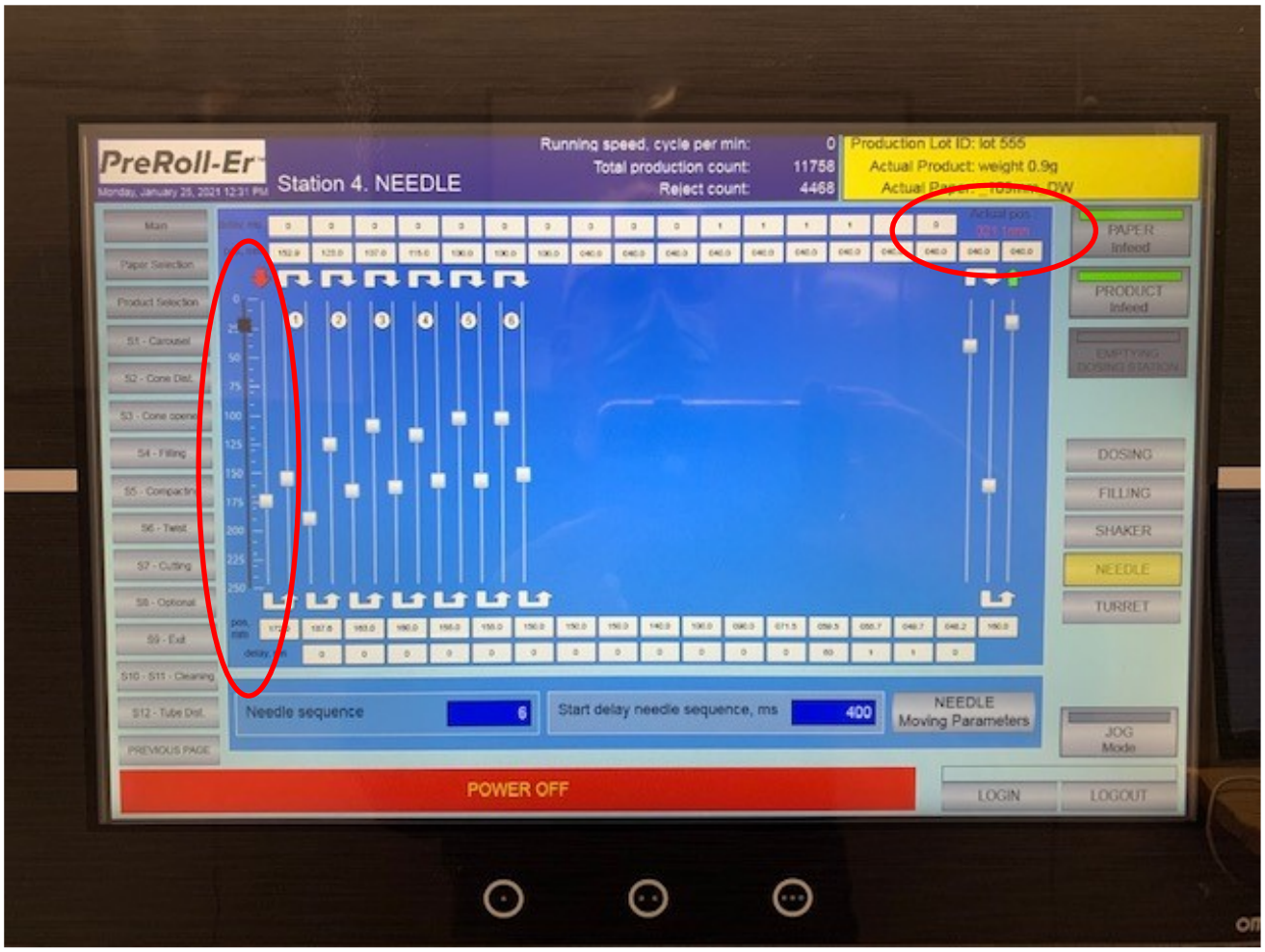


Figure 1 – HMI display for Needle adjustment

5.4.4. Second step

Depending on your particle size, you will need to rise the needle by step of 15-20mm on top position comparing to the lower position, in this case the compaction position, on each strike.

Let's pretend you filter is at 160mm, you position the needle at 160 for the start. Cannabis will drop over it in the paper. Then, rise the needle by 20mm, it takes you to position 140. While the needle is high at 140, cannabis will flow around it and get on bottom of paper.

First needle strike brings it back to 160, rise to 143mm and back to 157 (compaction), rise to 140mm and down to 154 (compaction), by steps of 3mm on each top position and compaction position. This will go on for all the strikes of the needle sequence parameter (see Figure 2). To make sure that you have cannabis over the needle when you start this routine, use the Start delay needle sequence parameter and add some delay (in milliseconds). Try to keep the delay number low, in order to keep sequence as short as possible.

After fixing these parameters, get the machine ready by pressing RESET (blue button on HMI) for one full second, then again momentary, RESET again any remaining faults. When the ribbon is green, showing status: <machine ready>, activate the green button to start and hit STEP button on station 4. The routine for the needle will start and go on until it reaches the number of strikes and after it went down in the cone former the carrousel will index to the next station, rise a new paper and wait until STEP button is activated again.

It is preferable to run five to ten pre-rolls before checking the quality of the lower compaction, doing so you will be able to compare them. Station 5 ,6 and 7 can be placed at OFF, in order to collect the pre-rolls at station 9 in the condition they were at station 4.

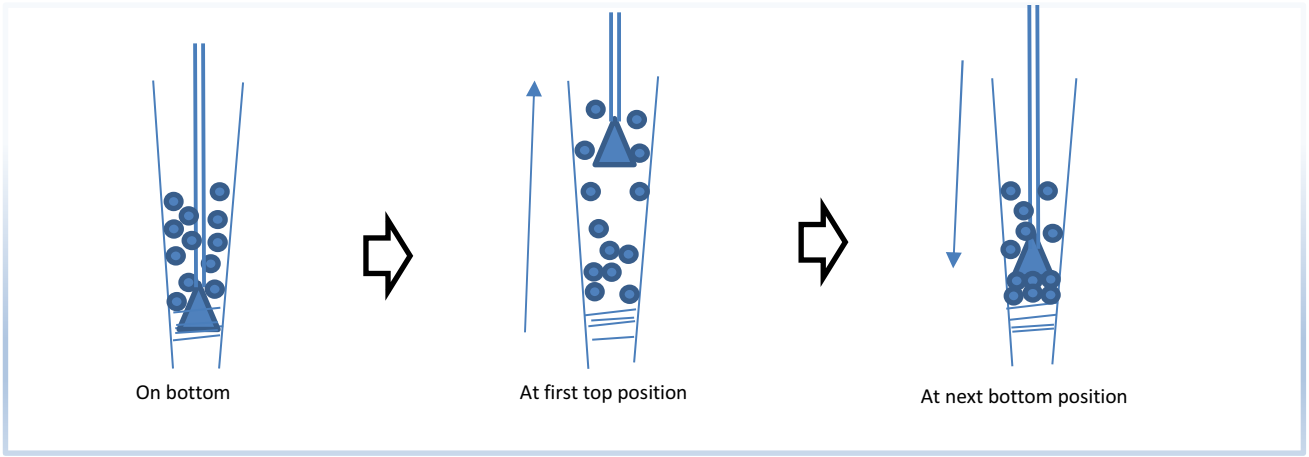


Figure 2 – Compaction schematics

5.4.5. Adjustment/ fine tuning

Adjustments can be done after, with the use of different parameters to achieve the desired compaction level.

- The height of lower compaction: broken paper close to the filter would need to be raised. On the opposite, a bad compaction would mean you need to lower it.
- The height of the upper position of needle: if too much cannabis is going under the needle it will rip the paper, or have a softer compaction. If you need more cannabis in, compaction won't be sufficient.
- If there is a slack in the overall shape, maybe you will have to increase the START DELAY OF SEQUENCE of the needle to make sure you have sufficient product over the needle during the first pass.
- You could have to change the SPEED of the needle if all the compaction is too soft, or if you are breaking the paper on one side. Be careful to only change the speed, by small increments at a time.
- If need you can add or reduce the number of needle strikes, be careful to set the upper and lower limits of those extra strikes before putting the machine ON.
- For very fine tuning you can add some delays on every positions of the needle, up or down, by factors of milliseconds, using the correspondent fields on the HMI screen, above and under the related position field.
- You need to have at least 6mm of free paper on top of the cone when indexing from station 4 to station 5. Doing so, you will ensure that all the flower weight stays inside the paper between both stations and there will be enough play on top to rise properly the paper on the next station.

5.6. STANDARD OPERATING PROCEDURES –SHAKER STATION 4

5.6.1. Shaker under station 4 adjustment

The objective of this procedure is to determine the best way to adjust the parameters, timing and speed to achieve a good compaction of the lower third of your **PreRoll-Er™.** It will work in tandem with the needle to achieve a target compression of your product. It could be used as a reference for operators to find the right data settings and gain consistency for all the output production.

5.6.2. Definitions

Home position: this parameter is showing the position of the rod under station 4, when standing just above the podium at station 4.

Cone up position: this parameter is the highest position that the shaker rod will move to. It will also be the position where your empty paper will be in place for filling.

Shaker top position: this parameter sets the top limit position of the movement of the shaker rod.

Shaker bottom position: This parameter sets the lowest position of the movement of the shaker rod.

Speed, acceleration and deceleration: speed is in millimeters by second, accel and decel are in mm per square seconds.

5.6.3. First step

The first step is to find the right height for the rod to lift the paper sufficiently high that it will be seen by the three optical sensors. Once the correct position has been found, it will be used for TOP POSITION data. Set the bottom position 0.5 to 1.0 mm lower than the top one.

5.6.4. Second step

Put station 4 in step by step mode. Start-up the machine and let it run until one paper is up to the funnel. Check the three sensors state; are they ON or not? Start with 15 mm as the top position. Check if the paper goes high enough to reach the sensor's level.

Figure 1 – Optical sensor checking for a paper presence

Try to rise the rod top position by half millimeter at the time, using the HMI interface, using TOP POSITION field. Increase slowly the shaker rod position by increasing the number in the field of top position. You need the paper to be almost on top, and still be straight (see Figure 2). If the paper is bended, you need to reduce the number in top position field, hit Step button and index a new paper in to see the new position.

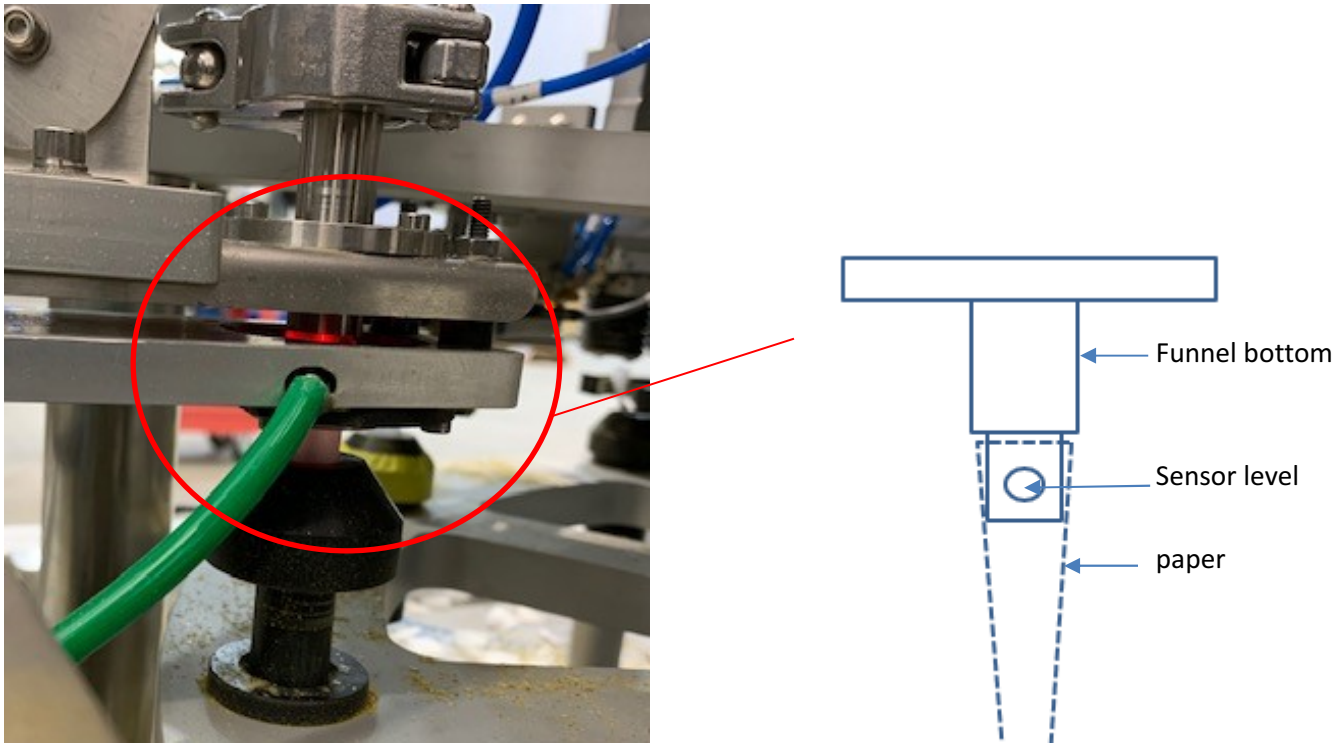


Figure 2 – Paper adjustment schematics

Once you reach 22mm (maximum height with spring return cone formers), and the sensors are covered by the paper, stop. If not completely covered by the paper, lower the table slowly using of the handle on right side of the machine, until all three sensors are ON (see Figure 3)

Figure 3 – Machine height adjustment handle

5.6.5. Sensors fine-tuning procedure

Once the paper's top position is set, you need to check the sensors tuning. The three sensors have to be dark when there is no paper around the funnel and red when one paper is placed in. See Figure 4 for reference:

- Make sure that there is no paper over the funnel
- First check the un-activated (dark) condition without a paper in. If correct, press the set button on all three sensors
- Put machine station 4 on STEP BY STEP mode
- Start machine
- Index the machine by putting it at ON and demand paper infeed and product infeed
- Once the paper is on top position check if the three sensors are activated (red state)
- Press set button on sensors once again

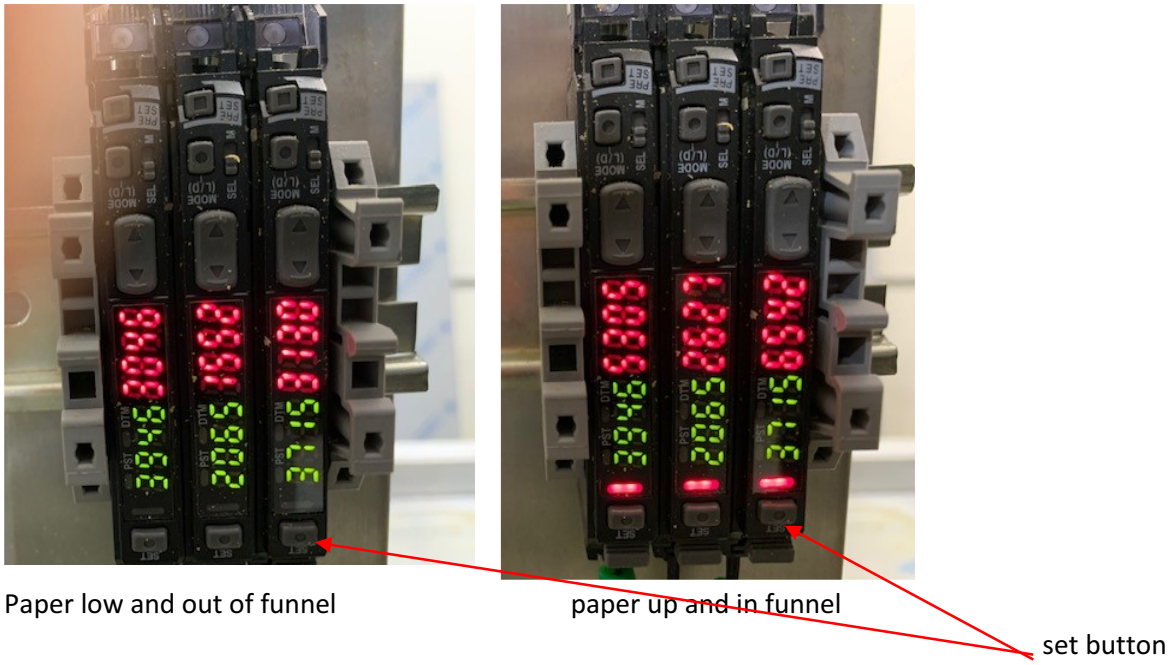


Figure 4 – Optical sensors (3) parameters interface

5.7. STANDARD OPERATING PROCEDURES –COMPACTING ROD STATION 5

5.7.1. Compacting rod station 5 adjustment

The objective of this procedure is to explain the optimal technique to adjust the Station 5 – Compaction's cycle, time and pressure to achieve the desired compaction of the upper half of your pre-rolls coming out of the **PreRoll-Er™.** This procedure can be used as a reference for operators to find the right settings to obtain a good compaction consistency on the machine.

5.7.2. Definitions

Compression cycle: this parameter is showing the number of strikes to be done during the compaction process.

Compression time: this parameter is the amount of time, in milliseconds, that the compression rod will stay down, each time it drops.

Gripper pressure value: this parameter sets the pressure put on the grippers to hold the paper in place. High values allow for greater compaction targets, be aware of damages to the pre-rolls using high gripper pressure values.

Cone back to wheel time: This parameter sets the time given for the cone to get back in the cone holder, allowing enough time before indexing to the next station.

Close clamp compactor raised: This option, when enable, will keep the grippers closed while the compacting rod rise. This could help to keep your product straight after compaction and achieve a higher compaction level.

5.7.3. First step

The first adjustment of Station 5 is the height of the pre-roll. Verify that the Station 5 is ON, on the station's HMI page (Figure 1). When ready to adjust the parameters of Station 5, put the STEP BY STEP mode ON. Run machine until one pre-roll arrives to Station 5. When using STEP BY STEP mode, the machine will bring one pre-roll up and will wait for the next step command. The paper height must be adjusted so that the top of the cone would get around the flower, just a few millimeters lower than the ceiling of the station (see Figure 2). You can raise or lower the station itself to position the pre-roll at the right height or you could also use the positioning of the rod under the station to change the pre-rolls' height to be at the right spot. The lower limit of the station is 3mm higher than the top of cone former (Station 4).

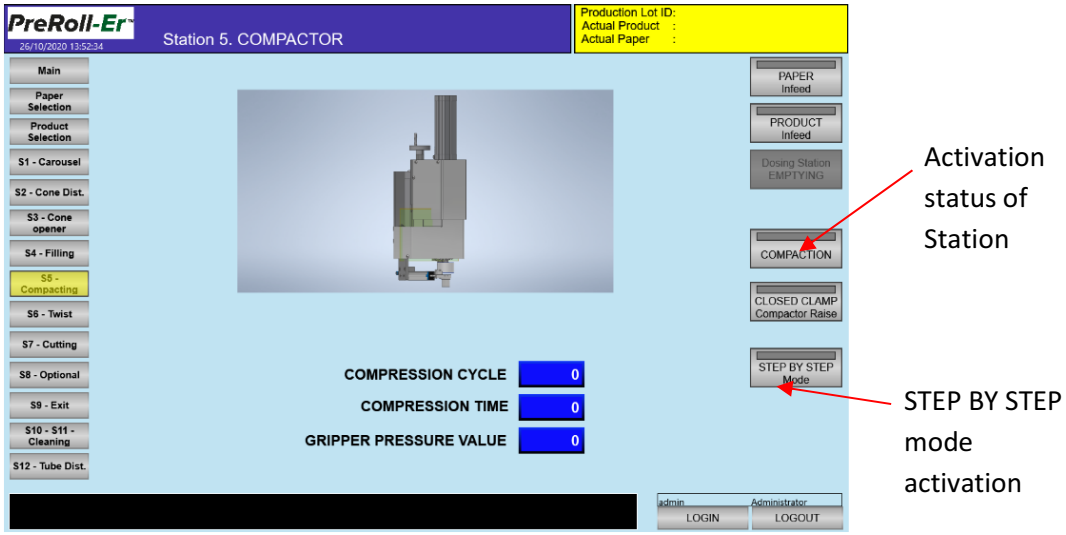


Figure 1 – HMI display for Station 5

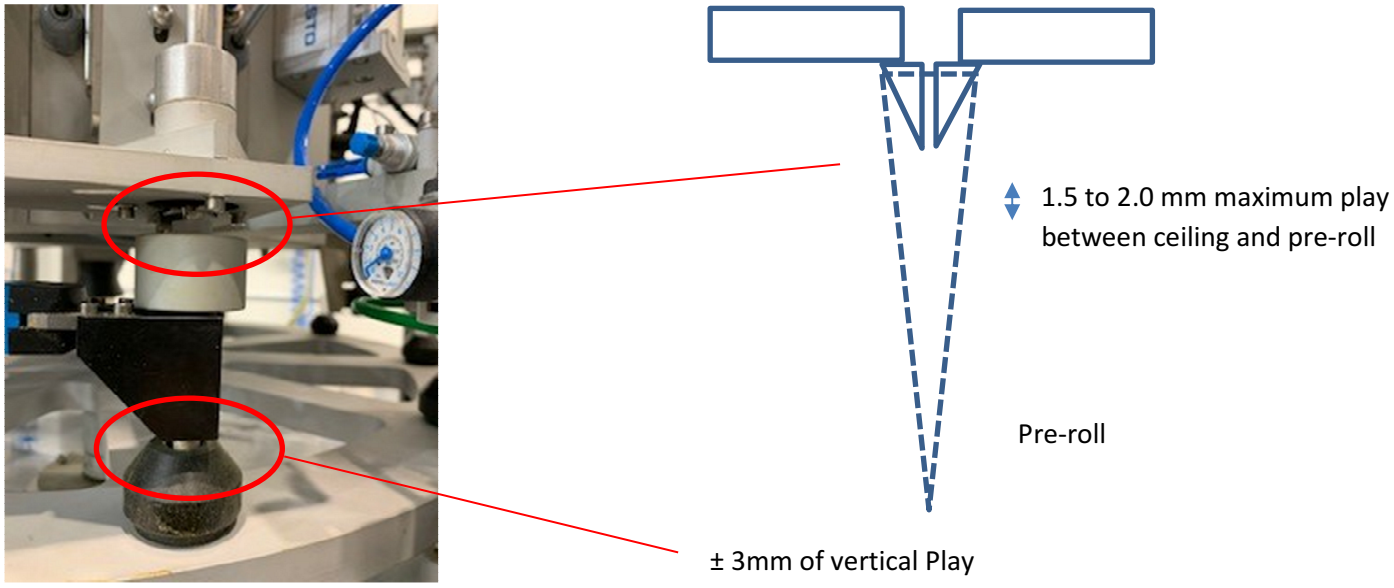


Figure 2 – Pre-roll positioning in Station 5

Once the pre-roll is lifted at the optimum position, you need to grab it with the set of dedicated grippers. Make sure that the grippers are perfectly aligned on both axis before going further. Using only one COMPRESSION CYCLE, and with a GRIPPER PRESSURE value of 3000, use the STEP BY STEP logic on the routine to follow progress.

5.7.4. Second step

Fine tuning should achieve a final product with an even compaction from top to bottom, leaving 10 to 12mmm of free paper on the very top of your pre-roll. Depending on the desired compression you wish to achieve, you can modify the compression level by increasing or lowering the GRIPPER PRESSURE VALUE. Putting a higher value on this parameter will increase the compaction since there is less chance for your pre-roll sliding down. It's strongly holds the pre-roll and the compaction rod will always have the same height when it drops down. On the opposite, a lower gripper value will leave a greater chance for the paper to slide between the grippers resulting in a lower uniform compaction.

You can also change the time that the rod will stay down, by changing the COMPRESSION TIME parameter. It could help you achieve a more uniform compaction, doing more than one compression strike. It is important to take note of the total time for the Station 5 routine, as it is directly linked with the number of strikes and time it stays down during each one.

5. STANDARD OPERATING PROCEDURES

5.13. Cleaning LEVEL 1

The objective of the maintenance schedule is to ensure that **PreRoll-Er™** performs at maximum efficiency over a long period of time. This helps to prevent breakdowns and failures and eliminate costly repairs.

Level I maintenance

This Level I maintenance is a preventive maintenance; it is a routine of maintaining the **Pre-Roll-Er™** on a regular schedule based on elapsed time. For the **PreRoll-Er™**, it should be scheduled after **four (4) hours** of operation. The intent is to prevent maintenance problems or failures before they take place, by following routine and comprehensive maintenance procedures.

All surfaces should be wiped and cannabis dust vacuumed, in order to prevent the **PreRoll-Er™** to be prone to particles of pre-rolls cones, and cannabis dust, building up inside the equipment during operation, which causes blockages. The goal is to achieve fewer, shorter, and more predictable outages.
The advantages are:

- It is predictable, making budgeting, planning, and resource leveling possible.
- When properly practiced, it generally prevents most major problems, thus reducing forced outages, and maintenance costs.
- It is easily understood and justified.

Schedule maintenance

This procedure must be performed **every four (4) hours** of operation.
Note: Scheduled maintenance should have a higher priority than special projects and should be the number one priority.

Equipment and Materiel

Level I maintenance may be carried out by the production operator, and involve using the following equipment and materiel:

- Isopropyl Alcohol 70% (Squeezable bottle dispenser, not a sprayer).
- Vacuum cleaner.
- O-ring removal tool.
- Clean and dry cloth.

Personal Protective Equipment

During maintenance, the operator is required to wear at least safety glasses, gloves and a safety mask to avoid breathing in the particles that have accumulated on the machine.

Machine Status

Push the red knob of the Emergency-Stop button.

Important: The E-Stop breaks the circuit of the PreRoll-Er™ machine and removes power supply for a safe cleaning.

5.13.1. Maintenance procedures

Station # 4:

The material detection sensor:

1. Apply a small amount of a rubbing alcohol (Isopropyl Alcohol 70%) directly to the cloth (not directly to the lens; see Figure 5-2) and move in small concentric circles, repeat as necessary, making sure to use small circles to avoid streaks.

2. Use a dry portion of the cloth at the end to remove any bits of dust or larger patches of remaining fluid.

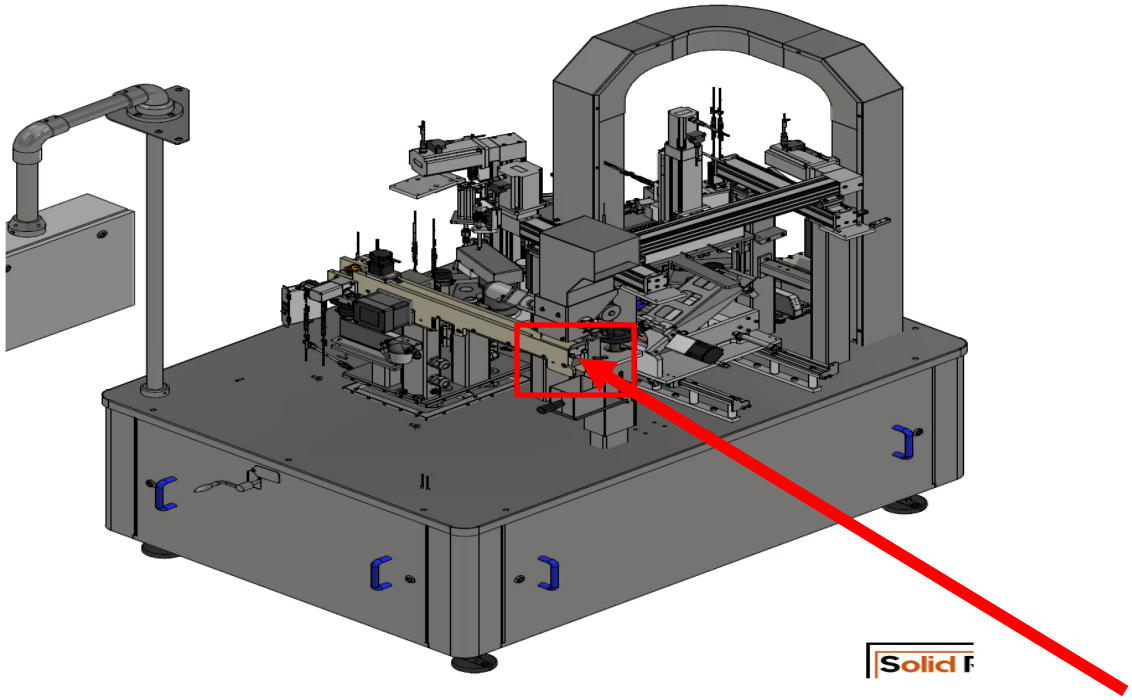


Figure 5-1 Camera lens position

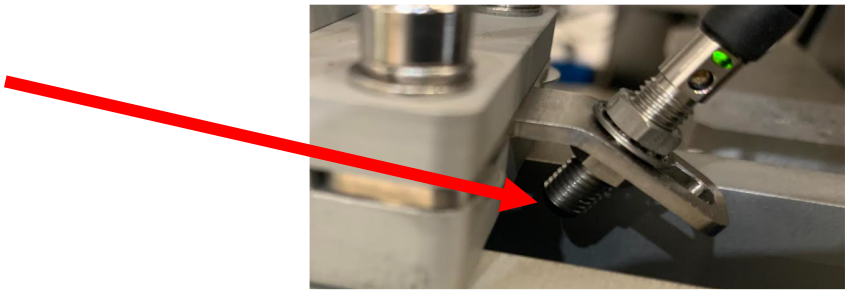


Figure 5-2 Camera lens cleaning

The conveyor:

1. Unscrew all the six (6) round thumb screws (see Figure 5-3 The Conveyor cleaning) to remove the right side facing the machine.

2. Use a vacuum cleaner to vacuum both sides of the belt and under the drive roller.

3. Make sure all dust is removed from all the surfaces and holes. Replace the right side by screwing all the six (6) screws to their rightful places.

4. Clean the top section of the metal tubes holding the screws located on both sides of the conveyor walls.

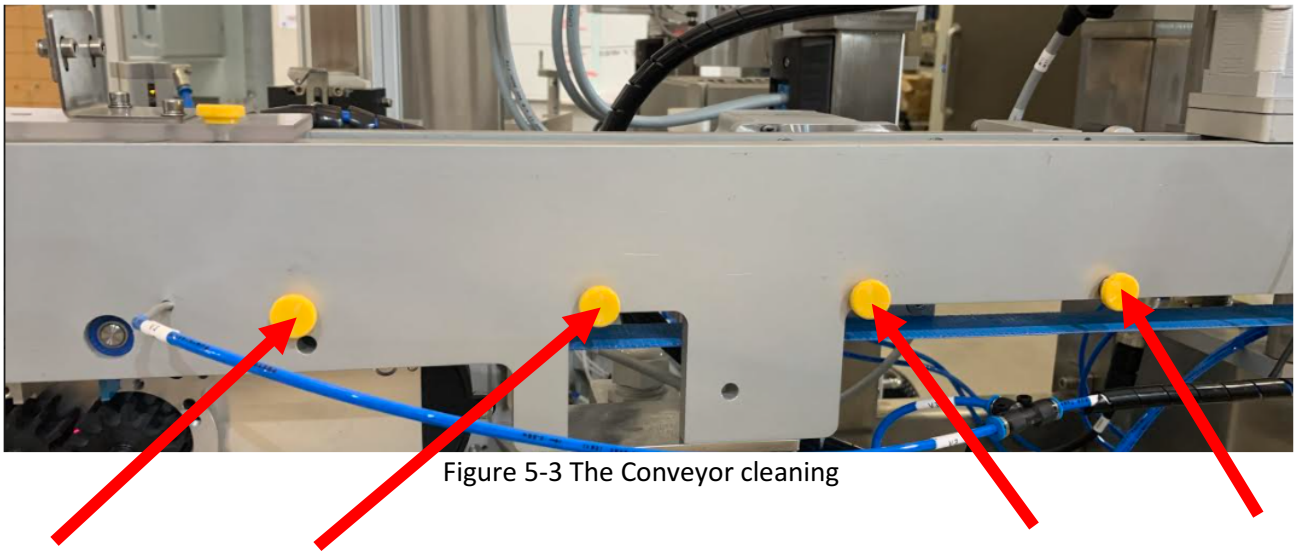


Figure 5-3 The Conveyor cleaning

The dosing gate:

Use a vacuum cleaner to vacuum any accumulated dust on the dosing gate surface as shown in Figure 5-5.

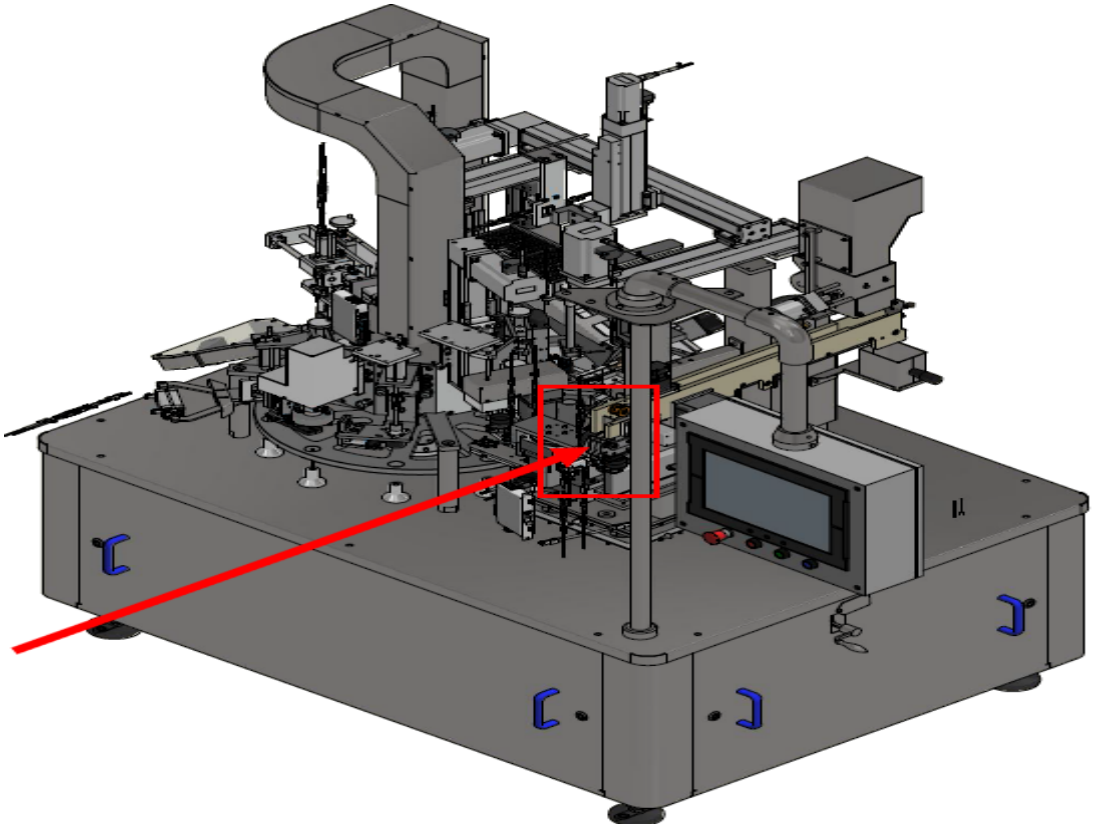


Figure 5-4 Dosing gate position

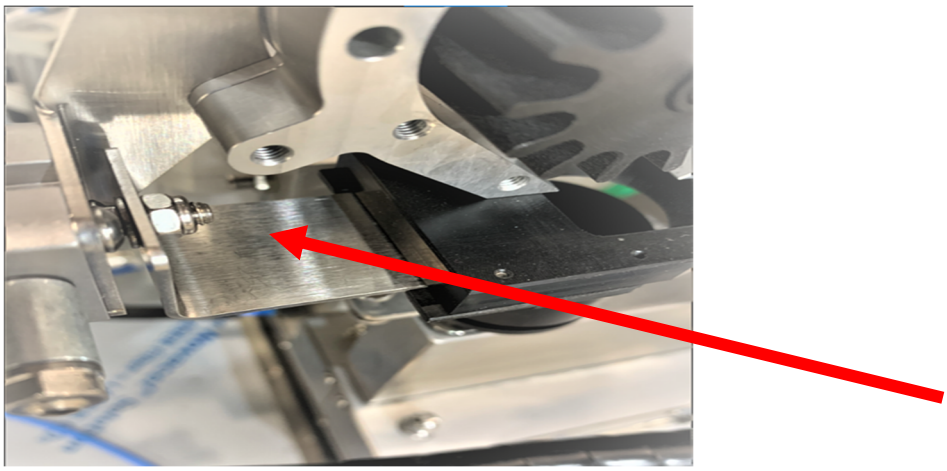


Figure 5-5 Dosing gate cleaning

The dosing gears (the heart):

1- Unscrew all the four (4) screws as shown in Figure 5-6 to remove the front cover.

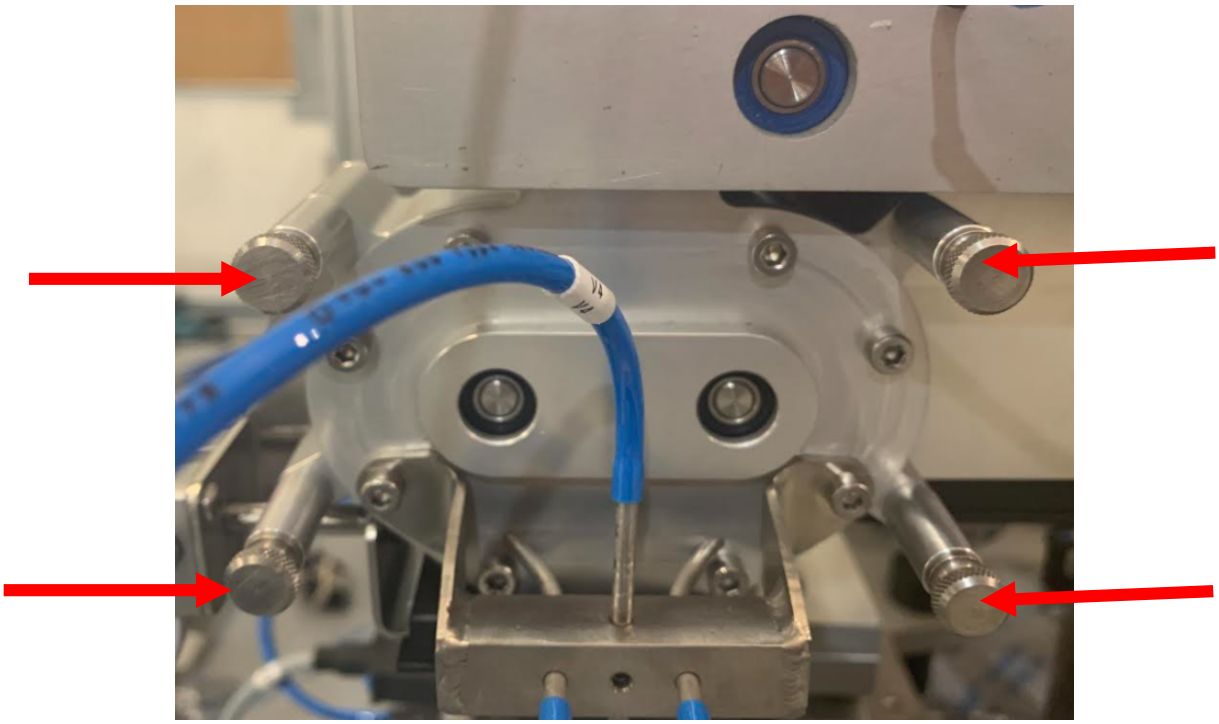


Figure 5-6 The dosing gear front cover

2- Use a vacuum cleaner to vacuum any accumulated dust in all surfaces as shown in Figure 5-7.

Figure 5-7 The dosing gears

3- Remove both dosing gears from the driveshaft see Figure 5-8.

4- Use a soft, dry cloth to remove any accumulated dust on both dosing gears. If needed, use a 70% alcohol solution to clean the gears. Let them dry accordingly before operation.

Figure 5-8 The dosing gears

5- Make sure to vacuum all dust from all the surfaces and hole in the gear hosing as shown in Figure 5-9.

6- Replace the dosing gears, and put back the front cover by screwing the four (4) screws to their rightful places.

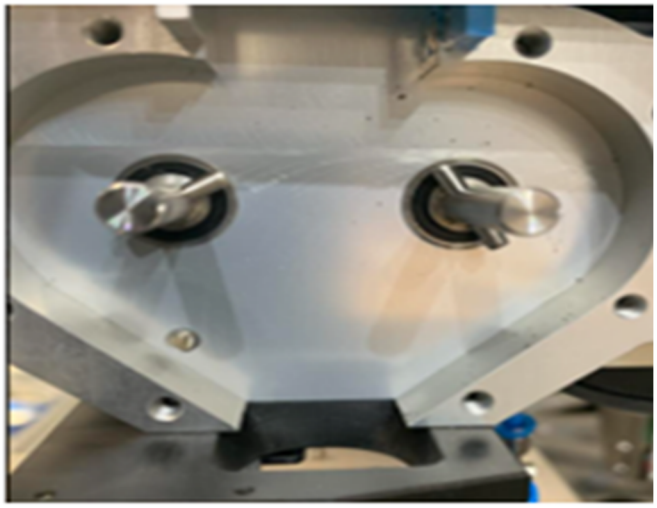


Figure 5-9 The dosing gears housing

The discharge funnel

Use a vacuum cleaner to vacuum any accumulated dust from all funnel surface as shown in Figure 5-10.

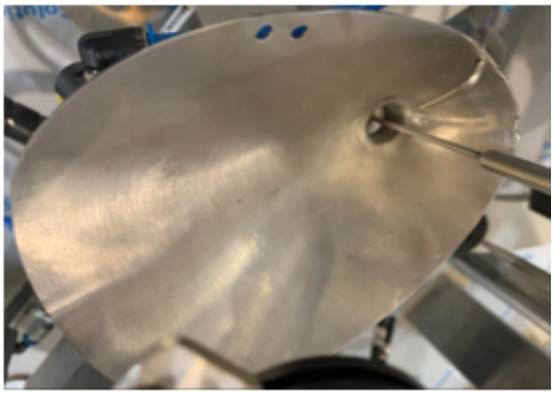


Figure 5-10 The discharge funnel

Station # 5

The compacting rod:

Use a vacuum cleaner to vacuum any accumulated dust in the funnel star as shown in Figure 5-13, by making sure all dust is vacuumed from all surfaces. Then use Isopropyl alcohol and a clean cloth to clean off all rods that have resin on it.

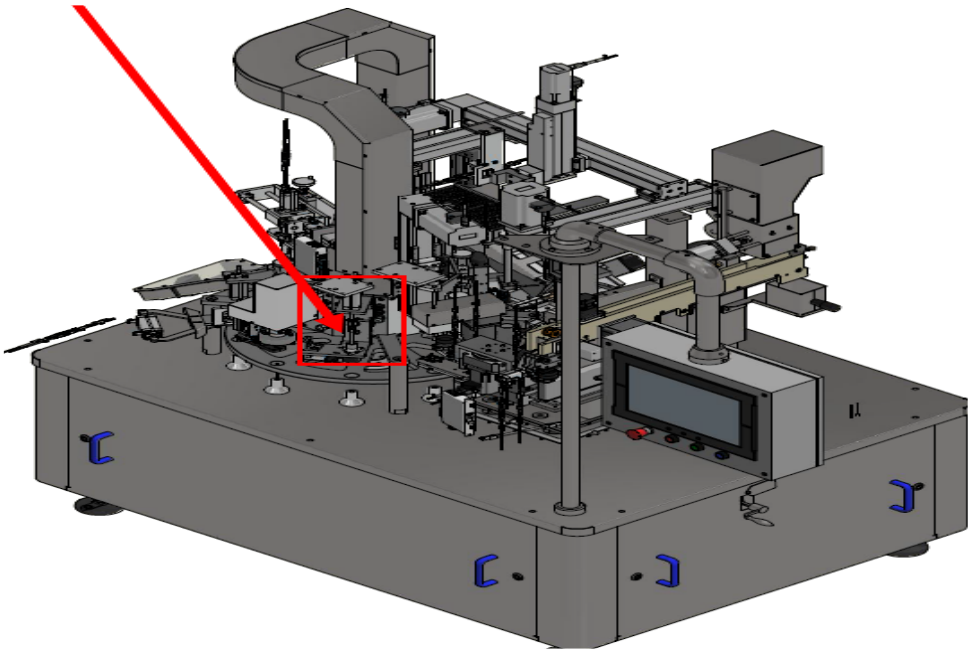


Figure 5-11 Station 5 - compacting rod position

Figure 5-12 The compacting rod

Figure 5-13 The funnel star position

Rods cleaning:

1- Twist the red knob clockwise (right) to release the Emergency-Stop (E-Stop) as shown in Figure 5-14.

2- Press and hold the Reset button (the blue button) for about three (3) seconds, release the Reset button, then repeat the procedure for the second time.

3- Open the side door (under station #5) using the provided key as shown in Figure 5-14

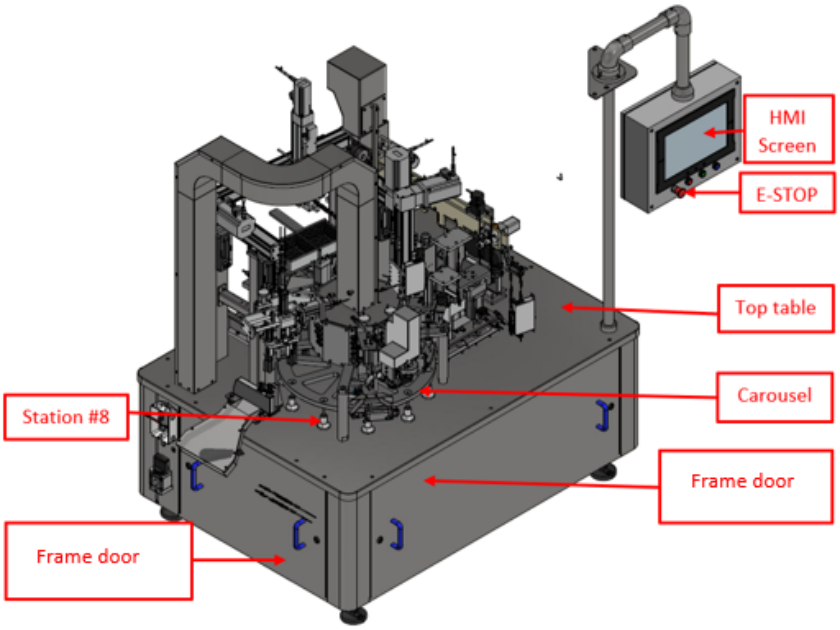


Figure 5-14 The PreRoll-Er™ overall layout

4- On the HMI screen, select JOG Mode by following the two (2) steps as shown in Figure 5-15. JOG mode screen is displayed as shown in Figure 5-16.

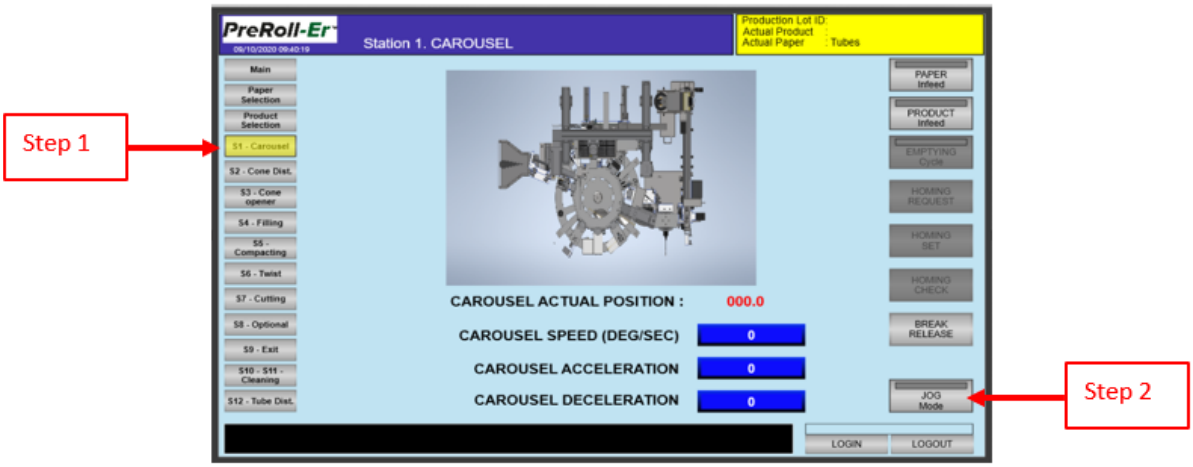


Figure 5-15 JOG mode selection

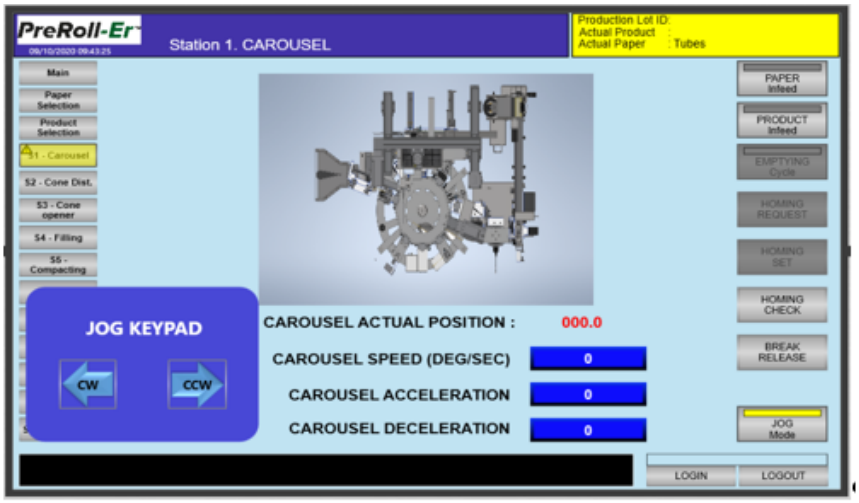


Figure 5-16 JOG mode display

5- To remove the cone holders:
   a. Use the JOG Keypad (see Figure 5-16) and select between (CW or CCW) to rotate the carousel and position the cone-holder to remove; in Station #8; as shown in Figure 5-14.

   b. Use the O-ring removal tool, to remove the O-ring from the cone-holder as shown in Figure 5-17.

   c. Pull out the cone holder from the Carousel.

   d. Repeat this procedure from step (a) for the ten (10) cone-holders.

6- Use a vacuum cleaner to vacuum any accumulated dust on all the surface of the top table as shown in Figure 5-14. and wipe off any dirt.

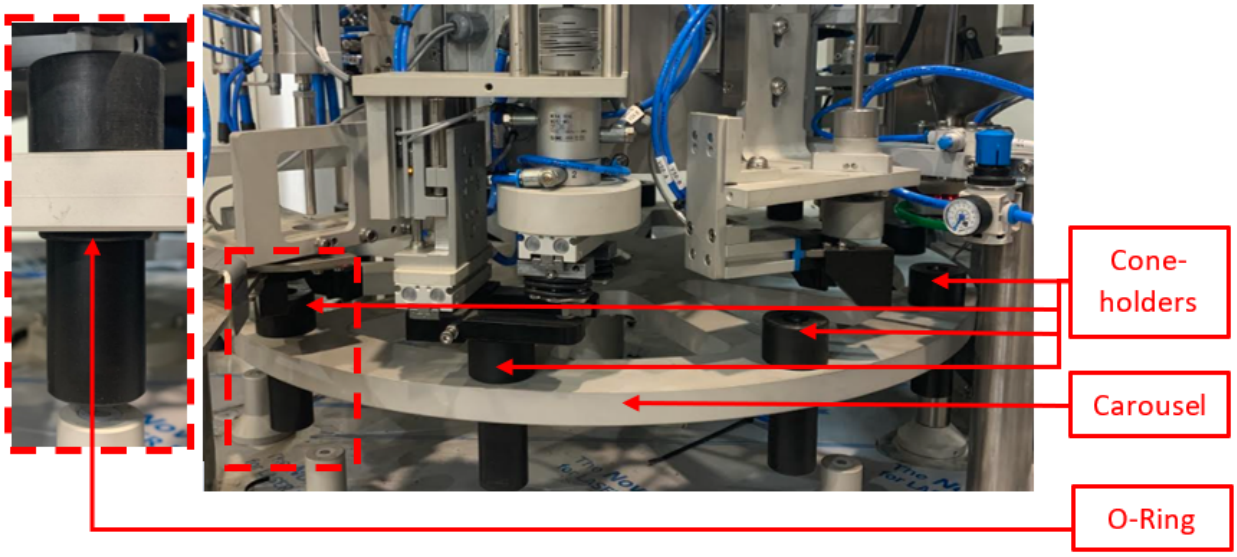


Figure 5-17 Cone-holders position

7- To pull up the rod:

a) Use the JOG keypad (see Figure 5-16) and select between (CW or CCW) to rotate the carousel and align the hole on the Carousel down the center of the rod to clean.

b) From the rod-chamber as shown in Figure 5-18, grasp with two fingers the rod, and push it up to the top of the table.

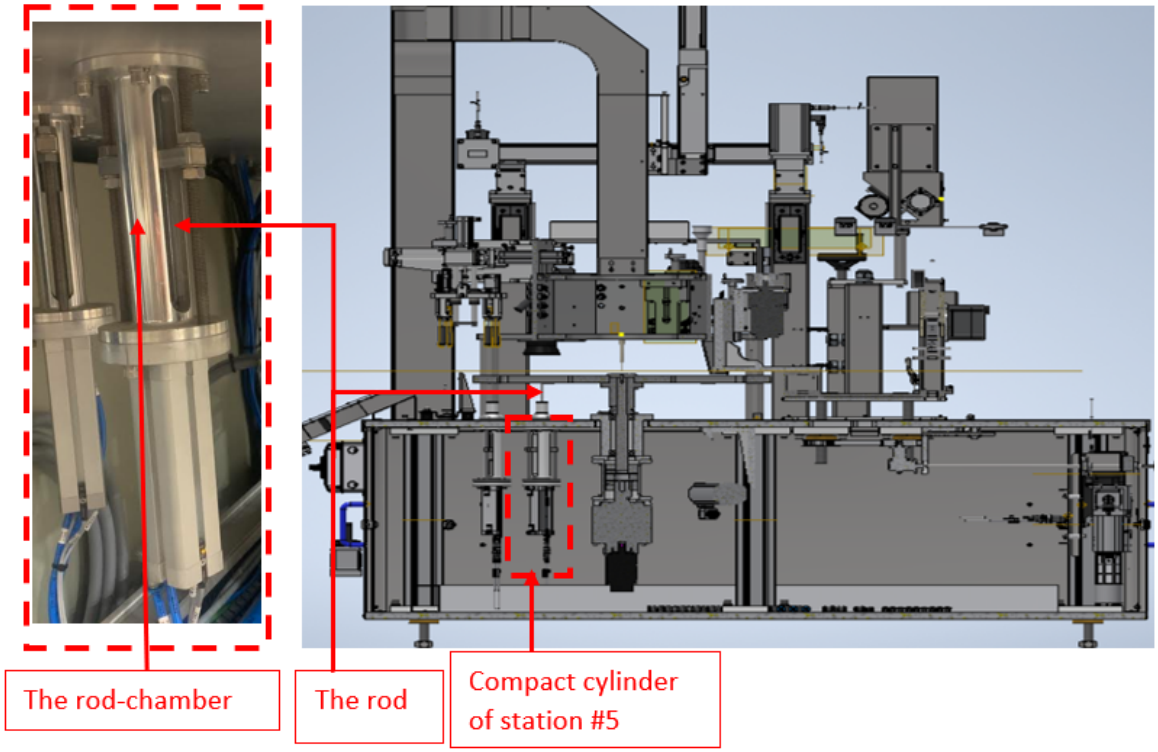


Figure 5-18 The compact cylinder of station #5 position

8- Push the red knob of the Emergency-Stop button (E-Stop) as shown Figure 5-14.

9- Apply a small amount of a rubbing alcohol (Isopropyl Alcohol 70%) directly to a clean and dry cloth, and clean the rod as shown in Figure 5-19.

Repeat as necessary, making sure to remove all the cannabis dust.

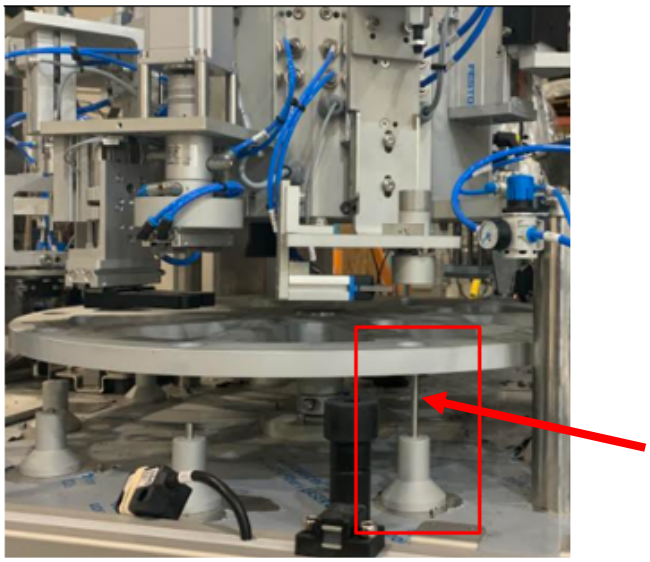


Figure 5-19 The rod cleaning

10- Repeat the procedure from **Step 7-** for all the other four (4) rods (Except for station #8) as shown in Figure 5-20.

Note: For the rods of station #9 and station #10, use the side door under the exit station (Station #9) as shown in Figure 5-14.

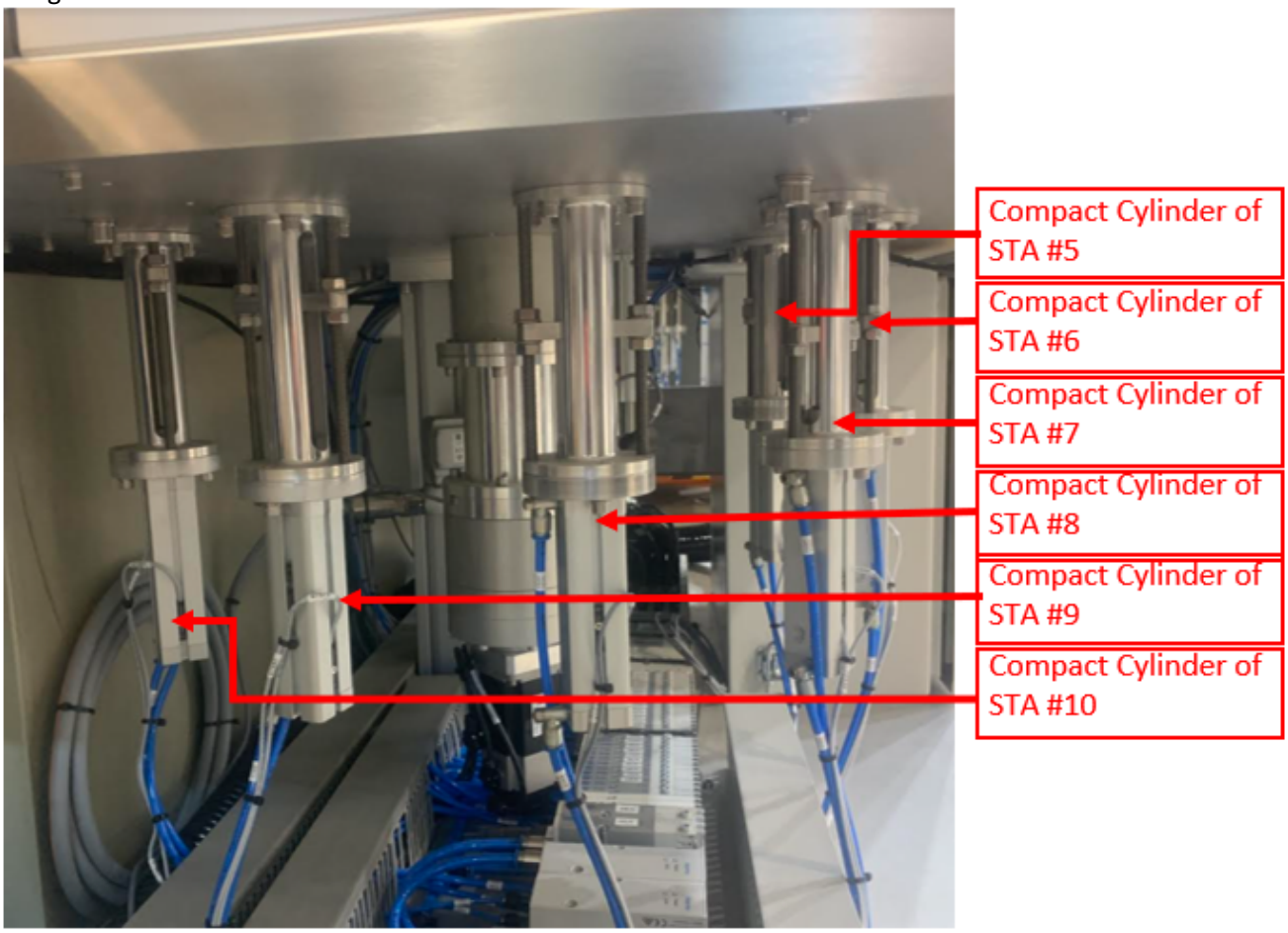


Figure 5-20 Compact Cylinders position

11- Close all the side doors and put back all the cone-holders and the O-Rings.

12- Twist the red knob clockwise (right) to release the Emergency-Stop (E-Stop) as shown in Figure 5-14

13- Reset the machine by holding down the blue RESET button below the HMI for 2 seconds, repeat a second time and start up the machine for production.

Chapter 6 – Control & HMI

6. CONTROL AND HMI

6.1. GENERAL

The Human Machine Interface (HMI) screens provides access to all operational information and configuration parameters regarding the machine during the operation, as well as maintenance and troubleshooting.

6.2. THE HMI DISPLAY

The **PreRoll-Er™** HMI display pages contains the following types of elements:

- High-level Key Performance Indicators
- Alarms
- Indications of abnormal situations.
- Important calculated parameters and conditions
- Important information from stations units
- Advanced control mechanisms performance and status
- Major equipment status
- Appropriate trends of important parameters
- Controls
- Detail view of equipment

The HMI screen template configuration is shown in Figure 6-1.

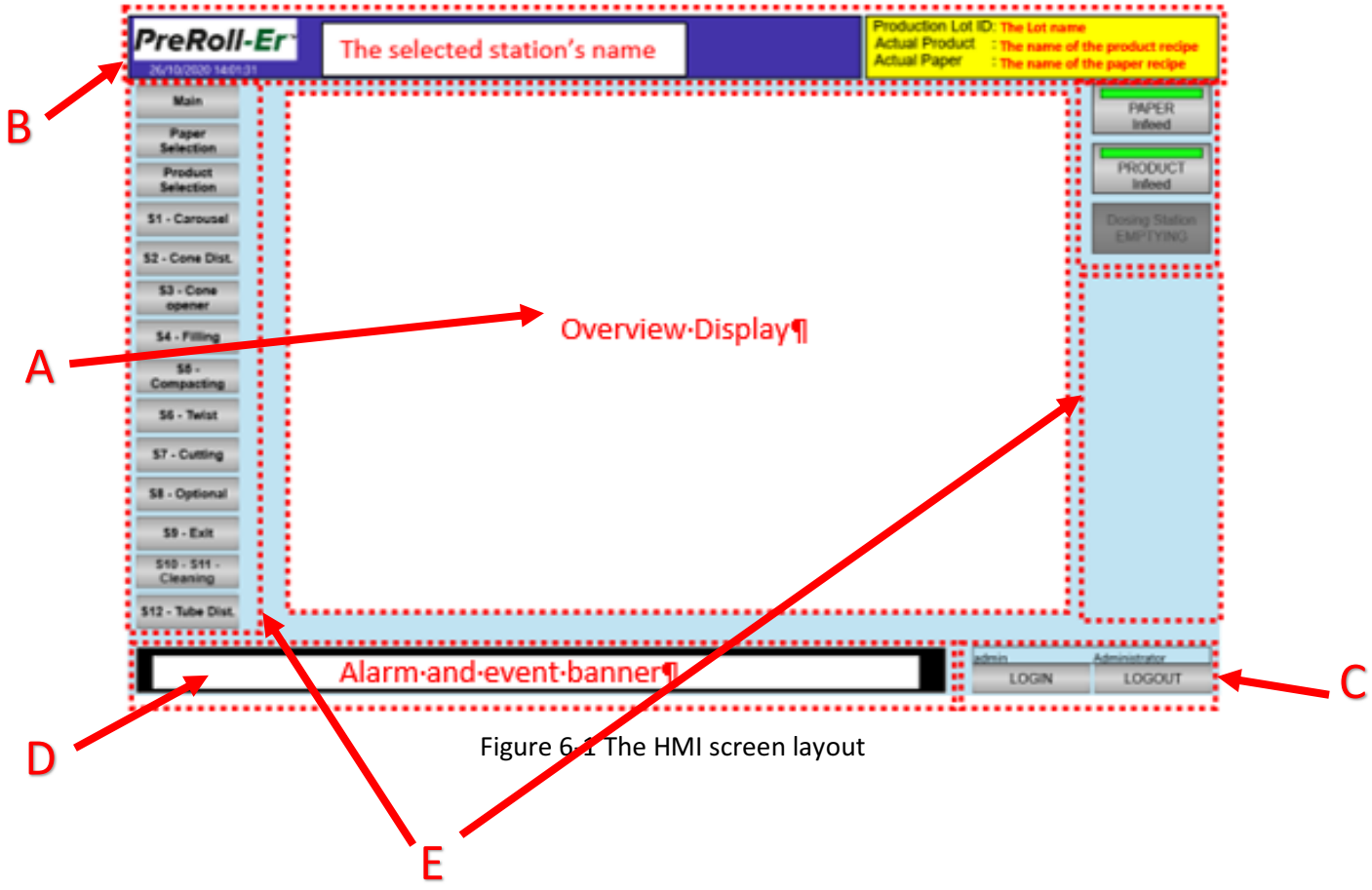


Figure 6-1 The HMI screen layout

(A) The main central section provides an overview of the **PreRoll-Er™** stations operation.

(B) The header contains functionality information such as:

- The running product information (Lot ID, the product name, and the paper name)
- The date & time.
- The name of the displayed station unit or subunit.

(C) Login/Logout button:

- The login will allow credentials to be entered, providing access to different levels of setup for **PreRoll-Er™** parameters.
- Please make sure that only qualified and authorized personnel setup the PreRoll-Er.
- The password should be managed safely and securely, to protect the PreRoll-Er against unauthorized operation, also to ensure that key parameters remain untouched by unauthorized users.
- There is no need to login to operate the PreRoll-Er.
- During the **PreRoll-Er™** runtime, the operator has access to the required information on the HMI in order to operate the machine adequately, but not be allowed to change the product's recipe data or modify any parameters.

- To login, just click on [Login] from any HMI screen, an overlapping screen will be displayed, as shown in Figure 6-2.

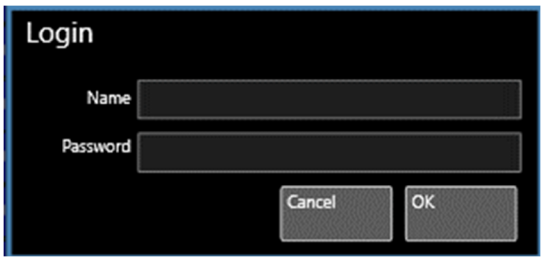


Figure 6-2 HMI Login

Note:
Where the HMI allows for an input of text or values, an on-screen numpad or keyboard will be displayed overlapping the screen.

(D) Alarm and event banner: the alarm summary is continuously displayed; the alarm colors are outlined in the table below.

COLOR CONDITION	STATUS	REQUIRED ACTION
Normal conditions	The **PreRoll-Er™** is Ready to run, or it is running	No action required.
Change of condition	Some value is approaching its limits. [e.g. No more product in Hopper]	The alarm message will remain visible until the message has been acknowledged by the operator and the input representing the fault has been reset.
Dangerous/Hazardous conditions	Indication that a condition has stopped the **PreRoll-Er™**. [e.g. safety doors opened]	The alarm message will remain visible until the message has been acknowledged by the operator and the input representing the fault has been reset.

Note:
The alarms history can be viewed by clicking on the banner where the alarm is displayed (see Figure 6-1)

(E) Button bars, they are located on both sides of the HMI screen.

The button bar located in the left-hand side is used for navigation purposes, going through all the stations and providing access to the primary screen of the station.

The button bar located at the bottom right of the screen, is different from one station to another, unlike the one displayed at the top which is the same for all screens, as shown in the table below.

	OFF/OFF STATUS	DESCRIPTION
PAPER Infeed		The **PreRoll-Er™** is running without paper infeed (can be used during calibration or cleaning)
		The **PreRoll-Er™** is running with paper infeed
PRODUCT Infeed		The **PreRoll-Er™** is running without product infeed (can be used during calibration or cleaning)
		The **PreRoll-Er™** is running with product infeed

6.2.1. Main screen

The main screen, as shown in **Error! Reference source not found.**, contains information on the ongoing production which can be easily observed and analyzed.

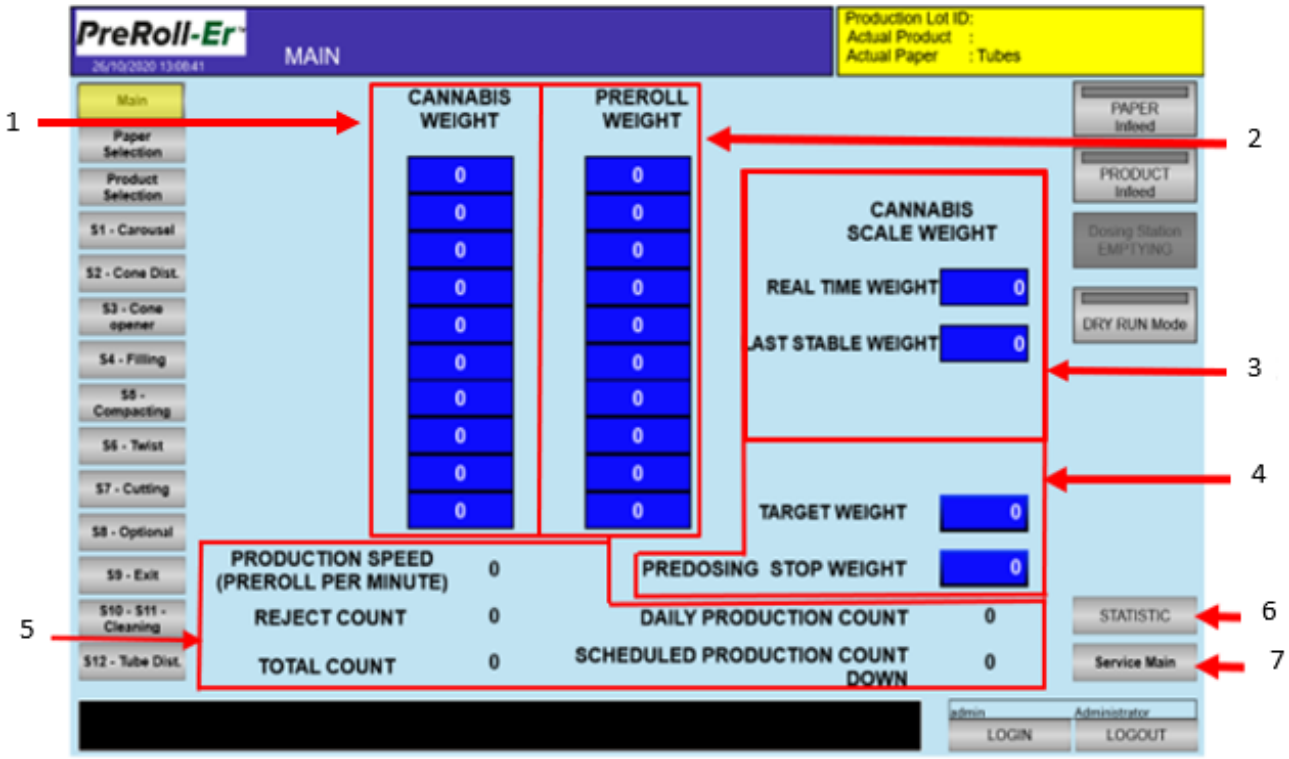


Figure 6-3 HMI Main screen

1- **Cannabis weight [g],** displays the last ten (10) product weight measured on the scale unit at station #4.

2- **Preroll weight [g],** displays the last ten (10) pre-roll weight measured on the scale unit at station #9.

3- **Cannabis scale weight [g],** this section displays the live scale sensor feedback of the ongoing weight verification.

	DESCRIPTION
Real time scale weight [g]	Displays the real time weighing sensor reading.
Last stable weight [g]	Displays the latest stable weight reading that was recorded

4- This section displays the preset parameters that have been establish for the current recipe.

	DESCRIPTION
Target weight [g]	Displays the established target weight of the product to be inserted in the empty cone.
Pre-dosing stop weight [g]	Displays the setpoint for the pre-dosing phase at station 4. Closer the value to the target weight, faster the production run should be. Meanwhile, a high pre-dosing value incurs the risk of getting more overweight products.

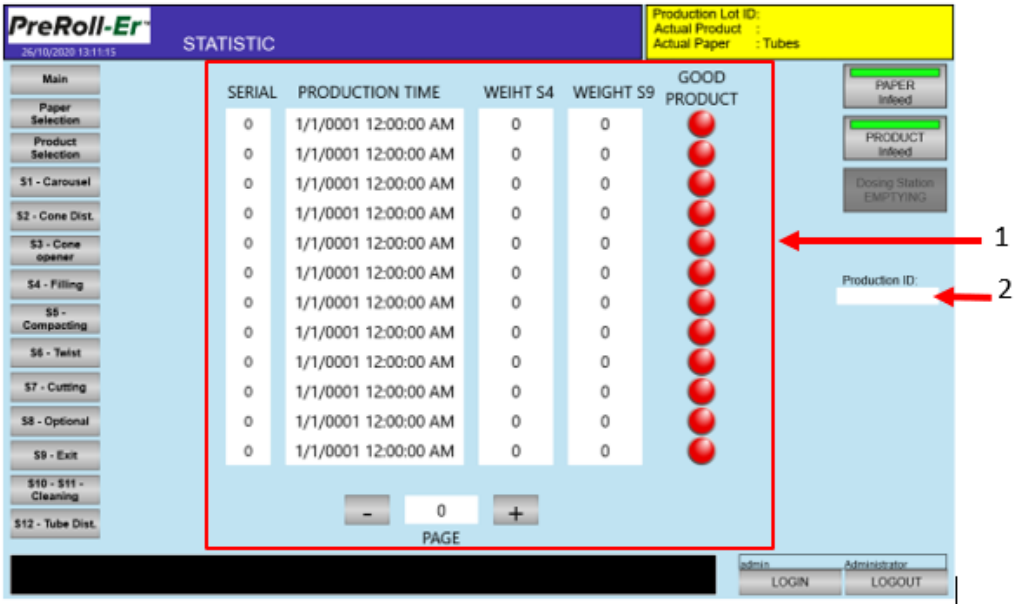
5- This section displays relevant real time statistic data concerning the production run.

		DESCRIPTION
Collected Data	**Production speed (Pre-roll per minute)**	Displays the quantity of pre-rolls produced per one (1) minute
	Reject count	Displays the quantity of pre-roll that have been rejected at the exit station (Station #9)
	Total count	Displays the quantity of pre-rolls that have been approved at the exit station (Station #9)
	Daily production count	Displays the quantity of pre-rolls produced per day
Preset parameters	**Scheduled production count down**	Allows the operator to determine an amount of prerolls to be produced. Machine will stop once the target is met.

6- When you click on Statistic button, it opens a new page. For more details on this sub-page, please see section 6.2.1.1

7- Service Main button will open a new page on the HMI. For more details on this sub-page, please see section 6.2.1.2.

6.2.1.1. Main screen – Statistic



1- This table displays the latest collected production data per page, those data are listed and defined in the table below.

	DESCRIPTION
Serial number	Displays the serial number of each pre-roll
Production time	Displays the exact time and date of the production
Weight S4	Displays the weight capture on the scale of Station #4 (product only)
Weight S9	Displays the weight capture on the scale of Station #9 (product + cone)
Good product	Displays if the pre-roll is rejected or approved, depending on the acceptance criteria established. Red for rejected Green for approved
Page	Displays up to 1666 pages of the latest data. Production data can also be collected using a SD card located inside the HMI panel.

2- **Production ID**: By clicking on it, an on-screen will be displayed overlapping the screen that allows you to enter the name of the production lot ID, you want to view. The name entered will display on the right top of the window [Production lot ID].

6.2.1.2. Main screen – Service Main

1- **Main,** returning to the main menu

2- **Service Mode** is a pushbutton

3- **HMI Setup** is a pushbutton

6.2.2. Paper selection screen

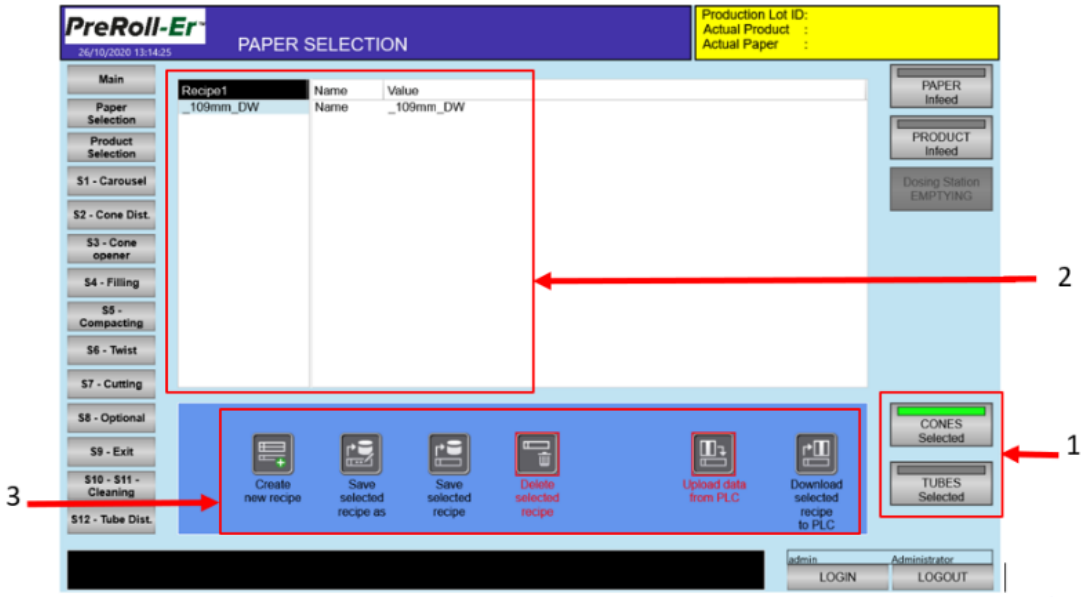
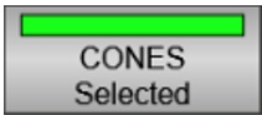
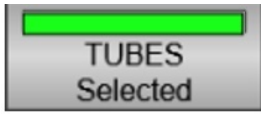
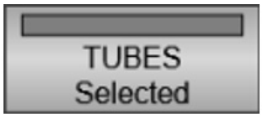


Figure 6-4 Paper selection screen

1. Pushbuttons to select the type of the pre-rolls

	DESCRIPTION	SELECTED STATUS	NON-SELECTED STATUS
Cones selected	Is to select **pre-rolled cones** for production. When highlighted in green, Station 2 will dispense cones on the holders.		
Tubes selected	Is to select **tubes** for production. When highlighted in green, Station 12 will dispense tubes on the holders. Note: Tubes, require to be inserted in the Straight tube feeding station, which is optional[1].		

[1] Not included in the scope of supply of every **PreRoll-Er™.** Please refer to **Error! Reference source not found.** in Chapter 3.

2. This table displays a list of the pre-existing product recipes saved in the system. To choose a recipe to run or to modify, just click on the name of the recipe.

3. Sub-Menu to work on paper recipes.

3.1. **Create new recipe:** By clicking on it, a new screen is displayed as shown in Figure 6-5.

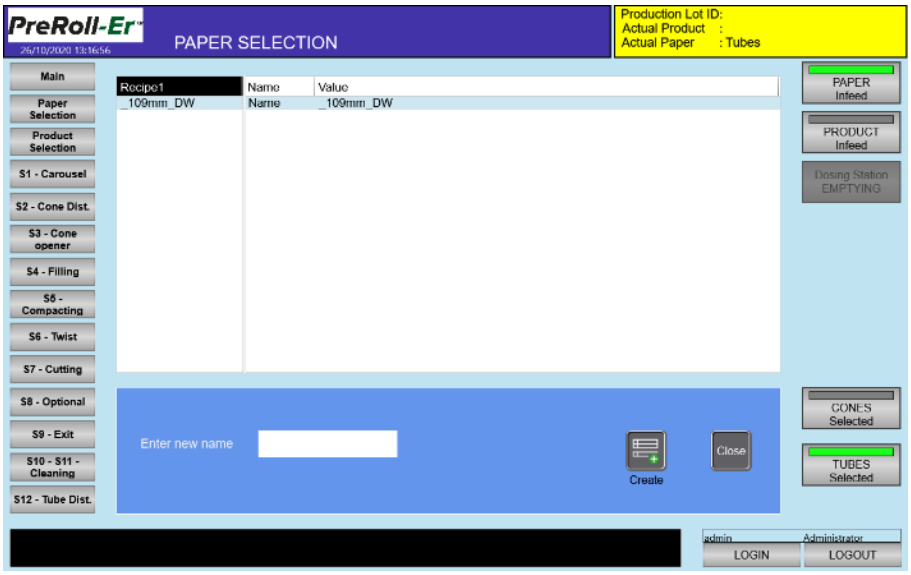


Figure 6-5 Create new recipe screen

Directly enter the name in the box with the white background by clicking in the box, a keyboard will be displayed overlapping the screen.

Click on [Create] button, and the related name will be saved.

3.2. **Save selected recipe as:** By clicking on it, the same screen is displayed as shown in Figure 6-5.

Directly enter the name in the box with the white background by clicking in the box, a keyboard will be displayed overlapping the screen. Click on [Create] button, and the new name will be saved accordingly

3.3. **Save selected recipe:** By clicking on it, the current recipe being edited will be save under the same name.

***Please be aware that this action will override the previous saved information for the recipe, use with care. ***

3.4. **Delete selected recipe:** By clicking on it, the current recipe being edited will be deleted.

***Please be aware that this action will permanently remove the recipe from the list, use with care. ***

3.5. **Upload data from PLC:** By clicking on it, the current recipe being edited will be replaced with the latest copy of the recipe that was downloaded in the PLC. All ongoing changes to the recipe being edited will be lost.

***Please be aware that this action will permanently remove the currently edited recipe, use with care. ***

3.6. **Download selected recipe to PLC:** By clicking on it, the current recipe being edited will override the previously saved recipe in the PLC.

***Please be aware that this action will permanently remove the last downloaded recipe from the PLC, use with care. ***

6.2.3. Product selection screen

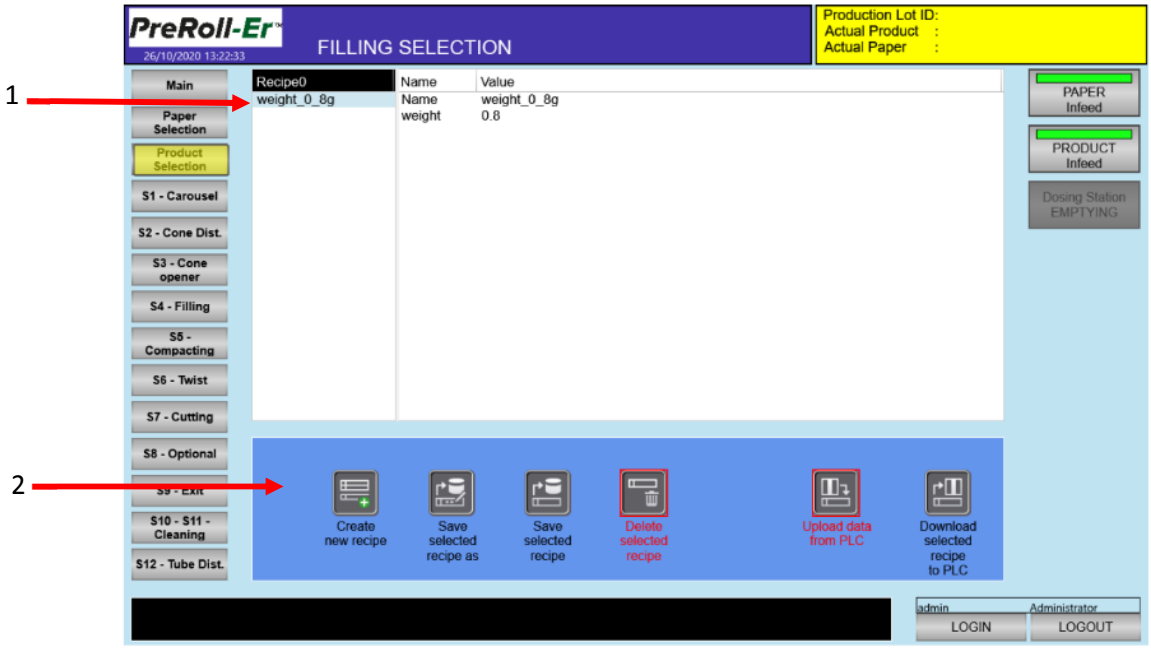


Figure 6-6 Product selection screen

1. **Main screen:** This screen displays a list of the pre-existing saved product recipes as shown in Figure 6-6 above. Simply click on the name of the recipe to select it.

2. Sub-Menu to work on product recipes.

2.1. **Create new recipe:** By clicking on it, a new screen is displayed as shown in Figure 6-7.

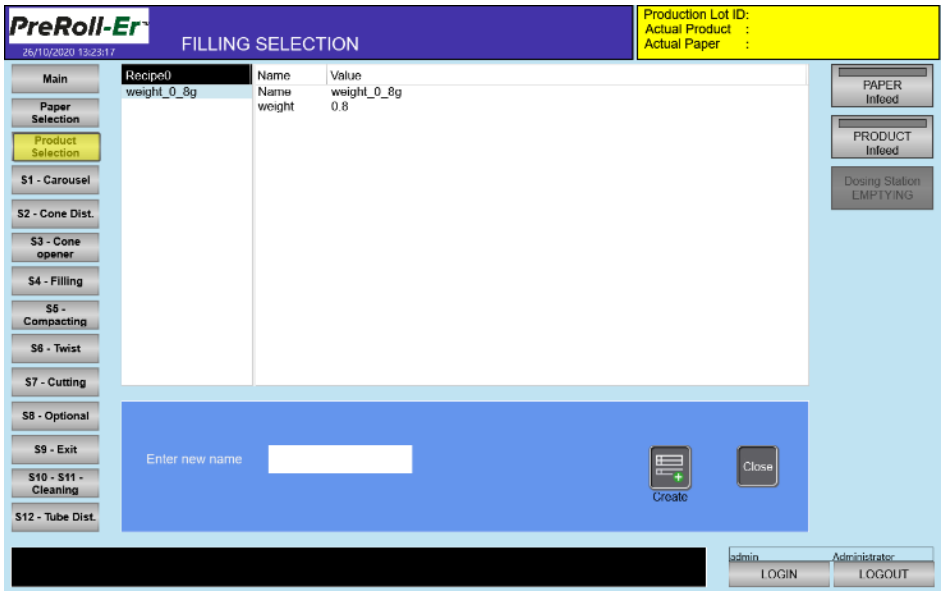


Figure 6-7 Create new recipe screen

Directly enter the name in the box with the white background by clicking in the box, a keyboard will be displayed overlapping the screen.

Click on [Create] button, and the related name will be saved.

2.2. **Save selected recipe as:** By clicking on it, the same screen is displayed as shown in Figure 6-7.

Directly enter the name in the box with the white background by clicking in the box, a keyboard will be displayed overlapping the screen.

Click on [Create] button, and the new name will be saved accordingly.

2.3. **Save selected recipe:** By clicking on it, the current recipe being edited will be save under the same name.

***Please be aware that this action will override the previous saved information for the recipe, use with care. ***

2.4. **Delete selected recipe:** By clicking on it, the current recipe being edited will be deleted.

***Please be aware that this action will permanently remove the recipe from the list, use with care. ***

2.5. **Upload data from PLC:** By clicking on it, the current recipe being edited will be replaced with the latest copy of the recipe that was downloaded in the PLC. All ongoing changes to the recipe being edited will be lost.

***Please be aware that this action will permanently remove the currently edited recipe, use with care. ***

2.6. **Download selected recipe to PLC:** By clicking on it, the current recipe being edited will override the previously saved recipe in the PLC.

***Please be aware that this action will permanently remove the last downloaded recipe from the PLC, use with care. ***

6.2.4. S1 – Carousel screen

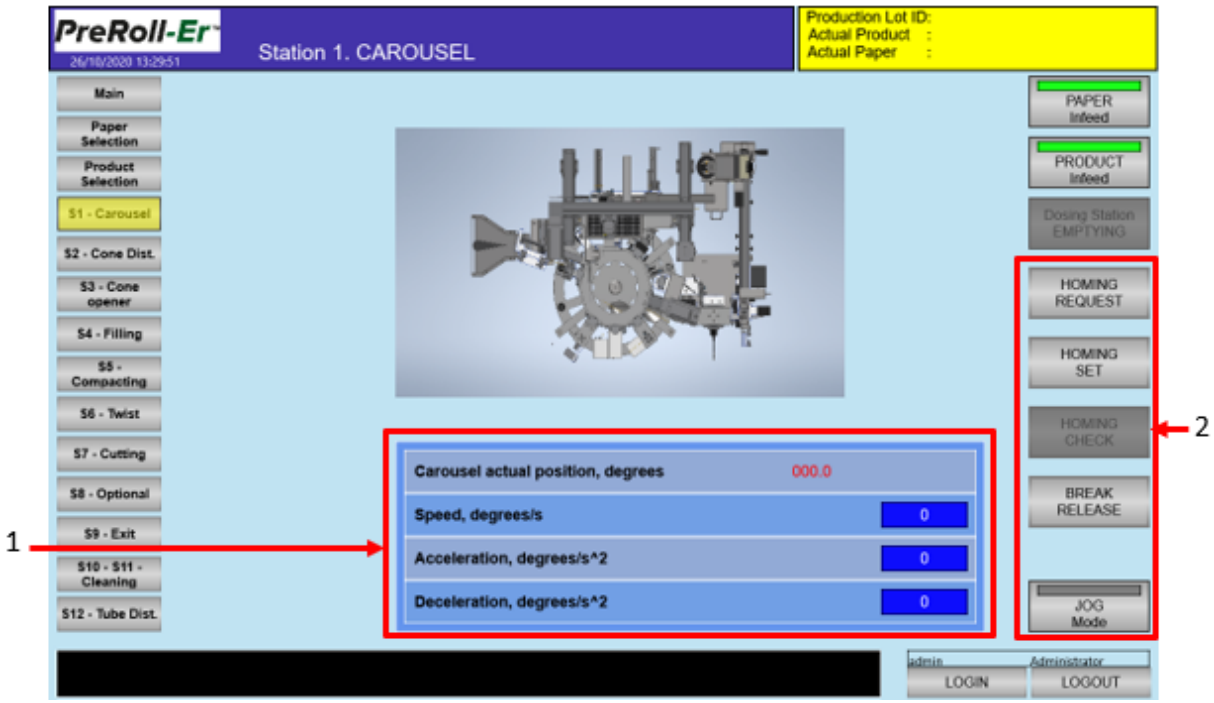
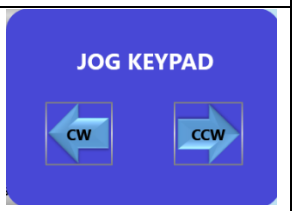


Figure 6-8 S1 - Carousel screen

1- This table displays collected data, and preset parameters for the carousel, and they are defined in the table below.

		DESCRIPTION
Collected Data	**Carousel actual position, degrees**	Displays the carousel current position.
Pre-set parameters	**Speed, degrees/S**	Displays the preset speed value the carousel rotates.
	Acceleration, degrees/S^2	Displays the preset acceleration value the carousel accelerates.
	Deceleration, degrees/S^2	Displays the preset deceleration value the carousel decelerates.

2- The available pushbuttons are used to adjust and align the carousel automatically as outlined below.

	Description
HOMING REQUEST	Is used to position the carousel at the correct position, in order for the push rod to be precisely under the cone holders.
HOMING SET	Is used to reset the carousel actual position degrees to Zero. If homing position is lost, please the carousel very precisely at the right position, test it by moving a push-rod upwards. Once confirmed, click on **HOMING REQUEST**
HOMING CHECK	Is used to check if the carousel is well aligned.
BREAK RELEASE	Allows, to rotate the carousel manually in either direction. Can be used, when changing the cone-holders, or during cleaning. Note: Can be used only when the E-Stop button is pushed.
JOG MODE	Allows to JOG the carousel CW (clockwise) or CCW (Counter Clockwise). By clicking on the button, the keyboard arrow keys, as pictured to the right; will be displayed overlapping the bottom left-hand side of the screen. 

6.2.5. S2 – Cone distributer screen

This screen displays relevant data and parameters of the paper distribution located on Station 2. The right-side bar displays four (4) pushbuttons that can be selected, to access the sub-section of Station 2.

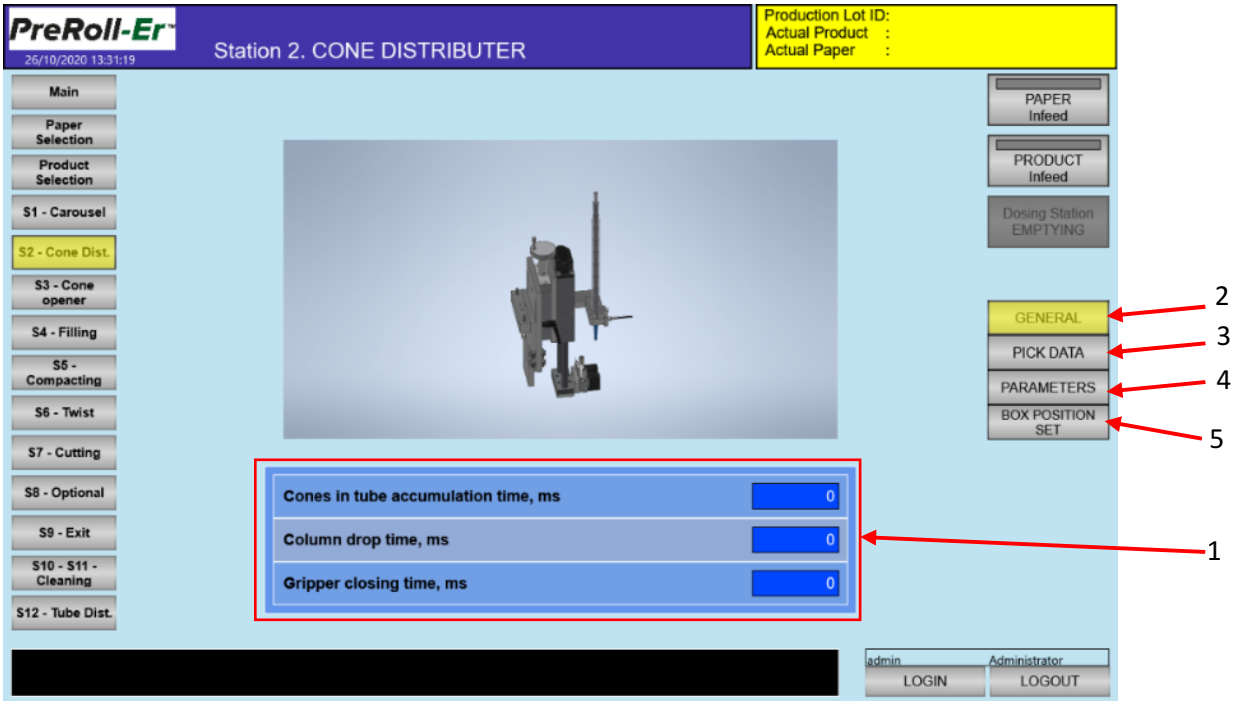


Figure 6-9 S2 - Cone distributer screen

1- This table displays preset parameters for different units of this station, those parameters are listed and defined in the table below.

	DESCRIPTION
Cones in tube accumulation time [ms]	Time allowed after the cones are dropped in the loading funnel before verifying if they are present.
Column drop time [ms]	Timer to make sure the cone drops at the right spot before being pulled down by the gripper.
Gripper closing time [ms]	Determine the speed of gripper to go from open to close position.

2- **General:** Allows the user to comeback to the main page of the Station 2 Cone Distributor.

3- **Pick Data:** is a pushbutton, by clicking on it, a new screen is displayed, please refer to section 6.2.5.1.

4- **Parameters:** is a pushbutton, by clicking on it, a new screen is displayed, please refer to section 6.2.5.2.

5- **Box Position set:** is a pushbutton, by clicking on it, a new screen is displayed, please refer to section 6.2.5.3.

6.2.5.1. S2 – Pick Data Screen

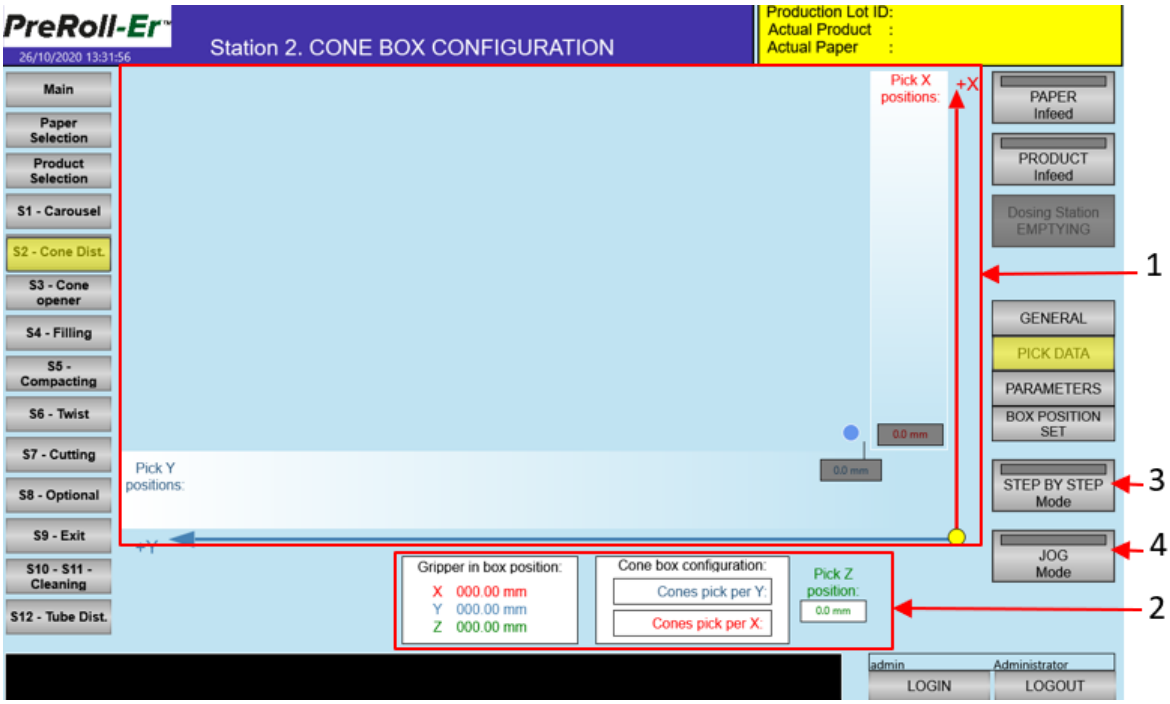
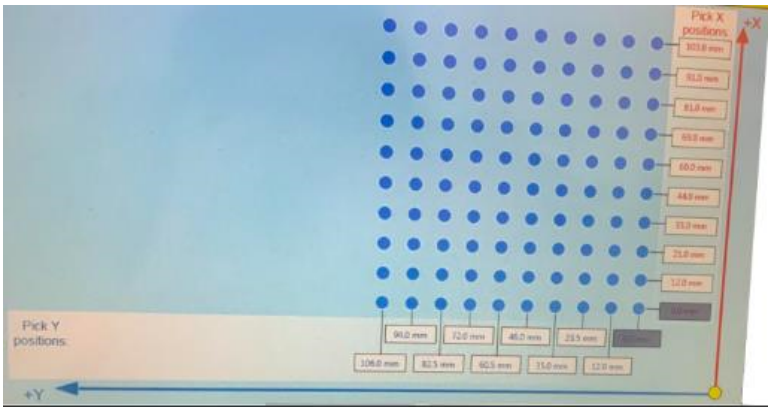


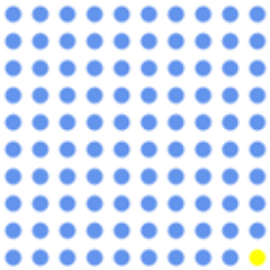
Figure 6-10 S2 – Pick data screen

1- **Main table:** Displays the X and Y coordinates of each row of cones on the empty cone cardboard base, as shown in the example pictured below:



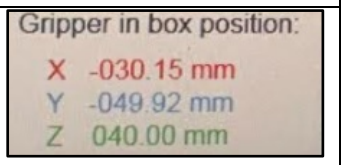
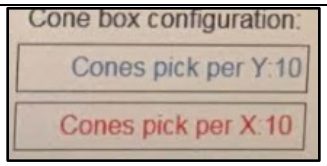
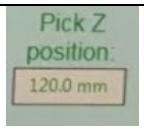
Note:

- Coordinates are established, for each different model and size of pre-rolled cones.
- Each hole in the pre-rolled cardboard base, is identified by an ordered pair of (x-coordinate, y-coordinate).
- The origin is the yellow circle, as pictured below.



Most of pre-rolled cardboard base models comes in 10 X 10 holes configuration.

2- **Position tables:** Displays real time collected data from the Pick & Place robotic unit.

	DESCRIPTION	EXAMPLES
Gripper in box position	Displays the gripper coordinates (X, Y, Z) from its home position.	
Cone box configuration	Displays the cone cardboard base configuration.	
Pick Z position	Displays the Z coordinate (height) of the gripper to pick up the row of the cones from the cardboard base.	

3- **Step by Step mode:** is a pushbutton that enables the pick & place to move step by step. This is a great troubleshooting tool when changing brands or type of cones.

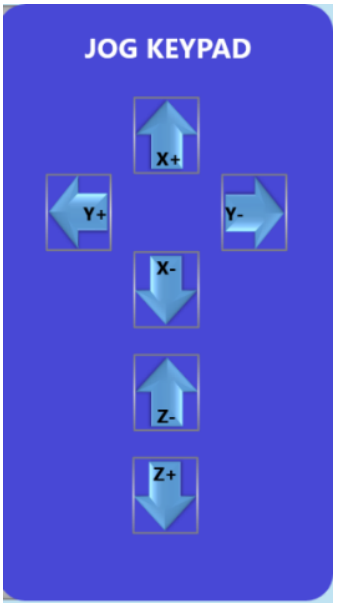
4- **Jog mode:** is a pushbutton that allows the user to manually move the robotic pick & place.

By clicking on the JOG Mode button, the keyboard arrow keys, as pictured to the right; will be displayed overlapping the left-hand side of the screen.

Pressing the [X+] or [X-] keyboard arrows jogs the gripper up and down along the X-axis.

Using the [Y+] and [Y-] arrow keys jogs the gripper left and right along the Y-axis.

Pressing the [Z-] or [Z+] keyboard arrows jogs the gripper up and down along the Z-axis.



6.2.5.2. S2 – Parameters Screen

This table displays the coordinates of the gripper (X, Y, Z) (as shown below). Those coordinates are either feedbacked data, or preset parameters.

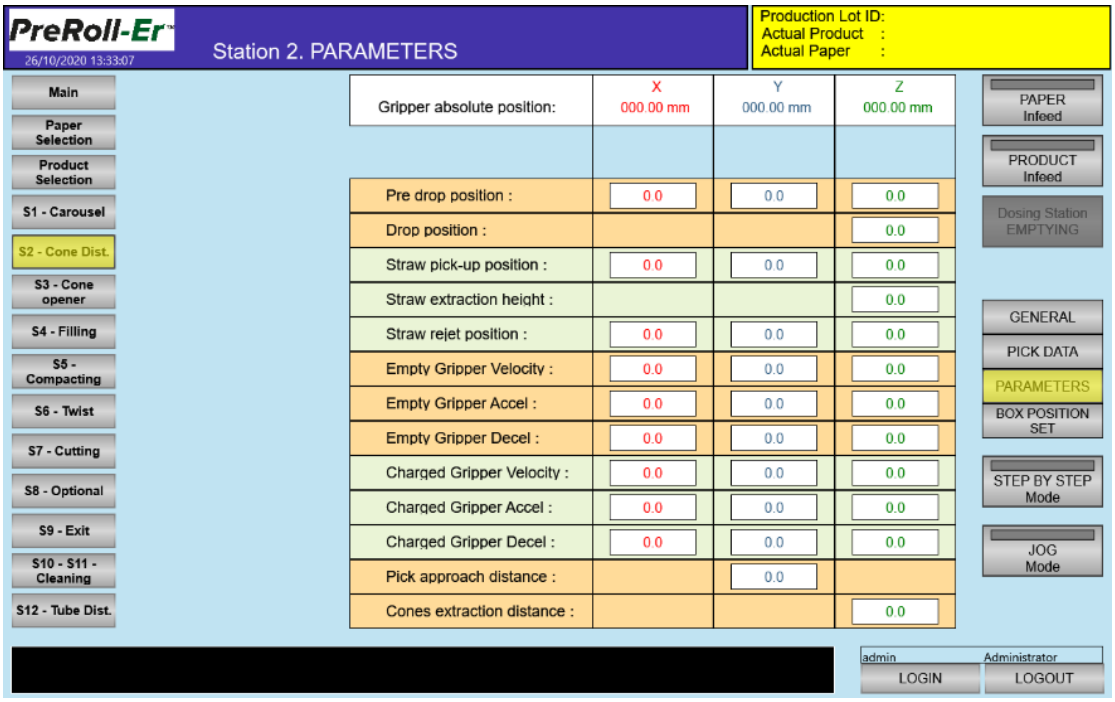
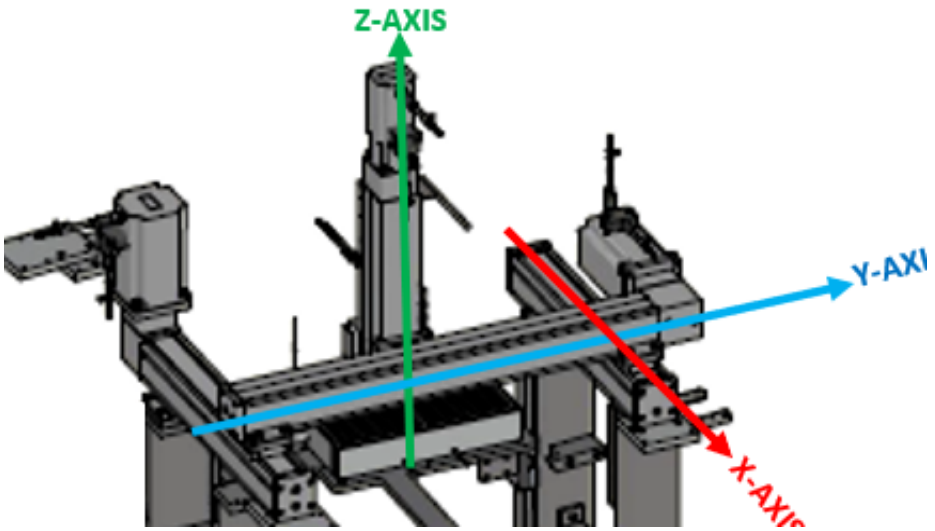


Figure 6-11 S2 – Parameters screen

Note: The 3-axis of the pick and place robot in station #2 are established as pictured below.



The first row of the table displays the actual sensor reading, as shown in the example below.

Gripper absolute position	X 0.42.01 mm	Y 015.99 mm	Z 040.00 mm

The remaining rows of the table shown in Figure 6-11 display the preset coordinates for the 3-axis pick and place robot.

Please find below more clarifications on the content of the main table with an example taken from a machine under test.

	DESCRIPTION	EXAMPLE		
		X [mm]	Y [mm]	Z [mm]
Pre-drop position	The coordinates of the 3-axis (X, Y, Z) that position the gripper just above the funnel in the distribution unit.	42.0	16.0	40.0
Drop position	The Z axis coordinate where the robotic gripper will move to clear the row of cones recently dropped.			100
Straw pick-up position	The PreRoll-Er offers a feature for the robot to remove the straw located on top of the last cone. This shows the coordinates of the 3-axis (X, Y, Z) where the gripper will be positioned and in open status, around the straw of the cone that was dropped in the funnel.	45.0	12.0	110
Straw extraction height	The coordinates of the 2-axis (Y, Z) to which the gripper will close to grasp the straw from cone's top row.		12.0	10
Straw reject position	The coordinates of the 2-axis (X, Z) to which the gripper will open and drop the straw.	180.0		20
Empty gripper velocity	Maximum speed (for each axes) of the robot movement while not carrying any cones	2000.0	12.0	2000.0
Empty gripper Accel.	Timer to go from stopped to maximum speed (for each axes) while not carrying any cones	1000.0	2000.0	1000.0
Empty gripper Decel.	Timer to go from maximum speed to stopped (for each axes) while not carrying any cones	5000.0	1000.0	5000.0
Charged gripper velocity	Maximum speed (for each axes) of the robot movement while carrying a row of cones	800.0	5000.0	800.0
Charged gripper Accel.	Timer to go from stopped to maximum speed (for each axes) while carrying a row of cones	1000.0	800.0	1000.0
Charged gripper Decel.	Timer to go from maximum speed to stopped (for each axes) while carrying a row of cones	1000.0	1000.0	1000.0
Pick approach distance	Defines how close the robot gets to its pick position of the row of cones before doing the final approach.		20.0	
Cone extraction distance	Defines how high the row of cones is lifted from the cardboard box before going into the funnel.			70.0

6.2.5.3. S2 – Box position set screen

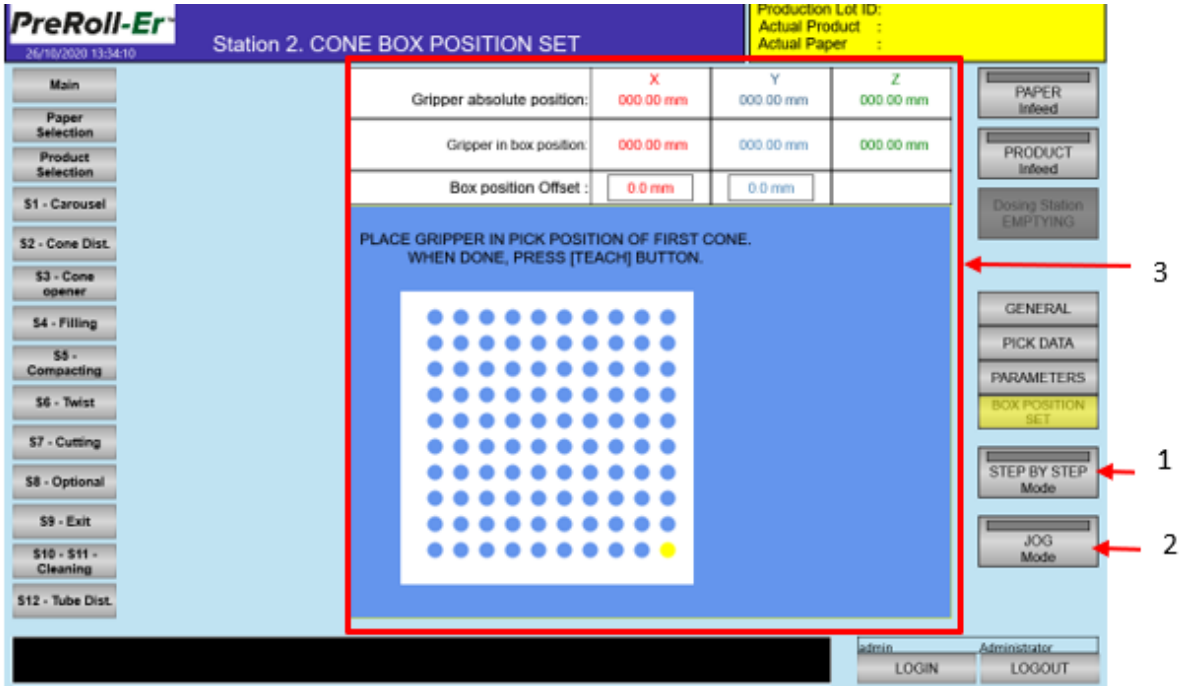


Figure 6-12 S2 – Box position set

1- **Step by step mode:** is a pushbutton to run this section slowly by pressing the button to generate a single movement.

2- **JOG mode:** is a pushbutton to allow manual control in JOG mode to confirm positioning.

3- This table displays the real time coordinates of the gripper (X, Y, Z), while it is moving above the cone box.

	DESCRIPTION	EXAMPLE		
		X [mm]	**Y** [mm]	**Z** [mm]
Gripper absolute position	Displays the actual real time position of the gripper.	0.42.01	015.99	040.00
Gripper in box position	Displays the actual position of the gripper within the set parameters of the cone box.	-030.15	-049.92	040.00
Box position Offset	Offset positioning of the cone box versus the robot absolute position.	72.2	65.9	

6.2.6. S3 – Cone Opening screen

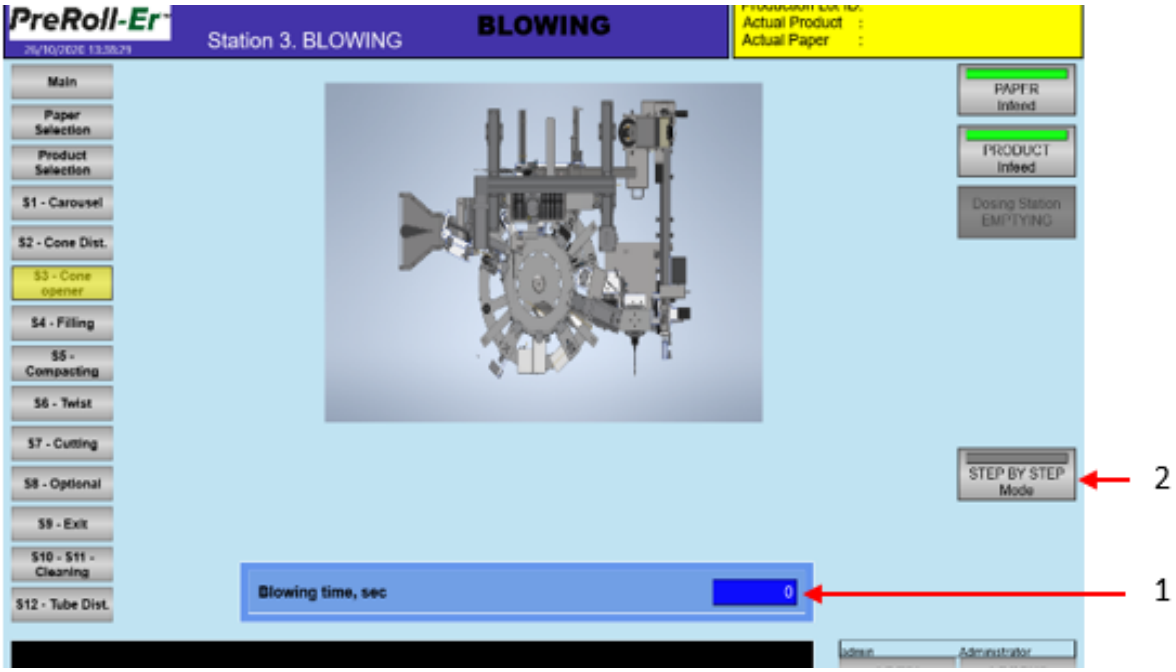


Figure 6-13 Cone opener screen

1- Displays the blowing preset timer in seconds.

2- **Step By step Mode**, is a pushbutton, by clicking on it, allows to run the cone opener unit step by step, and not automatically, by clicking on the button for every step.

6.2.7. S4 – Station 4 main screen

Station 4 represents the core of the Preroll-Er machine. It is responsible for the material handling from the operator, up to the empty cones. This screen gives access to the five (5) sub-sections of the Station 4, with the addition of a step-by-step mode selector, as shown in Figure 6-14.

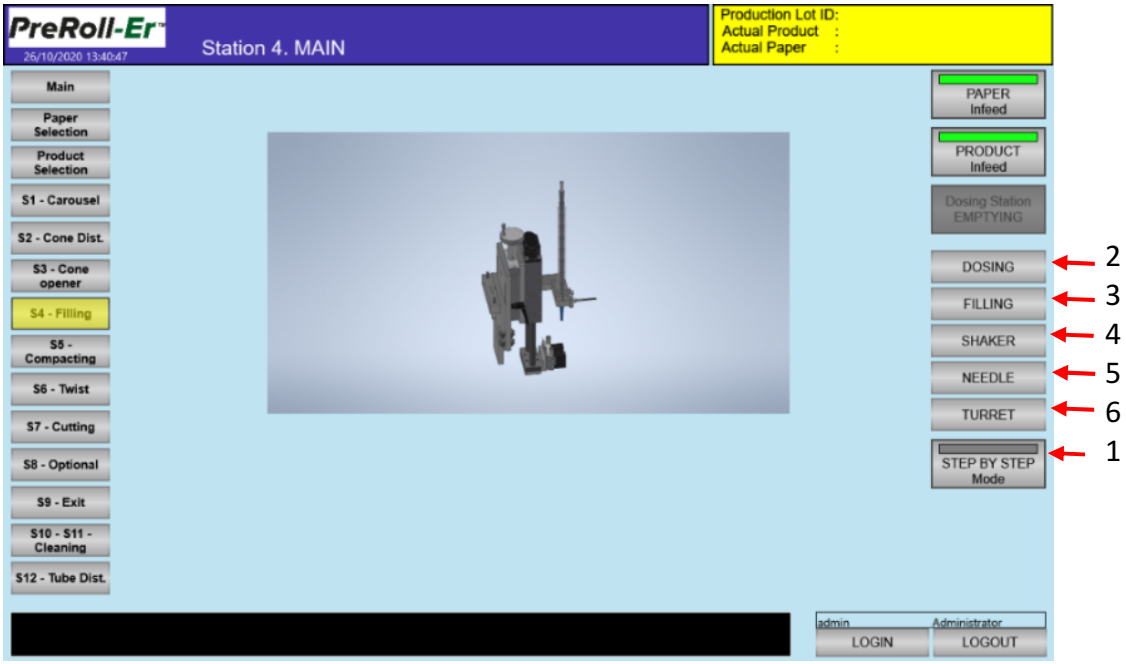


Figure 6-14 St.4 - Filling station main screen

1- **Step By Step Mode,** is a pushbutton, that allows to run station #4, step by step and not automatically, by clicking on the button for every step.

2- **Dosing,** is a pushbutton, by clicking on it, a new screen is displayed, please refer to **Dosing screen** found in section 6.2.7.1.

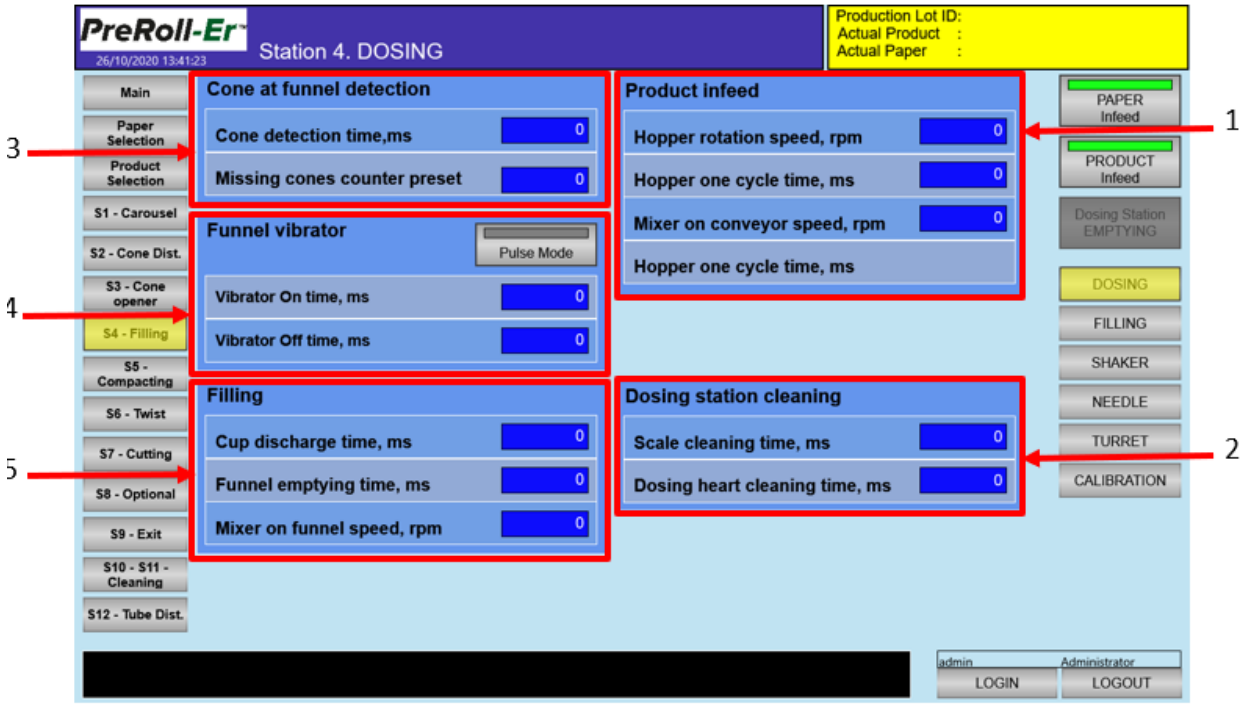
3- **Filling** is a pushbutton, by clicking on it, a new screen is displayed, please refer to **Error! Reference source not found.** found in section 6.2.7.2.

4- **Shaker,** is a pushbutton, by clicking on it, a new screen is displayed, please refer to **Error! Reference source not found.** found in section 6.2.7.3.

5- **Needle,** is a pushbutton, by clicking on it, a new screen is displayed, please refer to **Error! Reference source not found.** found in section 6.2.7.4.

6- **Turret,** is a pushbutton, by clicking on it, a new screen is displayed, please refer to **Error! Reference source not found.** found in section 0.

6.2.7.1. Dosing screen



1- **Product infeed:** displays the hopper preset parameters, those parameters are defined in the table below.

	DESCRIPTION
Hopper rotation speed [rpm]	Displays the preset rotation speed value at which the paddle wheel runs inside the Hopper.
Hopper one cycle time [ms]	Displays the preset amount of time the Hopper operates during one cycle.
Mixer on conveyor speed [rpm]	Displays the preset speed value at which the mixer runs to prevent bridging at the outlet.

2- **Dosing station cleaning** displays the preset parameters for the cleaning of the dosing station, those parameters are defined in the table below.

	DESCRIPTION
Scale cleaning time [ms]	Displays the preset amount of time the scale us cleaned using compressed air.
Dosing heart cleaning time [ms]	Displays the preset amount of time the dosing heart is cleaned using compressed air.

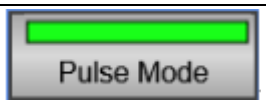
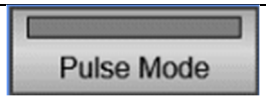
3- **Cone at funnel detection** displays the funnel preset parameters, those parameters are defined in the table below

	DESCRIPTION
Cone detection time [ms]	Displays the preset amount of time the sensor waits at the funnel neck before sending a missing cone signal.
Missing cones counter pre-set	Displays a preset value of how many fault detections on missing cones must be reached before a missing cones Fault Signal is generated on the HMI.

4- **Funnel vibration** displays the funnel shaking rod preset parameters, those parameters are displayed only if the pulse mode is enabled. They are defined in the table below.

	DESCRIPTION
Vibration ON time [ms]	Displays the preset amount of time, the funnel shaking rod remains in ON status.
Vibration OFF time [ms]	Displays the preset amount of time, the funnel shaking rod remains in OFF status.

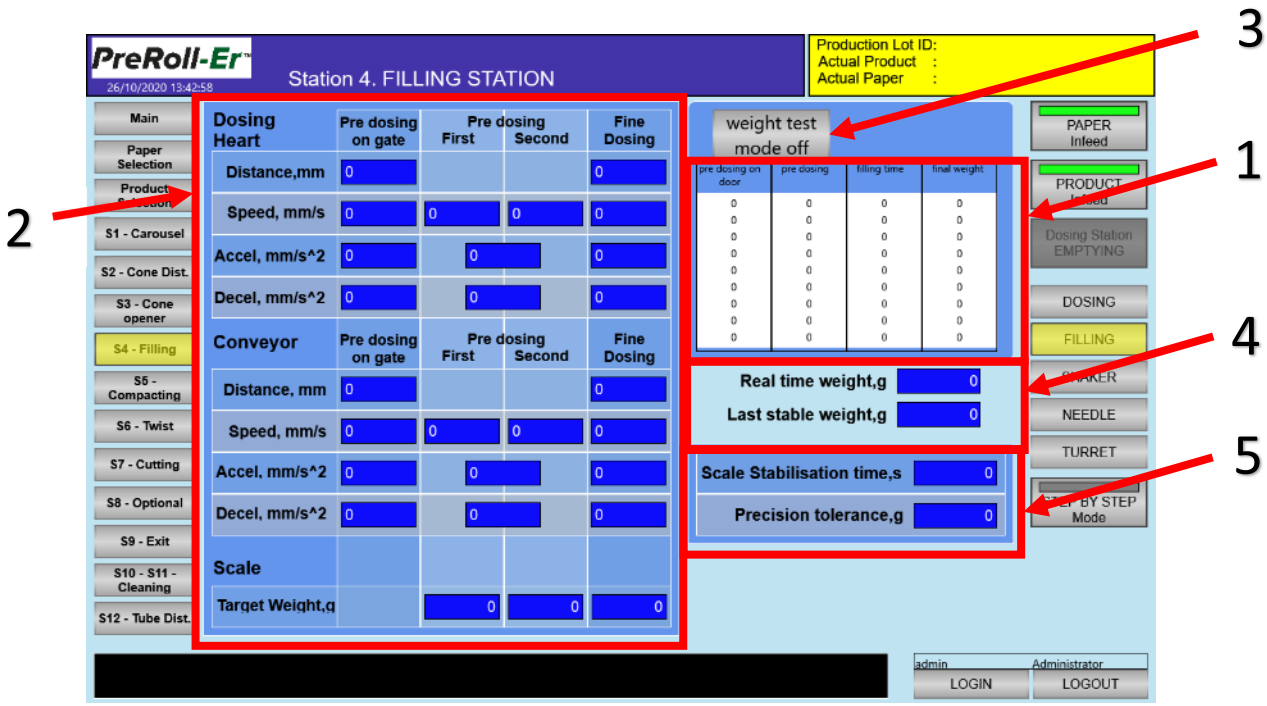
- **Pulse Mode**, is a pushbutton, the two (2) possible status are shown in the table below.

	ON/OFF STATUS	DESCRIPTION
Pulse Mode		The pulse mode is enabled
		The pulse mode is not desabled

5- **Filling:** displays the preset parameters for the different units of station #4, those parameters are listed and defined in the table below.

	DESCRIPTION
Cup discharged time [ms]	Displays the preset amount of time the transport cup remains in the discharge position.
Funnel emptying time [ms]	Displays the preset amount of time the funnel vibrates to allow all the material to flow down the pre-roll during the filling process.
Mixer on funnel speed [rpm]	This feature is currently inactive.

6.2.7.2. Filling screen



1- This table displays to nine (9) latest sensors readings, those values are listed and defined as following:

- **Pre-dosing on door** displays the weight of the cannabis that was on the sliding gate.
- **Pre-dosing** is the measured weight during the second stage of the pre-dosing.
- **Filling Time**: Displays the counted time for the three steps of the filling process (Pre-dosing on gate, Pre-dosing, and the Fine dosing).
- **The final weight:** displays the product weight that was transferred to the pre-roll.

2- This table displays the pre-set parameters for the weighing units, those parameters are listed and defined in the table below.

		DESCRIPTION	Pre dosing on gate	Pre dosing		Fine dosing
				1st	2nd	
Dosing heart	**Distance [mm]**	Displays the preset linear distance at which the dosing heart travels at each step.	☒			☒
	Speed [mm/s]	Displays the preset speed value, at which the dosing heart runs at each step.	☒	☒	☒	☒
	Accel, [mm/s²]	Displays the preset acceleration value at which the dosing heart speeds up at each step.	☒	☒		☒
	Decel, [mm/s²]	Displays the preset deceleration value at which the dosing heart slows down at each step	☒	☒		☒
Conveyor	**Distance [mm]**	Displays the preset linear traveled distance at which the conveyor travels at each step.	☒			☒
	Speed [mm/s]	Displays the preset acceleration value at which the conveyor speeds up at each step.	☒	☒	☒	☒
	Accel, [mm/s²]	Displays the preset acceleration value at which the conveyor speeds up at each step.	☒	☒		☒
	Decel, [mm/s²]	Displays the preset deceleration value at which the conveyor slows down at each step	☒	☒		☒
The scale unit	**Target weight [g]**	Displays the target weight to reach for each step.		☒	☒	☒

3. **Weight test mode off**: it is a pushbutton that activates a special mode on the machine that allows fine-tuning of the weight control sequence.

   With the weight test mode ON, it allows you to adjust the dosing heart and the conveyor parameters as per the following guidelines:

   3.1. **Pre-dosing on gate:** this first step determines a certain weight of cannabis per linear distance moved.

- During this first step, the sliding gate in closed position, once it opens, the weight will be displayed in table (1) as shown in **Error! Reference source not found.**.

- The main parameter to preset, is the linear distance moved; **Distance [mm],** for:
  - The dosing-gears
  - The conveyor

  This value is preset by viewing on which velocity **Speed [mm/s]**, the target pre-dosing weight is achieved.

  - By knowing the distance and the speed, we compute and determine the **Accel, [mm/s^2] and Decel, [mm/s^2]** values**.**

   3.2. **Pre-dosing this second step:** determines a target pre-dosing weight, it is done in two (2) steps, with two (2) different speeds, consequently, with two (2) different target weights.

- In this second step, the sliding gate is in the open position, the weight is displayed in table (1), the displayed weight relates to the second target weight.

- The main parameters to pre-set for the first and the second step at this pre-dosing stage, are the speed values **Speed [mm/s]**; for:
  - The dosing-gears
  - The conveyor

3.3. **Fine dosing:** this step is similar as the first one (Pre-Dosing on gate), it determines a certain weight of cannabis per linear distance moved. This weight value is to achieve the final target weight. the weight will be displayed in table (1).

- During this step, the sliding gate remains open until the target weight is achieved.

- The main parameter to pre-set, is the linear distance moved; **Distance [mm],** for:
  - The dosing-gears
  - The conveyor

  This value is pre-set by viewing on which velocity **Speed [mm/s]**, the target pre-dosing weight is achieved.

- By knowing the distance and the speed, we compute, and we determine the **Accel, [mm/s^2] and Decel, [mm/s^2]** values**.**

4. This table provides a feedback of the latest product that was weighted, it showcases the same values that are shown on the main page (see Figure 6-3).

5. This table displays the scale preset parameters as defined in the table below.

	DESCRIPTION
Scale stabilisation time [s]:	Displays the amount of time the system waits for the scale to stabilize before recording a measurement.
Precision tolerance [g]:	Displays the preset tolerance value.

6.2.7.3. Shaker screen

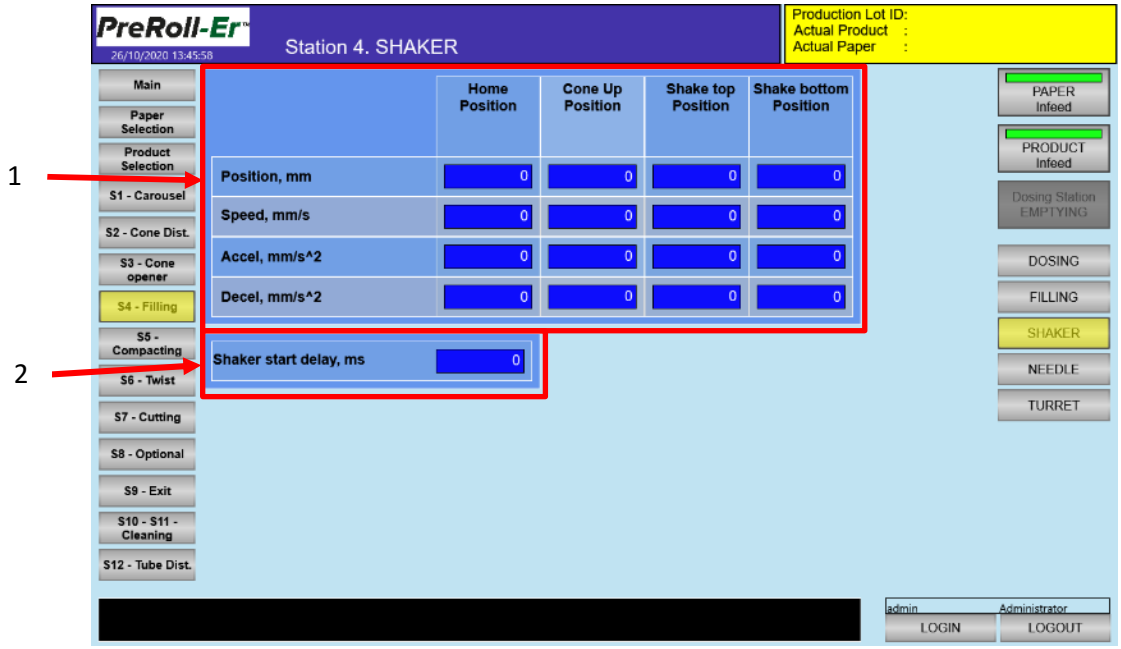


Figure 6-15 Shaker screen

1- This table displays preset parameters for the pushing rod for each of the following position:

- **Home position**: the initial position when the rod is in OFF status.
- **Cone Up position**: when the rod is activated, pushing up the pre-roll cone and sliding it into the funnel neck.
- **Shake top position**: the highest position to reach during the shaking mode.
- **Shake bottom position**: The lowest position during the shaking mode.

The displayed parameters are preset to reach the above listed positions. those parameters are defined as following:

- **Position [mm]:** for each position, the rod is positioned at the displayed value.
- **Speed [mm/s]:** for each position, the rod runs for the displayed speed value.
- **Accel [mm/s^2]:** for each position, the rod speeds up for the displayed acceleration value.
- **Decel [mm/s^2]**: for each position, the rod slows down for the displayed deceleration value.

2- Shaker start delay [ms]: The rod, shaking mode starts at this displayed time value to allow more (or less) product to fall in the pre-roll.

6.2.7.4. Needle screen

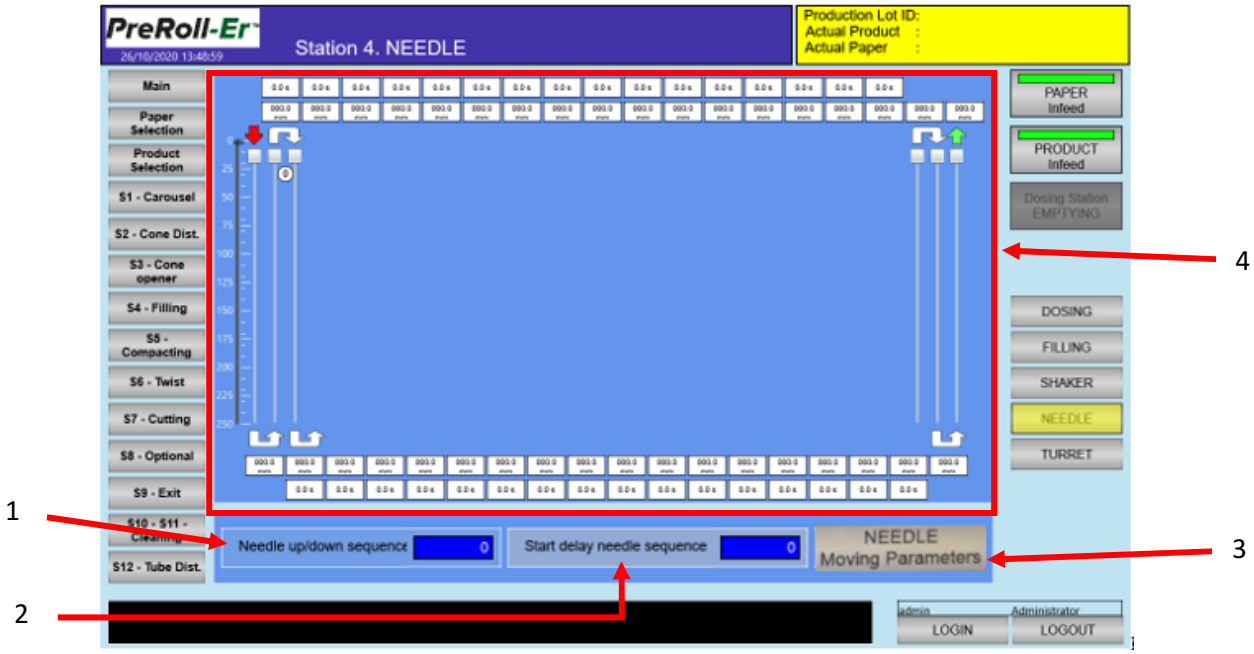
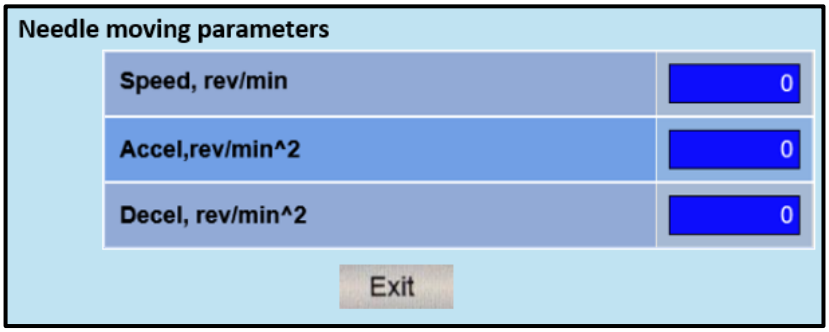


Figure 6-16 Needle screen

1- **Needle up/down sequence:** displays the number of up and down movements the needle executes per one cycle (or pre-roll).

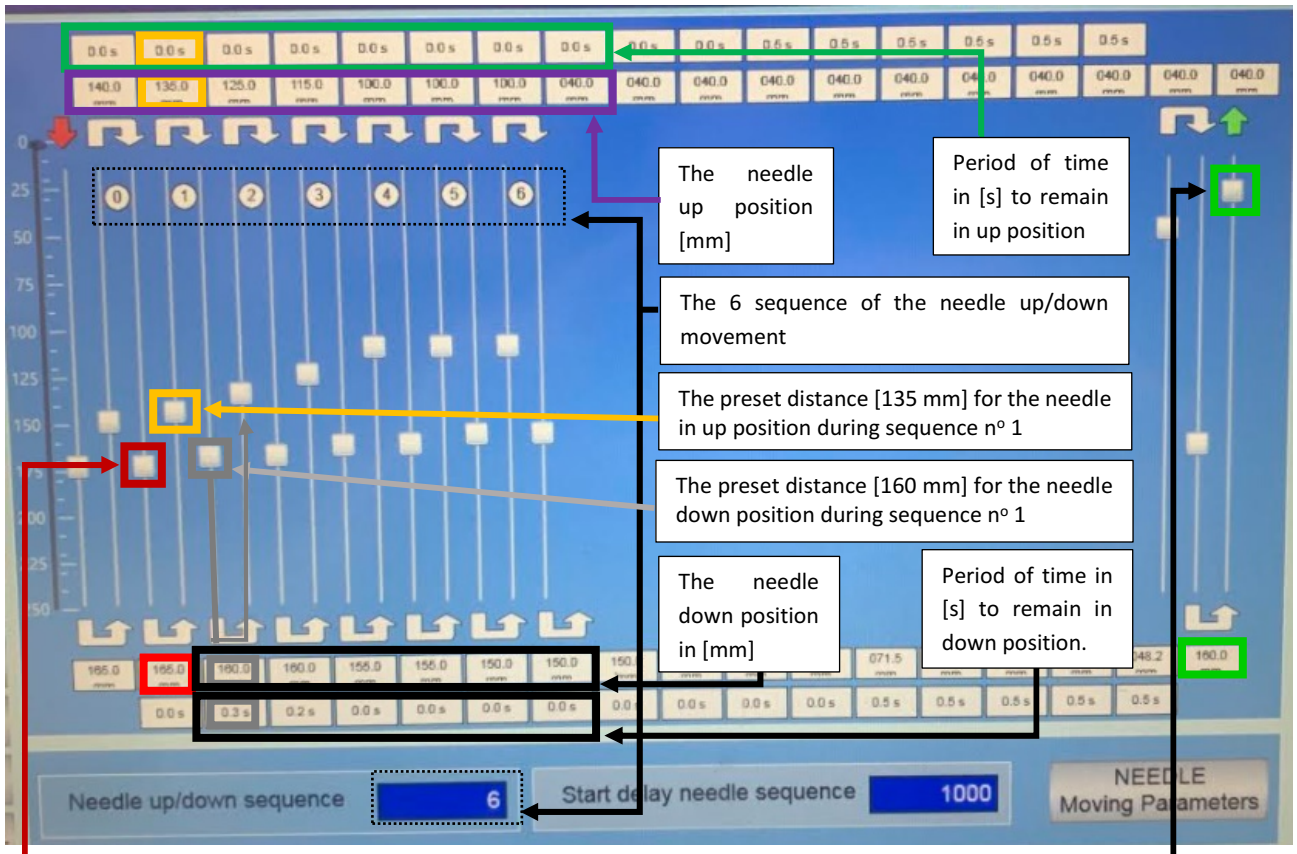
2- **Start delay needle sequence:** displays the amount of time the needle waits after the cannabis has been inserted into the funnel, to start the up/down cycle.

3- **Needle moving parameters:** is a pushbutton, by **c**licking on it, a table will be displayed overlapping the bottom side of the screen, as shown below, this table displays the needle pre-set moving parameters.



- **Speed [rev/m],** displays the preset speed value the needle's movement.
- **Accel [rev/m^2],** displays the preset acceleration value of the needle while speeding up.
- **Decel [rev/m^2],** displays the preset deceleration value the needle while slowing down.
- **Exit,** is a pushbutton to close the displayed screen.

4- This table displays the needle position, and the time for each up and down cycles, during the preset sequence. Those parameters are defined and outlined in the example below:



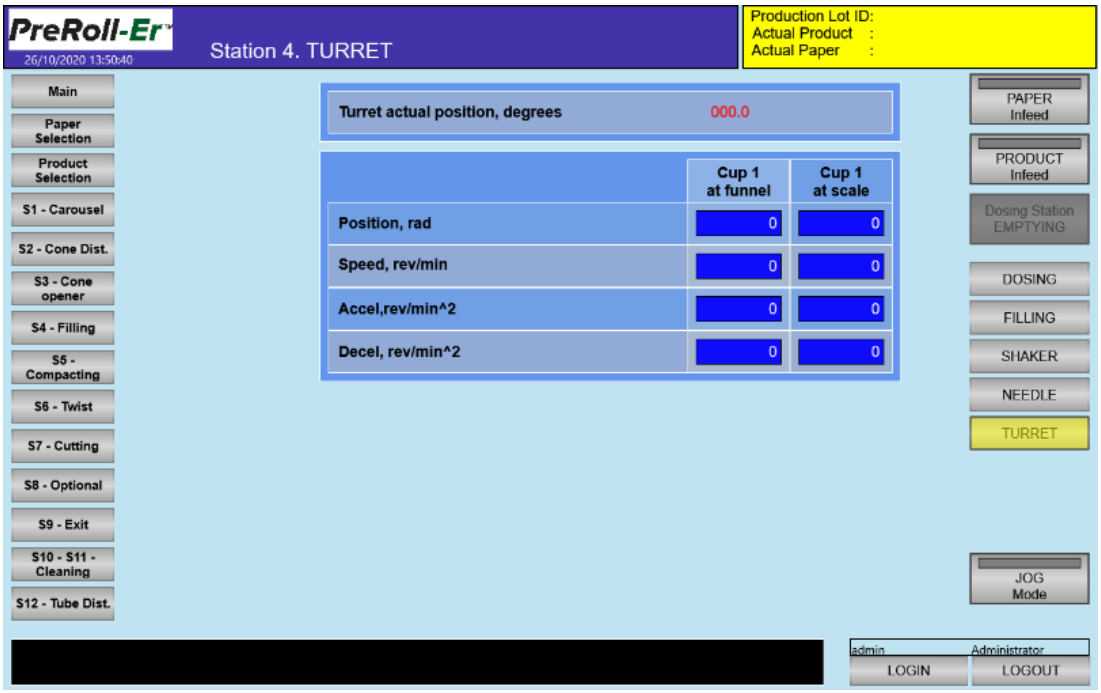
The needle position, when the cone-box is detected at station #4.
Preset value [165 mm]

If a pre-roll is detected, and after the start delay sequence is up, the needle will start the 6 up/down movement sequences.

If a pre-roll is not detected, the needle will go up to its preset home position. [040.0 mm]

The needle home position
Preset value [040.0 mm]

6.2.7.5. Turret Screen



6.2.8. S5 – Compaction screen

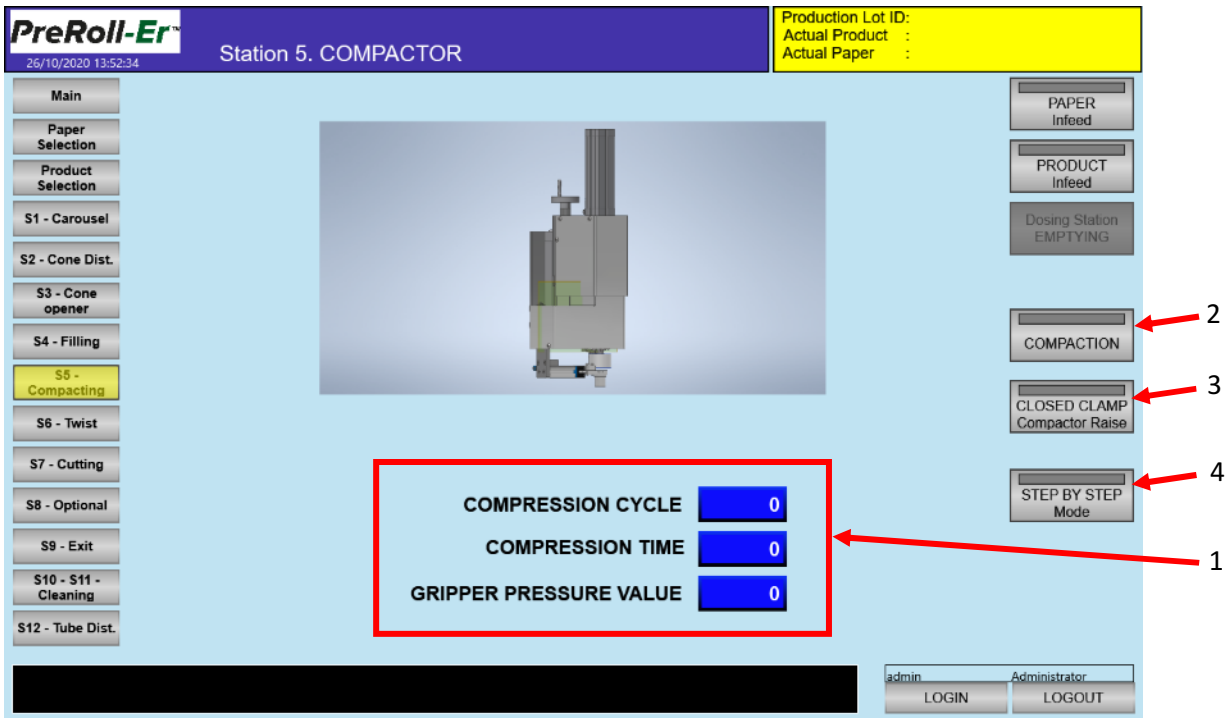


Figure 6-17 Station 5 – Compaction

1- This table displays the compactor pre-set values, they are listed and defined as following:

- **Compression cycle**: displays the number of up/down movement that the compacting rod will execute per one cycle.

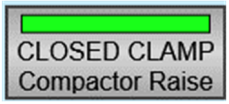
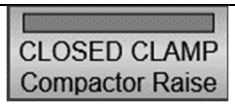
- **Compression time [ms]:** displays the amount of time that rod maintains the lowest position during the cycle

- **Gripper pressure value [millibar]:** displays the preset contact pressure for the grippers when grasping the pre-roll cone.

2- **COMPACTION:** is a pushbutton, the two (2) possible status are listed and defined in the table below:

	ON/OFF STATUS	DESCRIPTION
COMPACTION		The compaction cycle is activated
		The compaction cycle is desactivated

3- CLOSED CLAMP (Compactor raise): is a pushbutton, to open or to close the gripper when the compacting rod goes up during the compaction cycle, the two (2) possible status are listed and defined in the table below:

	OPPEN/CLOSE GRIPPER STATUS	DESCRIPTION
CLOSED CLAMP Compactor raise		The gripper remains in the CLOSED position while the compacting rod is moving upwards.
		The gripper changes to the OPENED position while the compacting rod is moving upwards.

4- **Step by Step Mode**: is a pushbutton, that allows to run station #5 step by step and not automatically. The sequence will be operated manually by clicking on the button for every step.

6.2.9. S6 – Twist screen

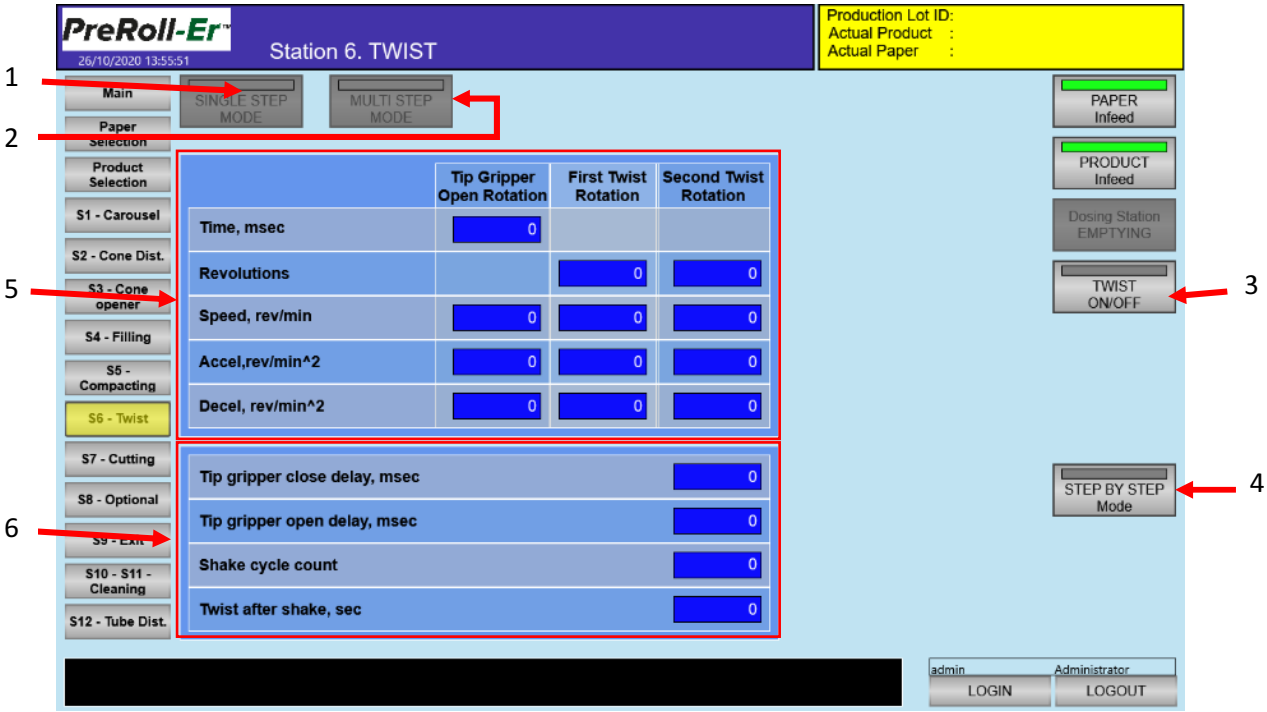


Figure 6-18 Twist screen

1- **SINGLE STEP MODE:** Is a pushbutton, the three (3) possible options are listed and defined in the table below:

		DESCRIPTION
SINGLE STEP MODE		The user does not have the permission to access change this mode.
		The Twist unit runs with the single step mode active.
		The Twist unit does not run with the single step mode.

2- **MULTI STEP MODE:** Is a pushbutton, the three (3) possible status are listed and defined in the table below.

		DESCRIPTION
MULTI STEP MODE		The selection is not allowed to be changed. You need to loogged in.
		The twist unit runs multi steps with a a preset delay.
		This mode is not selected.

3- Twist ON/OFF: is a pushbutton, the two (2) possible status are listed and defined in the table below.

	ON/OFF TWIST STATUS	DESCRIPTION
Twist ON/OFF		The Twist station is activated
		The Twist station is desactivated and not in use.

4- **Step by Step Mode:** is a pushbutton, that allows to run station #6, step by step and not automatically, by clicking on the button for every step.

5- This table displays the gripper operation preset parameters, they are listed and defined in the table below:

		DESCRIPTION
Tip gripper open rotation	**Time [ms]**	Displays the preset amount of time the gripper remains in the open position.
	Speed [rev/min]:	Displays the preset speed value the Tip gripper rotates.
	Accel [rev/min^2]:	Displays the preset acceleration value the gripper accelerates.
	Decel [rev/min^2]:	Displays the preset deceleration value the gripper decelerates.
First Twist Rotation	**Revolutions**	Displays the preset amount of revolution the gripper rotates during the first twist.
	Speed [rev/min]:	Displays the preset speed value of the first twist.
	Accel [rev/min^2]:	Displays the preset acceleration value the gripper accelerates during the first twist.
	Decel [rev/min^2]:	Displays the pre-set deceleration value the gripper decelerates during the first twist.
Second Twist Rotation	**Revolutions**	Displays the preset amount of revolution the gripper rotates during the second twist.
	Speed [rev/min]:	Displays the preset speed value of the second twist.
	Accel [rev/min2]:	Displays the preset acceleration value the gripper accelerates during the second twist.
	Decel [rev/min2]:	Displays the pre-set deceleration value the gripper decelerates during the second twist.

6- This table displays the gripper preset timing parameters as they are defined in the table below.

	DESCRIPTION
The gripper Close delay [ms]	Displays the amount of time the gripper waits in the CLOSED position before finishing the cycle.
The gripper open delay [ms]	Displays the amount of time the gripper waits in the OPENED position before starting the cycle.
Shake cycle count	Displays the number of shaking per cycle.
Twist after shake [sec]	Displays the delay between the twist and the shake.

6.2.10. S7 – Cutting screen

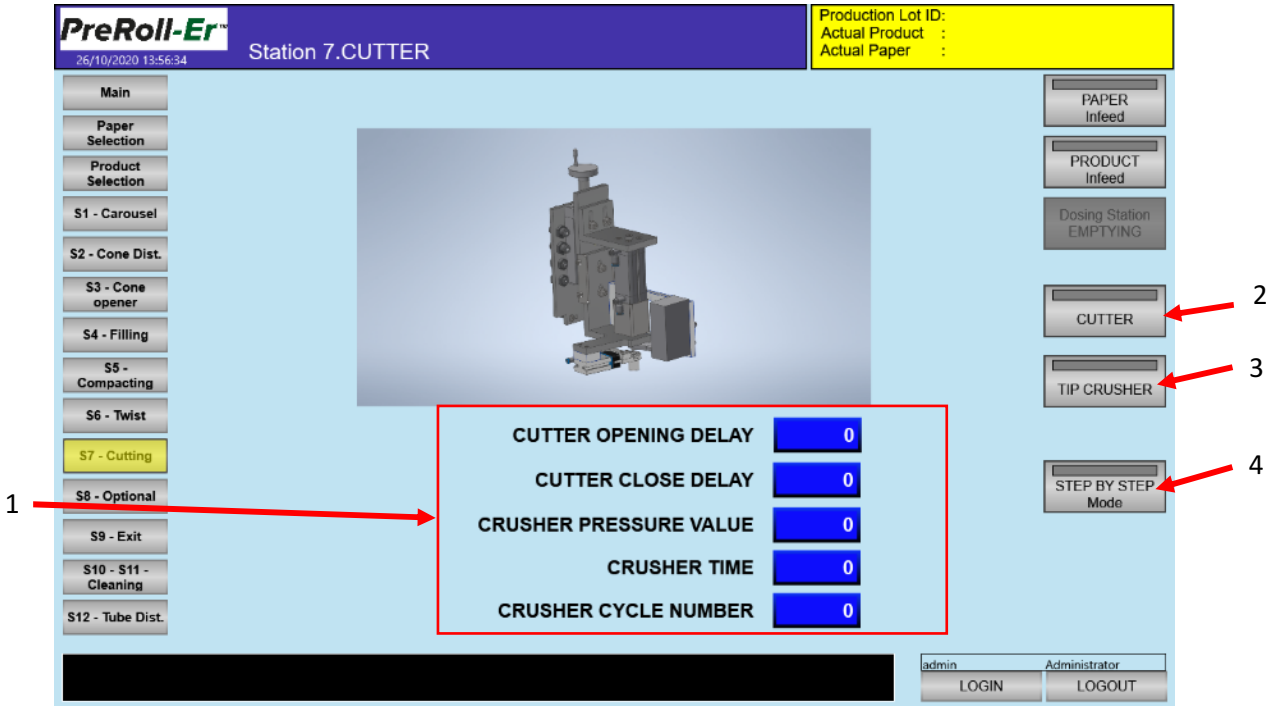


Figure 6-19 Station 7 Cutter screen

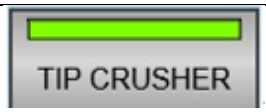
1- This table displays the cutter preset parameters, as detailed below:

	DESCRIPTION
Cutter opening delay [s]	Displays the amount of time the cutter waits before OPENING to ensure pre-roll well cut.
Cutter closed delay[s]	Displays the amount of time the cutter waits before CLOSING to ensure pre-roll is ready.
Crusher pressure value	Displays the preset pressure value the crusher applies on the cone tip.
Crusher time[s]	Displays the preset amount of time the crusher is activated
Crusher cycle number	Displays the number of crashing the crusher executes per cycle.

2- Cutter: is a pushbutton, to activate or deactivate the cutter. The two (2) status are defined in the table below.

	ON/OFF STATUS	DESCRIPTION
CUTTER		The cutter is activated
		The cutter is desactivated and not in use.

3- Tip crusher: is a pushbutton, to activate or deactivate the tip crusher. The two (2) status are defined in the table below

	ON/OFF STATUS	DESCRIPTION
TIP CRUSHER		The tip crusher is activated
		The tip crusher is desactivated and not in use.

4- Step by Step Mode: is a pushbutton that allows to run station #7, step by step and not automatically, by clicking on the button for every step.

6.2.11. S9 – Exit screen

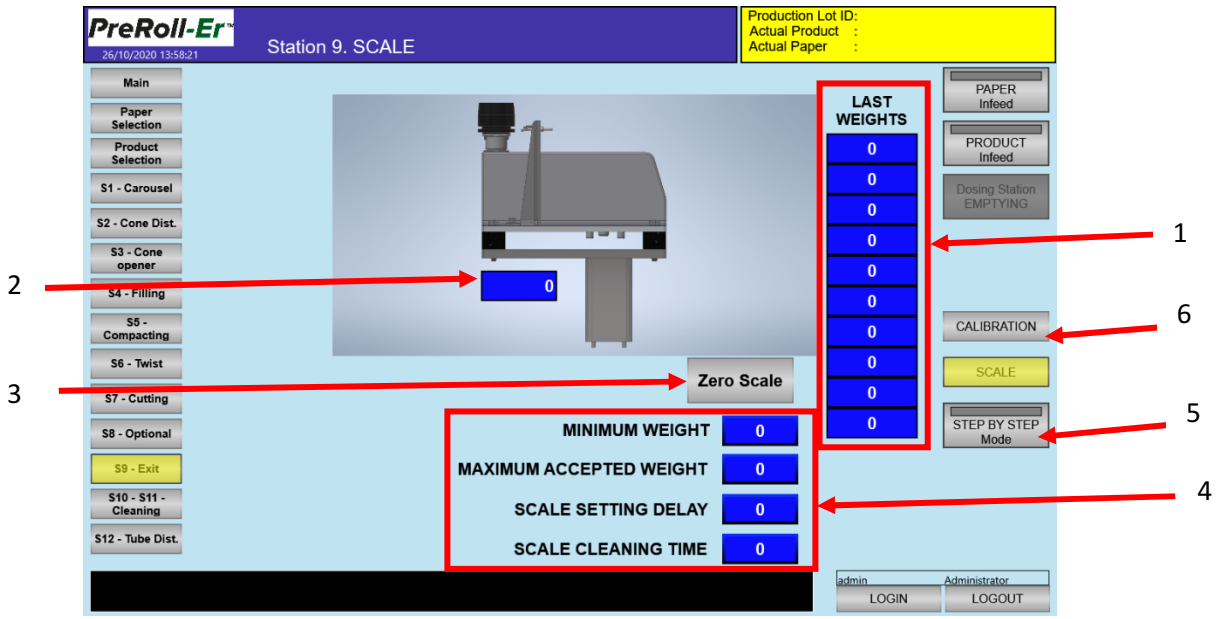


Figure 6-20 Station 9 - Exit screen

1- Displays the latest 10 weights reading on the exit scale.

2- Displays the current weight of the scale of station 9.

3- **Zero scale:** is a pushbutton, to use when the current displayed weight in (2) does not indicate zero when the platform is empty.

4- This table displays the following pre-set parameters:

- **Minimum weight:** displays the minimum accepted weight value. The weight of each pre-roll must be greater than or equal to this value, otherwise it will be rejected at the exit chute.

- **Maximum accepted weight** displays the maximum accepted weight value. The weight of each pre-roll must be less than or equal to this value, otherwise it will be rejected at the exit chute.

- **Scale setting delay** displays the settling time before we get the final weight value.

- **Scale cleaning time** displays the pre-set time schedule for compressed air cleaning on the scale to remove any debris.

5- **Step By Step Mode:** is a pushbutton, that allows to run station #9, step by step and not automatically, by clicking on the button for every step.

6- Calibration: is a pushbutton, by clicking on it, it opens a new page. Please find all details in section .

6.2.11.1. S9 – Calibration

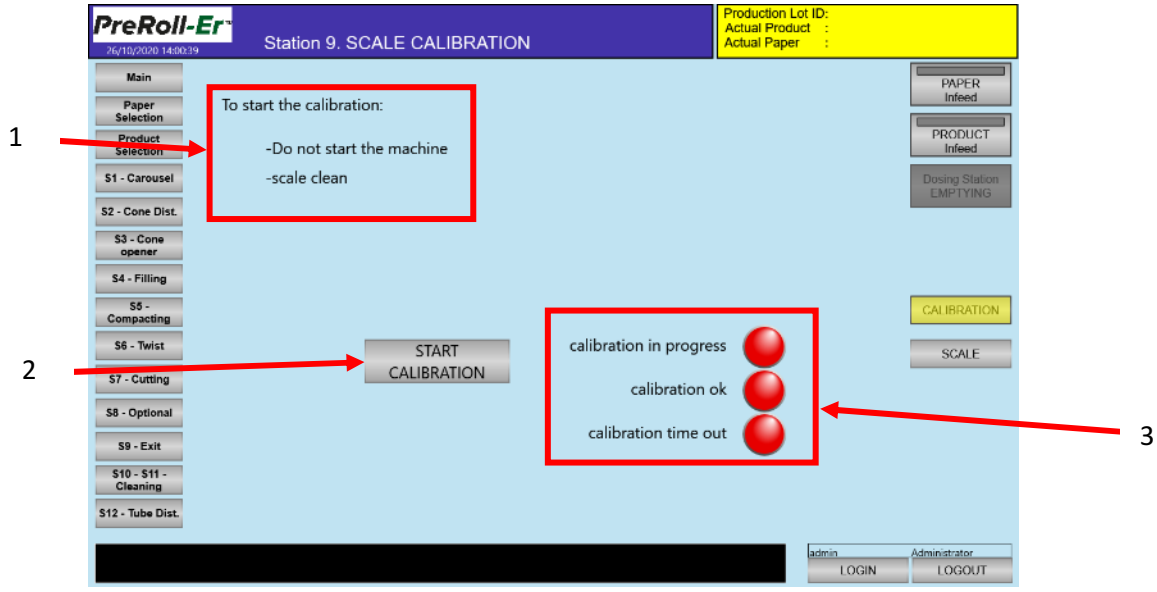


Figure 6-21 Station 9 – calibration sub-menu

1- Displays instruction to follow before starting the calibration.

2- **START CALIBRATION:** is pushbutton, clicking on it will start the calibration sequence.

3- LED status lights for the calibration process, they are listed and defined in the table below:

	LED COLOR	DESCRIPTION
Calibration in progress	🔴	The calibration is off
	🟢	The calibration is in progress
Calibration OK	🔴	The calibration is not done
	🟢	The calibration is done
Calibration time out	🔴	The calibration time is up
	🟢	The calibration still running

6.2.12. S11 – Cleaning screen (Brush)

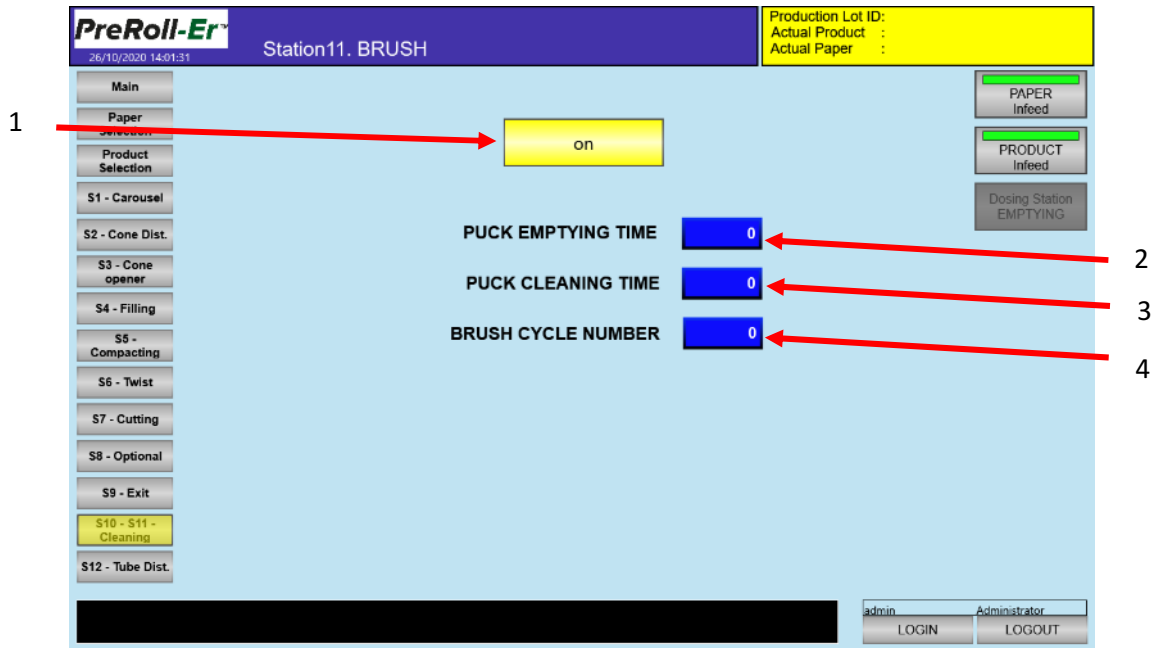


Figure 6-22 Station 11 – cleaning screen

1. **Function button (ON),** is an ON/OFF pushbutton, allows you to enable or disable station #11.

2. **Puck emptying time,** displays the preset amount of time the brush stays in the ‘’down’’ position during cleaning.

3. **Puck cleaning time** displays the preset amount of time allowed for the cleaning cycle.

4. **Brush cycle number** displays the preset number of up/down movement that the brush executes per cleaning cycle.

Chapter 7 – Spare parts breakdown

7. SPARE PARTS

7.1. GENERAL

Parts are identified by part number on the Drawing and itemized by name and part number on the summary parts list.

Our **customer services** will be pleased to quote you on any or all those parts upon request. When ordering replacement parts or even corresponding with **Solid Packaging Robotik inc.** about any matter concerning the **Pre-Roll-Er™** be sure to provide the following information:

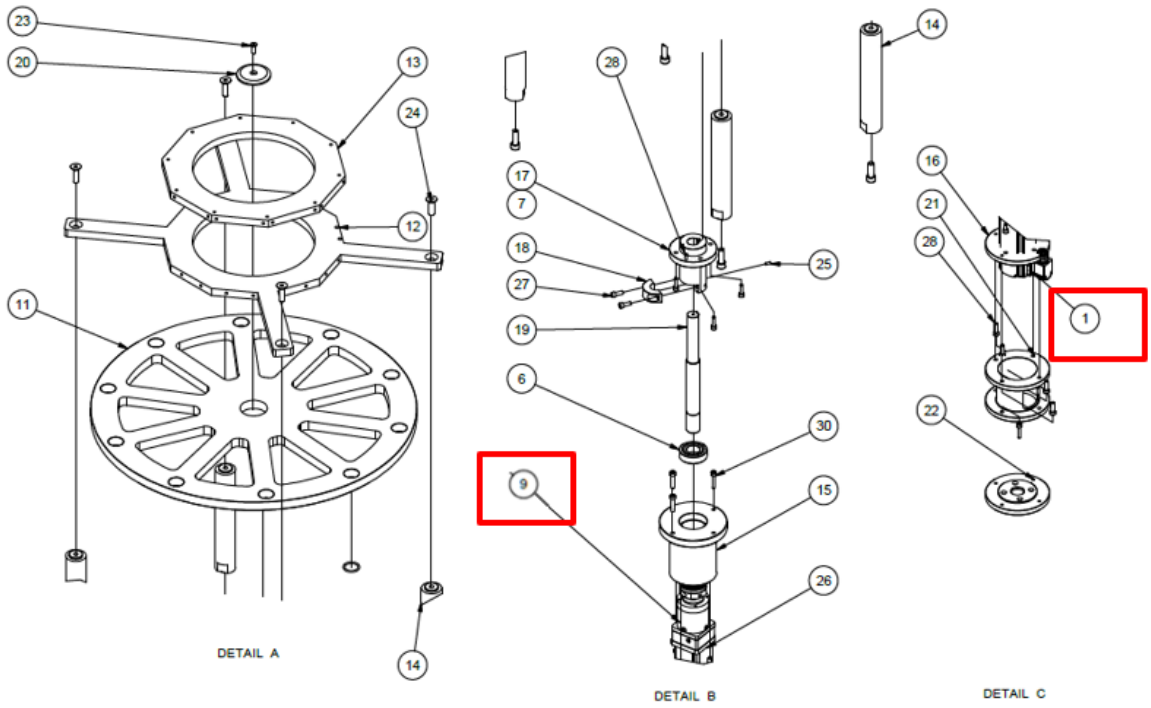
- the serial number of the unit
- the part numbers
- description of the item

7.2. SUMMARY PARTS LIST

The following spare parts are recommended to be held on site as a part of your Maintenance, Repair and Operations (MRO) supplies inventory.

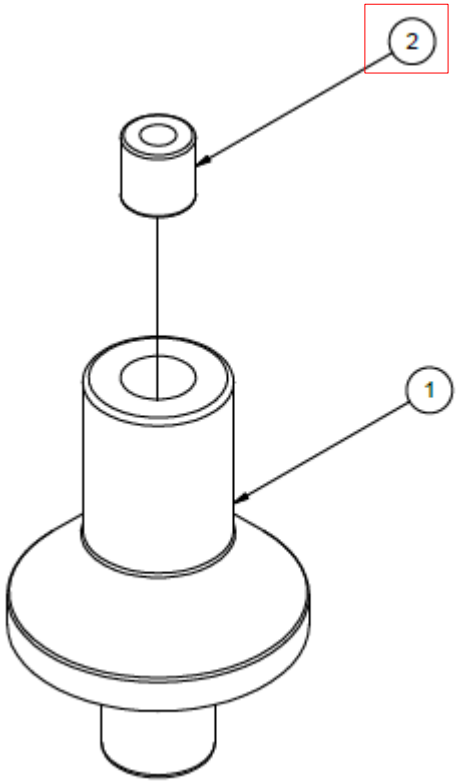
7.2.1. Station 1

CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 1	**DRAWING # CASSY000101.idw**



ITEM	PART N^{O}	DESCRIPTION	QTY
1	CAELE000046	SERVO MOTOR	1
9	CAMEC000177	SERVO SHAFT COUPLING	1

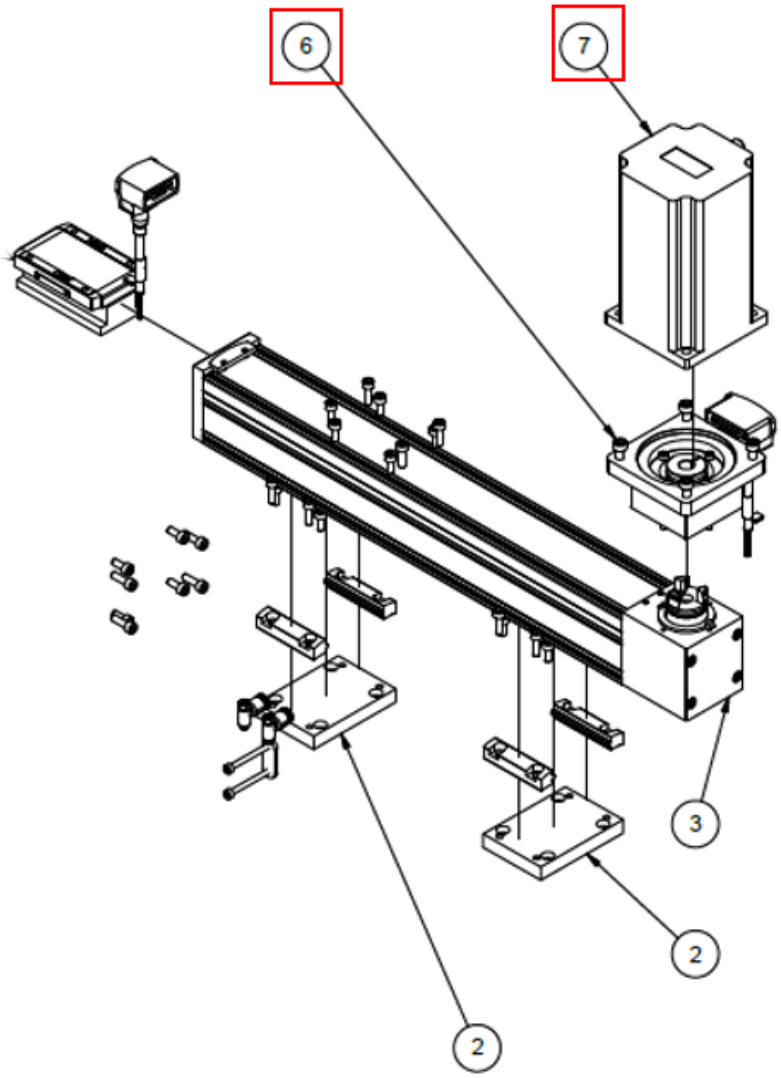
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 1	DRAWING # CASSY000028.idw

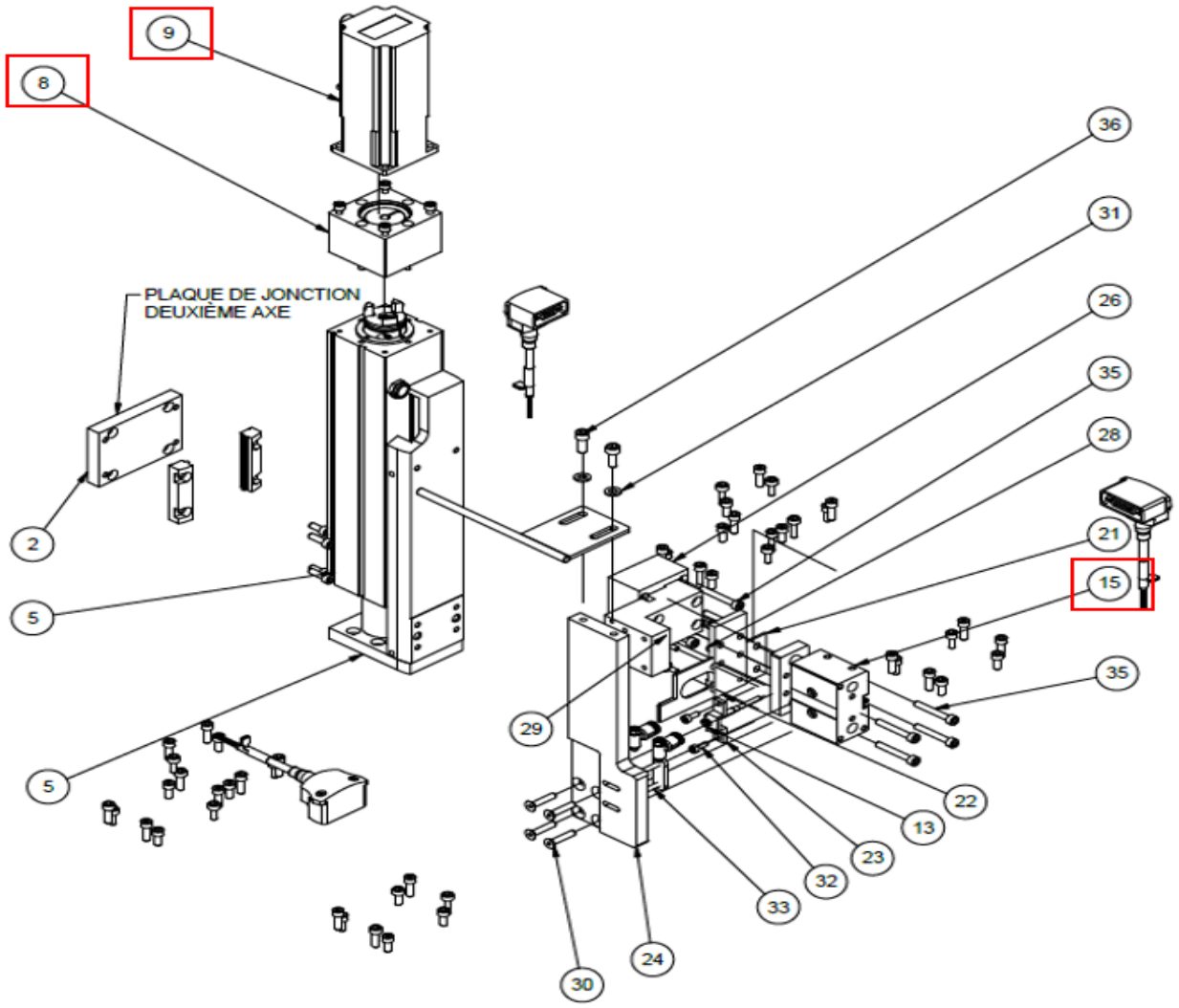


ITEM	PART N^{O}	DESCRIPTION	QTY
2	CAPRT000304	INSERT HUB PIN	6

7.2.2. Station 2

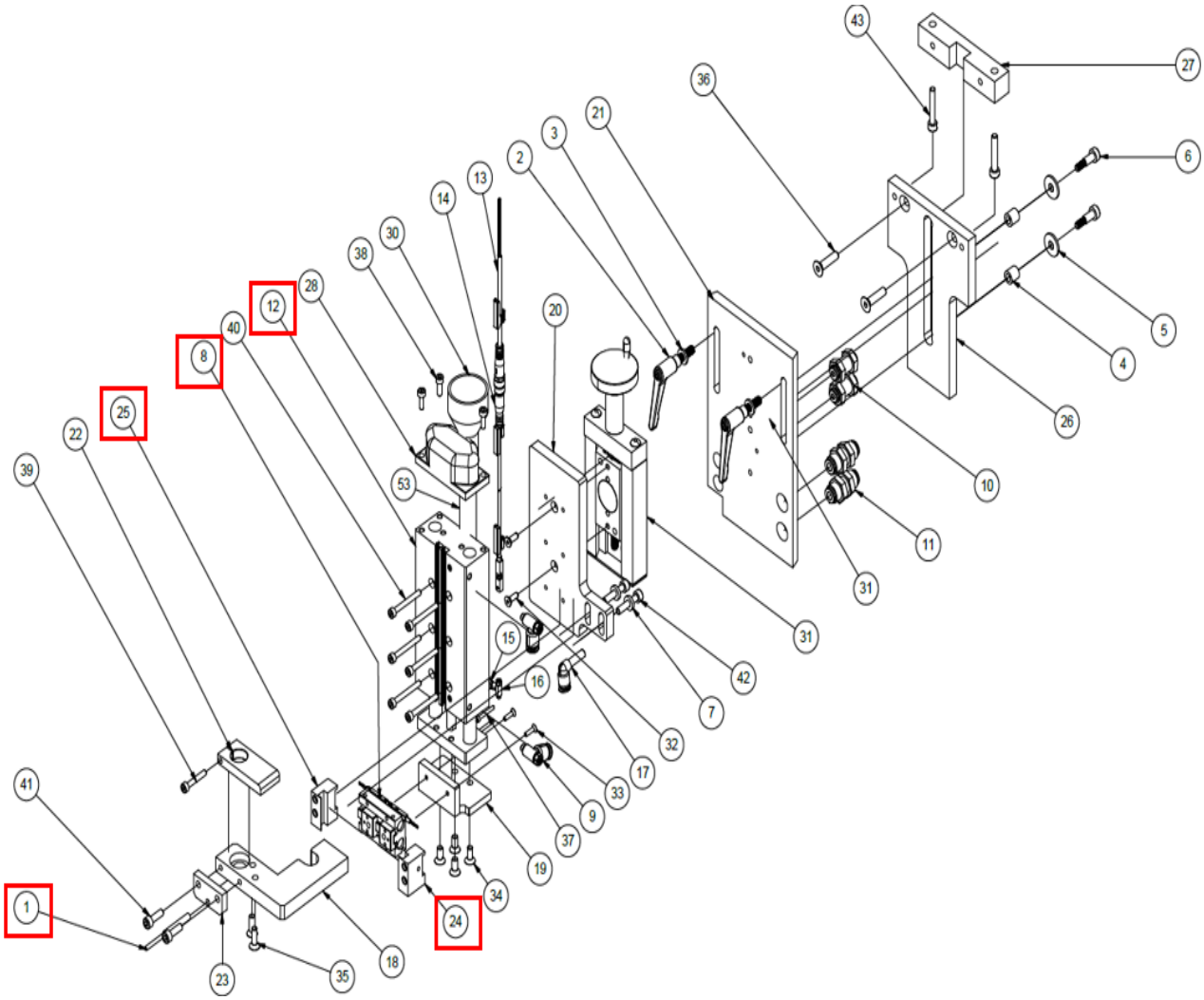
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 2	DRAWING # CASSY000042.idw





ITEM	PART N^{O}	DESCRIPTION	QTY
6	CAELE000016	AXLE KIT	1
7	CAELE000017	STEPPER MOTOR	1
8	CAELE000018	AXIAL KIT	1
9	CAELE000019	STEPPER MOTOR	1
15	CAPNE000028	GUIDED DRIVE	1

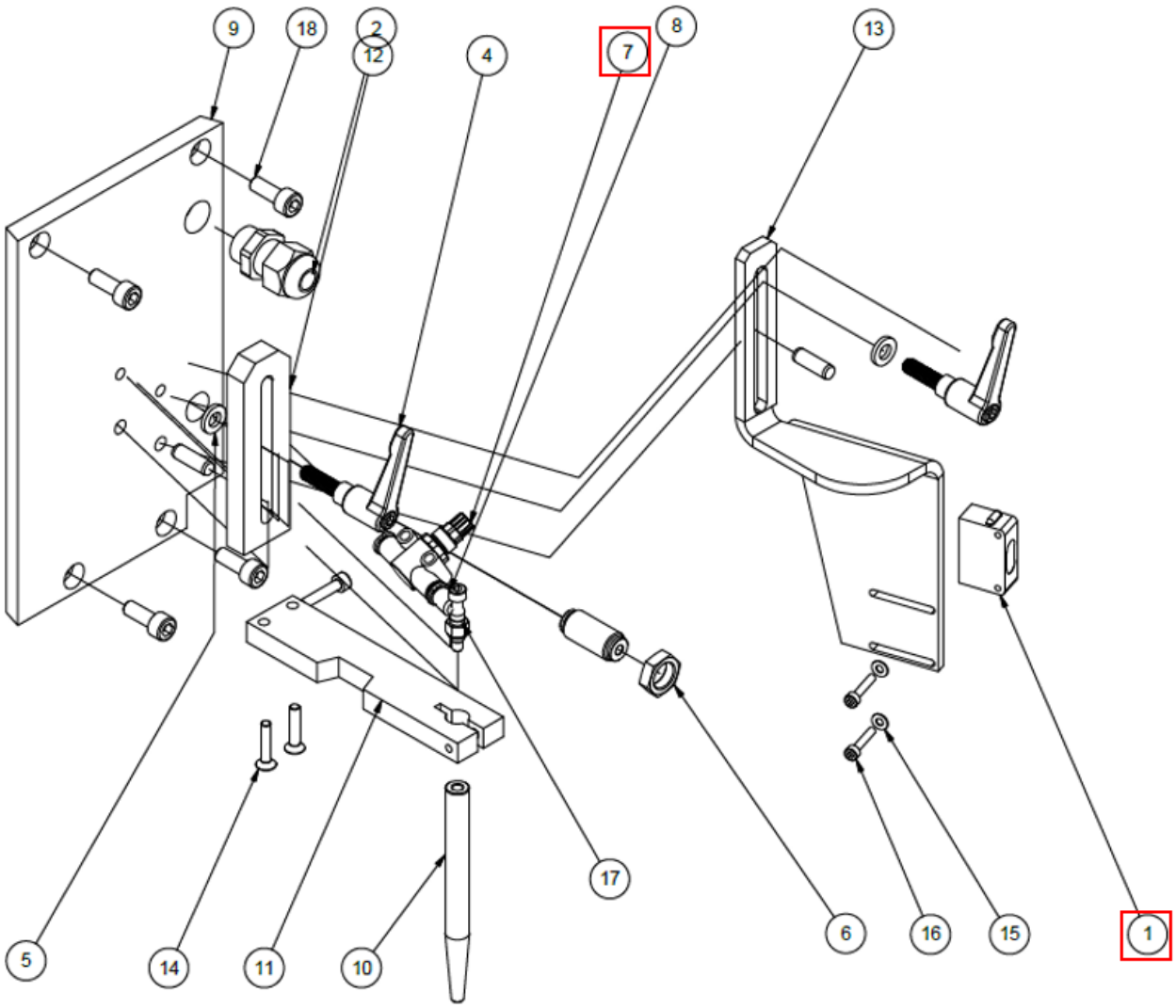
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 2	DRAWING # CASSY000002.idw



ITEM	PART N^{O}	DESCRIPTION	QTY
1	CAELE000002	PHOTOELECTRIC SENSOR	4
8	CAPNE000002	MHF2, AIR GRIPPER, 2 FINGER, LOW PROFILE	1
12	CAPNE000027	GUIDED DRIVE	1
24	CAPRT000316	LEFT JAWS	1
25	CAPRT000317	RIGHT JAWS	1

7.2.3. Station 3

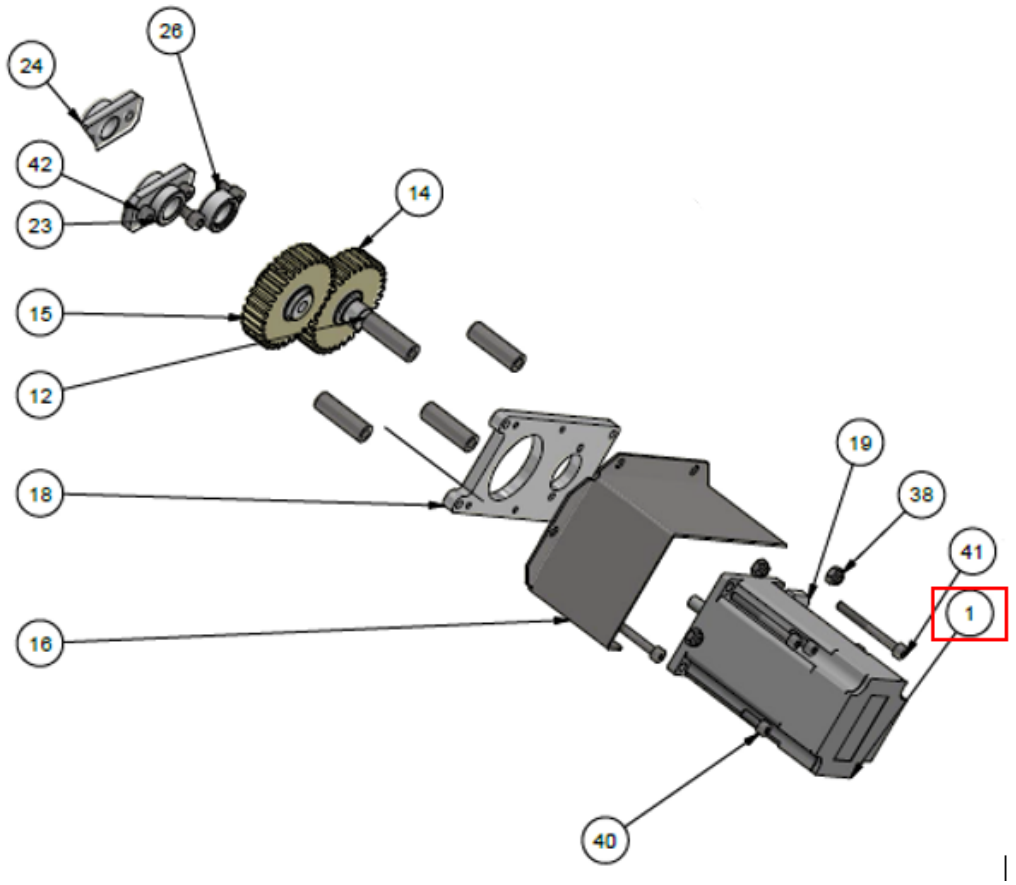
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 3	DRAWING # CASSY000003.idw

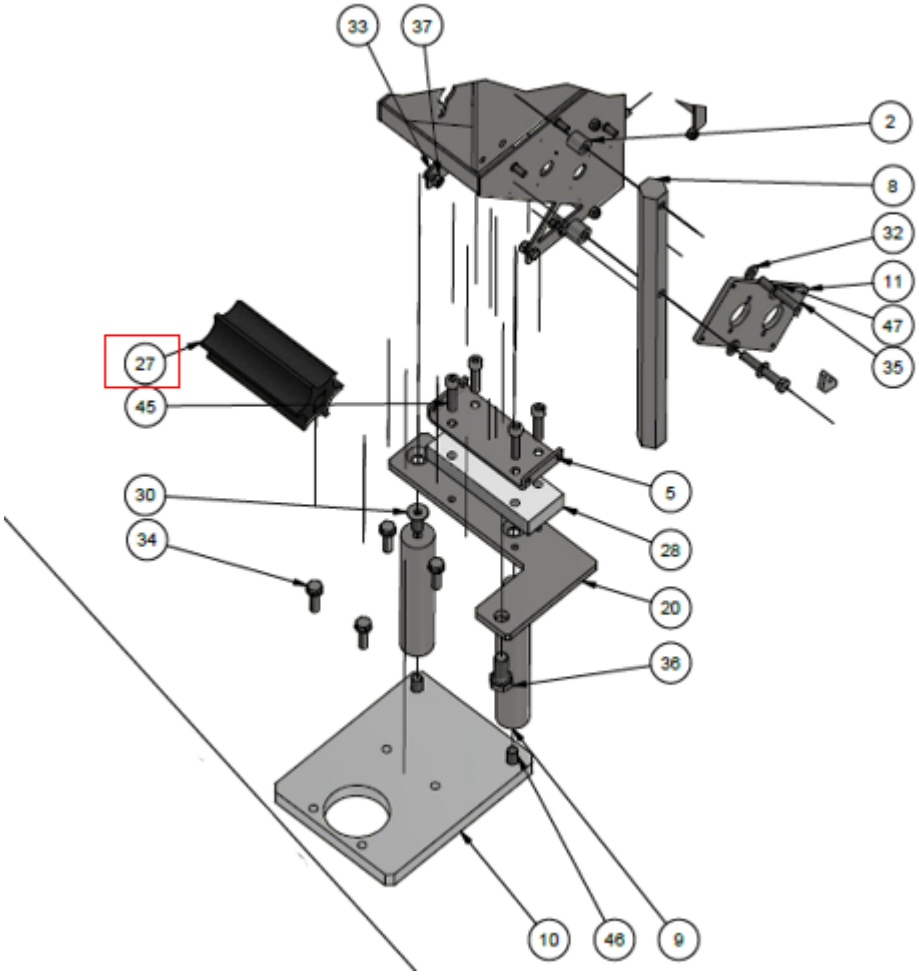


ITEM	PART N^{O}	DESCRIPTION	QTY
1	CAELE000036	RETRO-REFLECTIVE MODELS	1
7	CAPNE000104	ONE-WAY FLOW CONTROL VALVE	1

7.2.4. Station 4

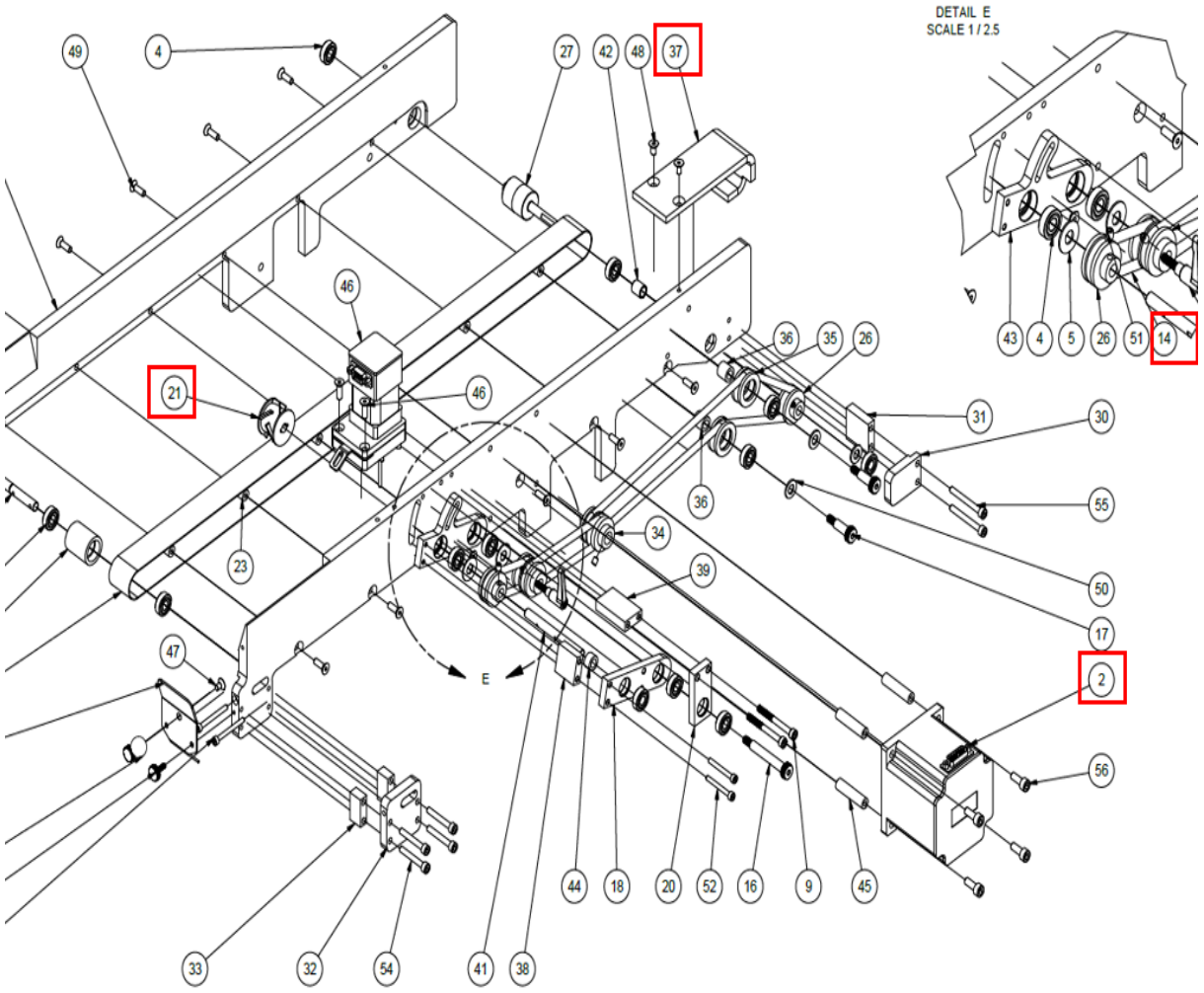
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 4	DRAWING #CASSY000156.idw





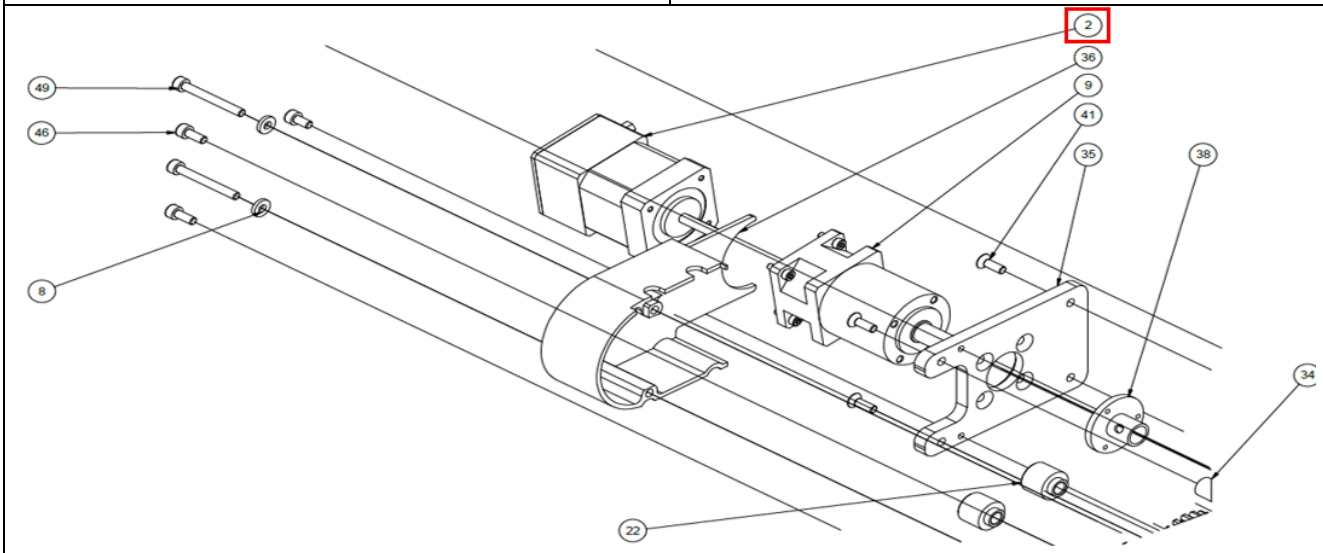
ITEM	PART N^{O}	DESCRIPTION	QTY
1	CAELE000059	STEPPER MOTOR	1
27	CAPRT001481	PADDLE WHEEL LARGE	1

CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 4	DRAWING #CASSY000095.idw

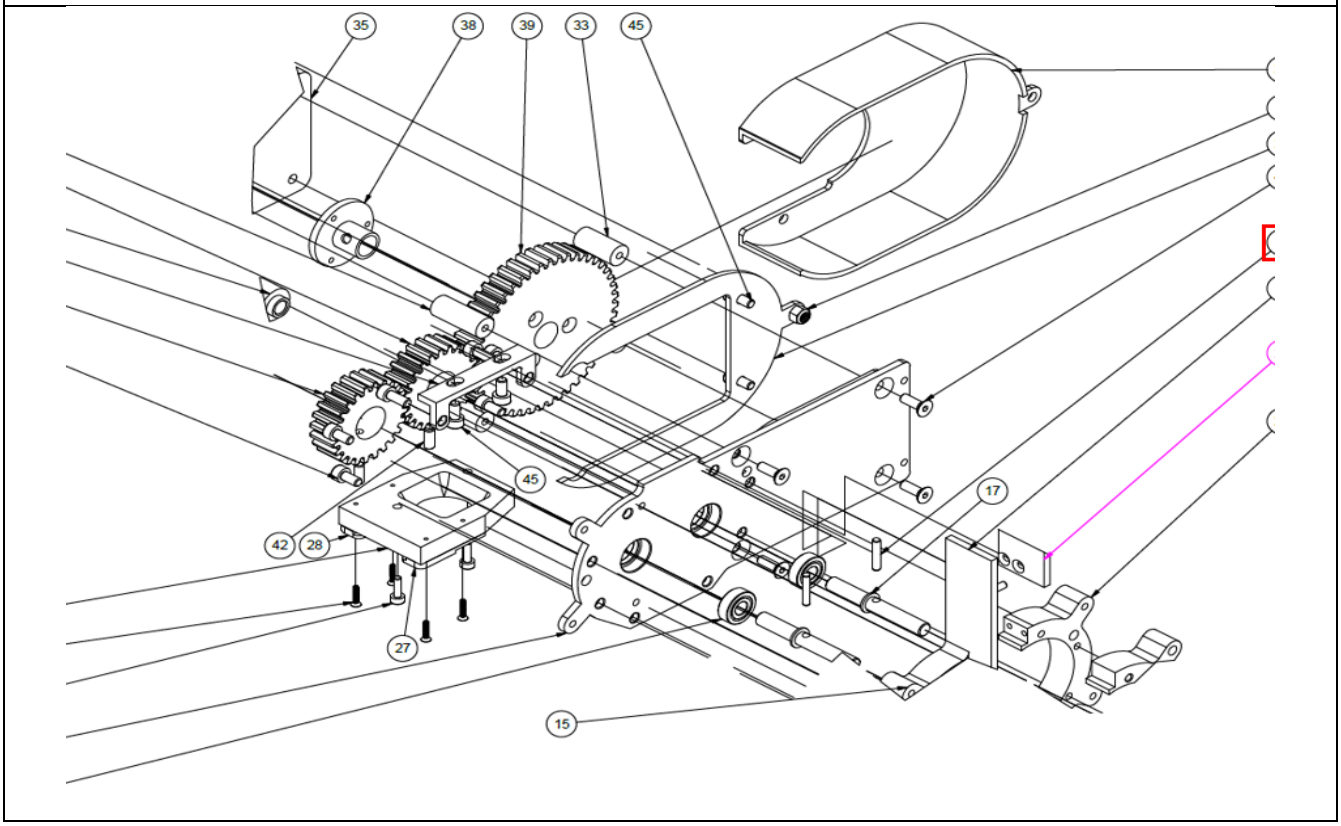


ITEM	PART N^{O}	DESCRIPTION	QTY
2	CAELE000063	STEPPER MOTOR	1
4	CAMEC000024	BEARING SHAFT	4
12	CAMEC000241	BELT CONVEYOR	1
14	CAMEC000245	ORING BELT	1
21	CAPRT000886	LEVELING WHEEL	1
37	CAPRT001001	COVER CONVEYOR	1

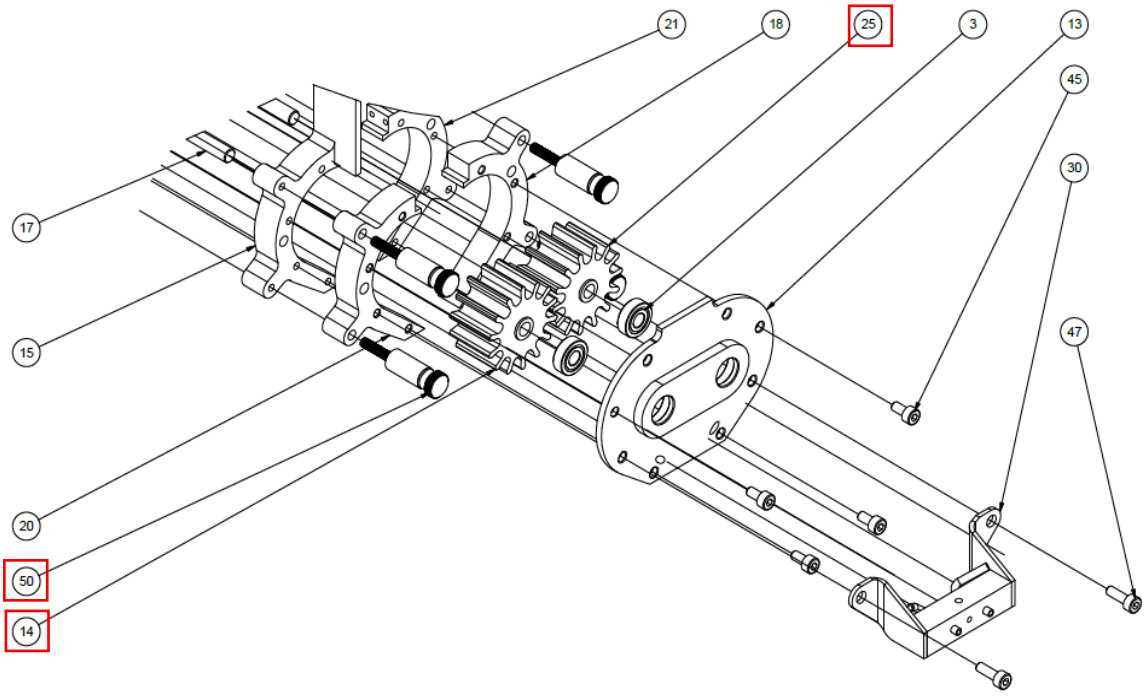
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 4	DRAWING # CASSY000096.idw



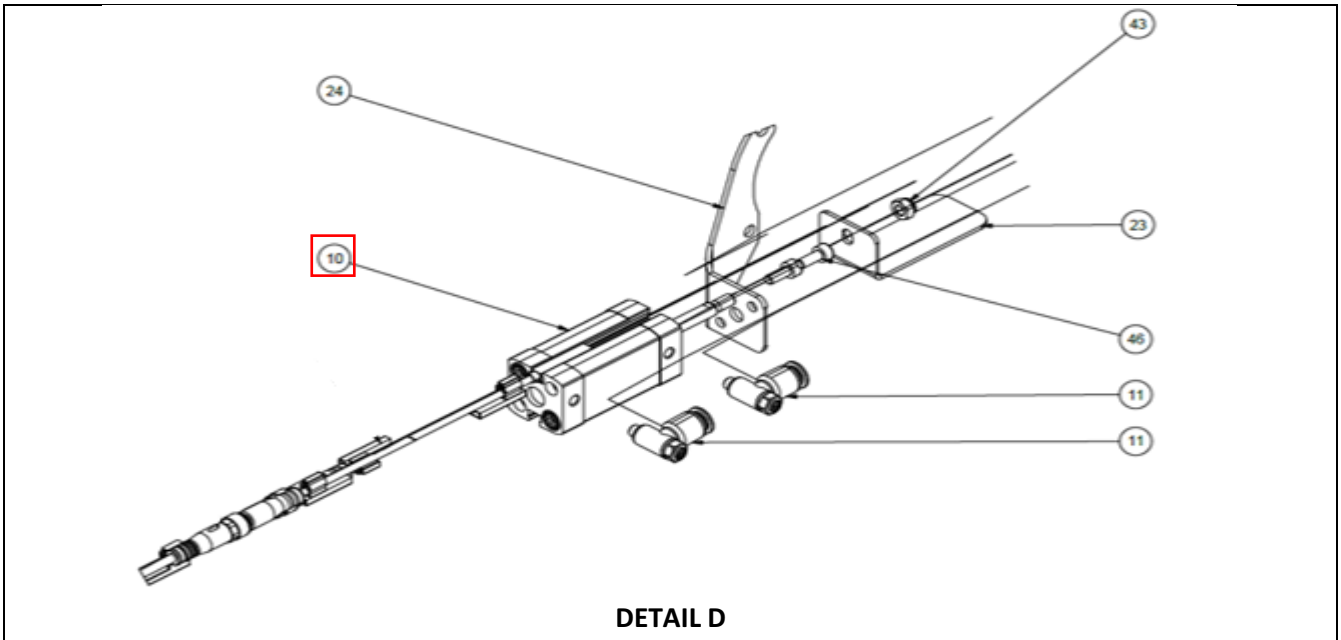
DETAIL A



DETAIL B



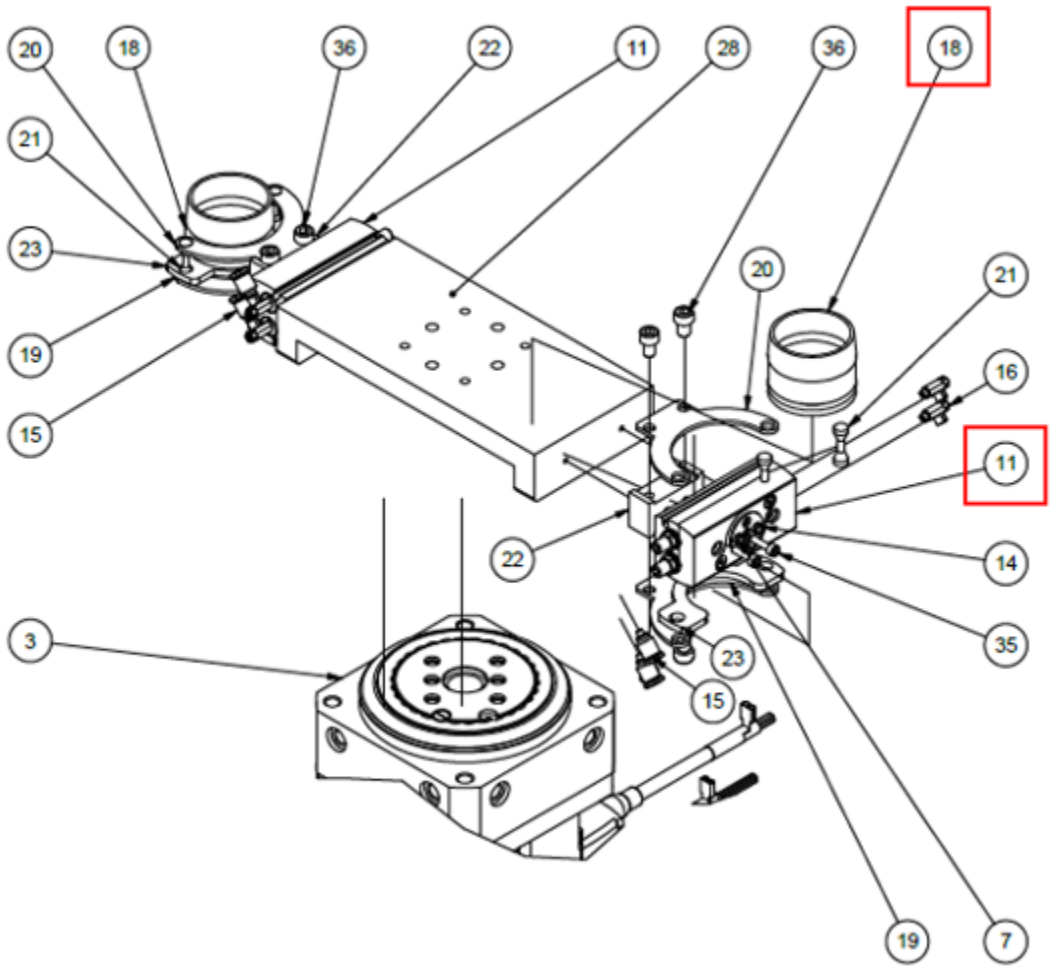
DETAIL C



DETAIL D

ITEM	PART N^{O}	DESCRIPTION	QTY
2	CAELE000064	STEPPER MOTOR	1
3	CAMEC000041	BEARING SHAFT 1/4	4
4	CAMEC000043	DOWEL PIN	2
10	CAPNE000029	COMPACT CYLINDER	1
14	CAPRT000119	DOSING GEAR	1
25	CAPRT000366	DOSING GEAR	1
50	CASSY000276	BOLTING ASSEMBLY	4

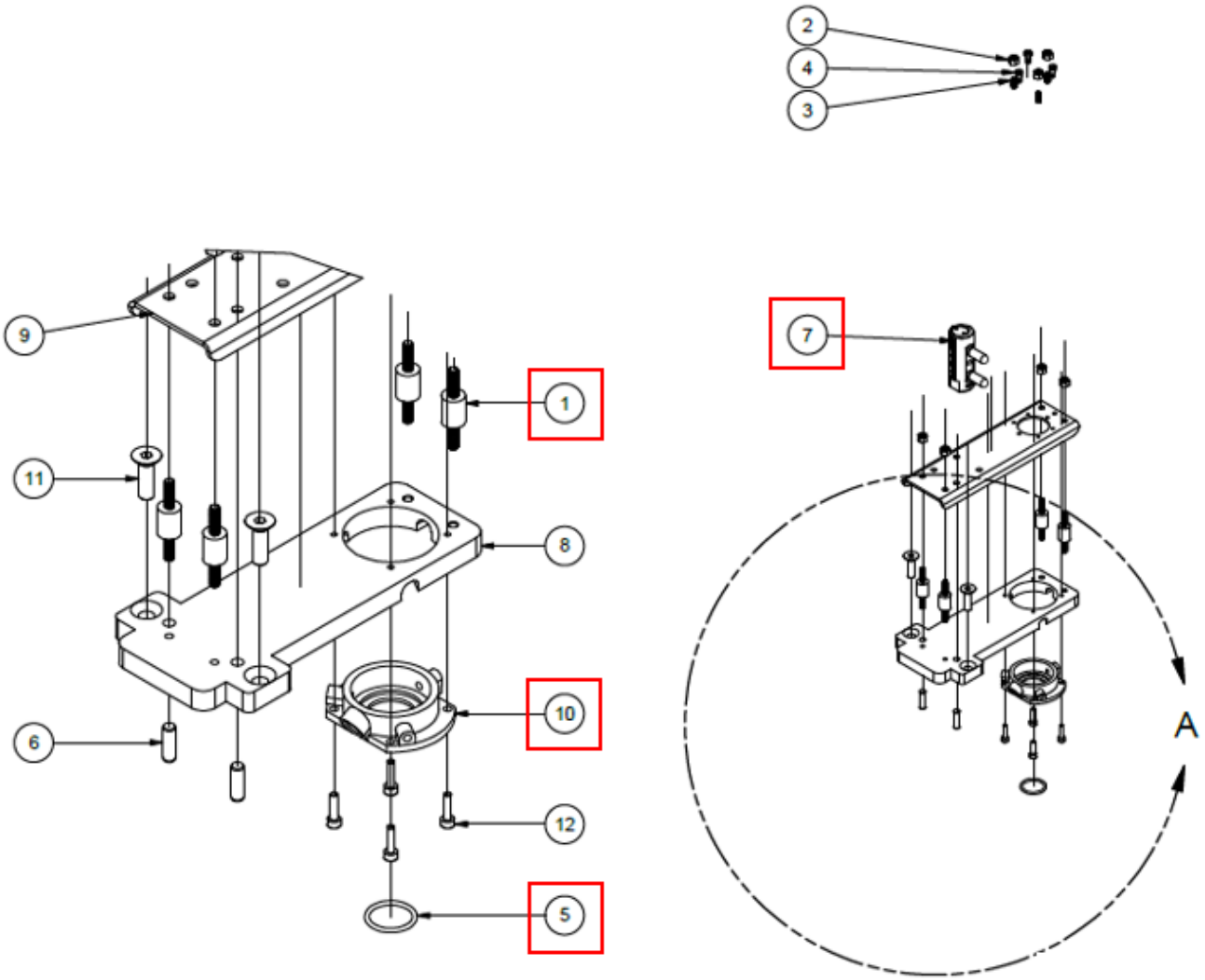
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION #4	DRAWING #CASSY000092.idw



DETAIL D

ITEM	PART N^{O}	DESCRIPTION	QTY
11	CAPNE000031	DRRD-SEMI-ROTARY DRIVE	1
18	CAPRT000370	TRANSPORT CUP	2

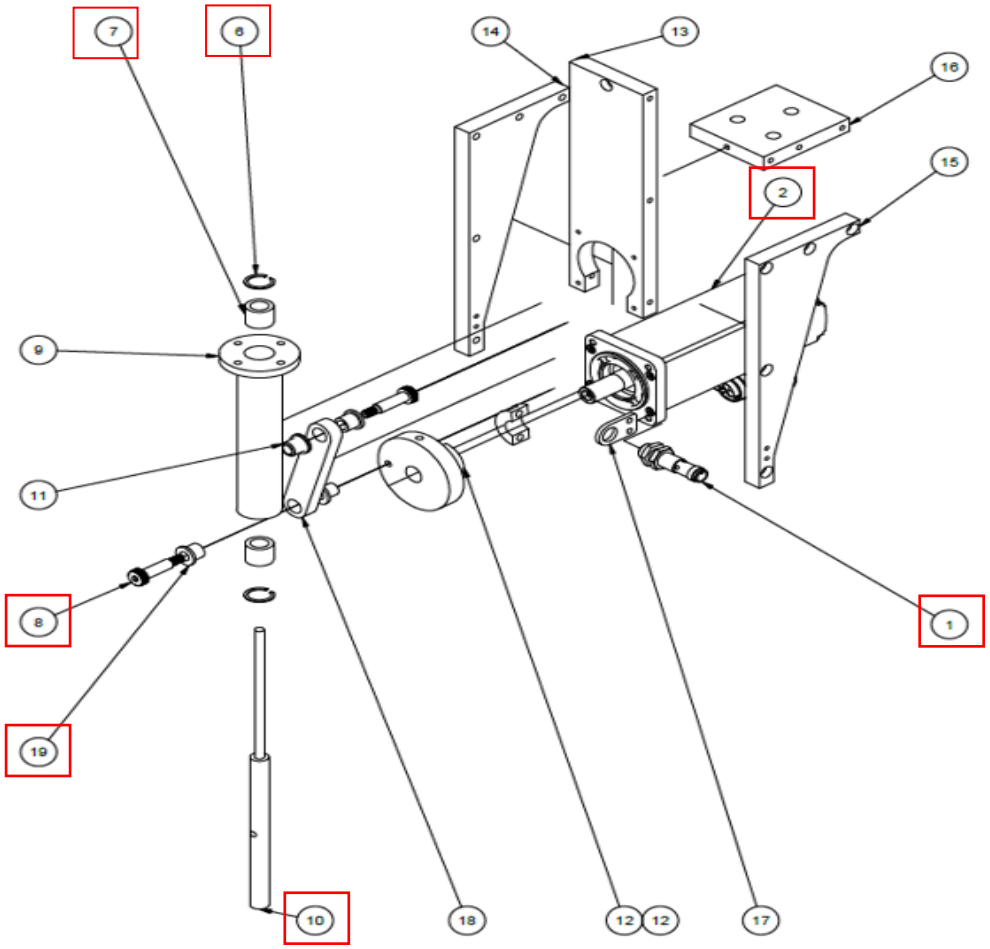
CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION # 4	DRAWING # CASSY000050.idw



DETAIL A

ITEM	PART N°	DESCRIPTION	QTY
1	CAMEC000003	VIBRATION MOUNT	4
5	CAMEC000088	BUNA-N O-RING	100
7	CAMEC000233	AIR VIBRATOR	1
10	CAPRT000389	VACUUM COLLECTOR	1

CRITICAL PART LIST	
MECHANICAL SPARE PARTS LIST	
STATION #4	DRAWING # CASSY000115.idw

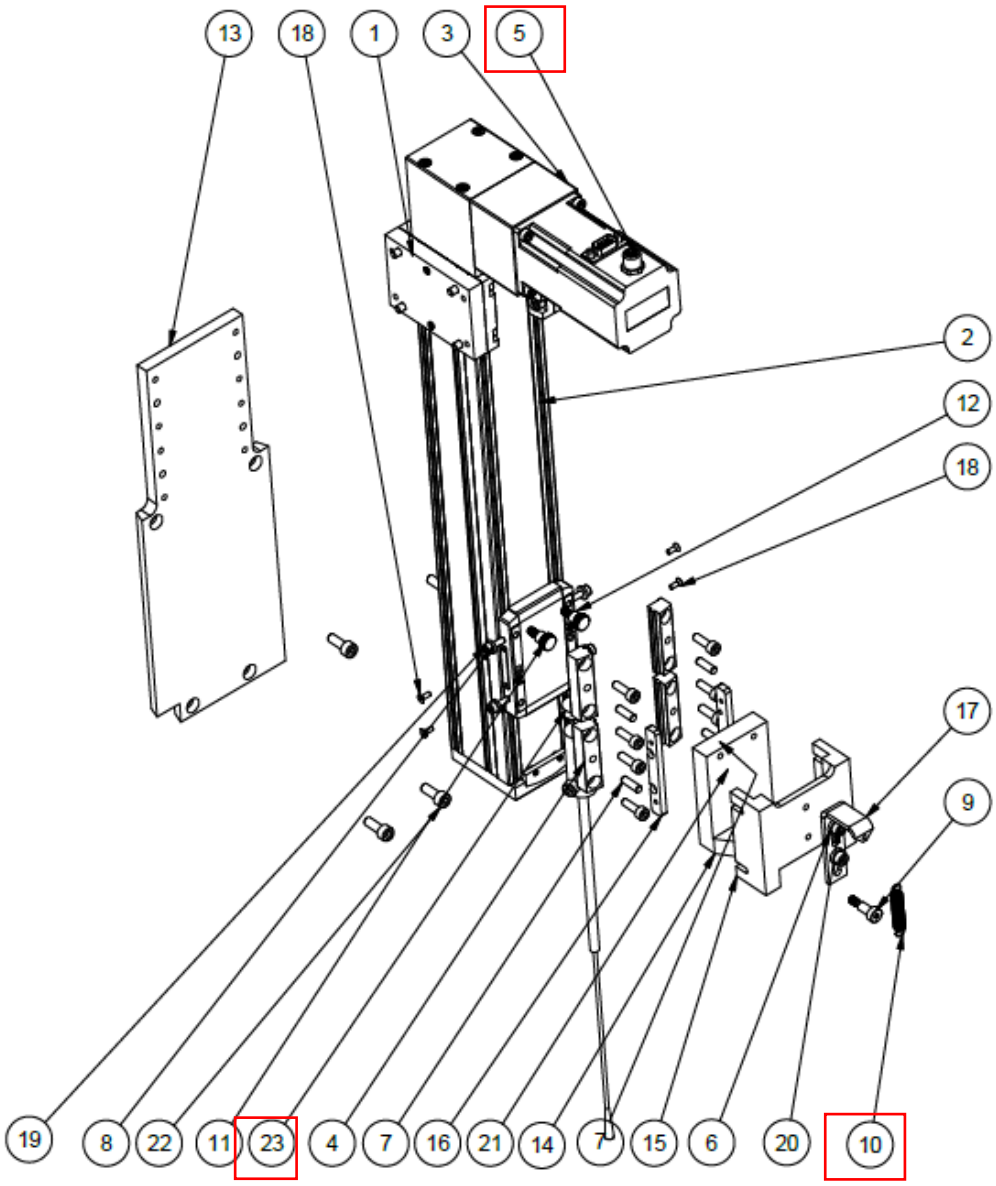


ITEM	PART N^{O}	DESCRIPTION	QTY
1	CAELE000032	PROXIMITY SENSOR	1
2	CAELE000046	SERVO MOTOR	1
6	CAMEC000197	SINGLE-TURN SPIRAL INTERNAL RETAINING RING	10
7	CAMEC000198	BRONZE SLEEVE BEARING	4
8	CAMEC000200	STAINLESS STEEL SHOULDER SCREW	2
10	CAPRT000732	SHAKER RODS	1
19	PAMEC000687	SLEEVE BEARING FLANGED OIL EMBEDDED	2

CRITICAL PART LIST

MECHANICAL SPARE PARTS LIST

STATION # 4	DRAWING # CASSY000114.idw



ITEM	PART N^{O}	DESCRIPTION	QTY
5	CAELE000047	SERVO DRIVE	1
10	CAMEC000232	EXTENSION SPRING	6
23	CAPRT001297	NEEDLE	1

Chapter 8 – Troubleshooting

(Chapter Under construction)

8. INTRODUCTION

8.1. List of alarms

8.2. General guidelines

8.3. FAQ

Chapter 9 – Mechanical Drawings

(Chapter Under construction)

9. INTRODUCTION

9.1. General Assembly

9.2. All Stations

Chapter 10 – Electrical Drawings

(Chapter Under construction)

10. INTRODUCTION

10.1. Small Control Cabinet

10.2. Large Power Distribution Cabinet

10.3. PreRoll-Er wiring diagram