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Instruction Manual for SF unit



AZIMUTH MACHINERY
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Dear customers,

Thank you for your purchase, we look forward to providing the best customer experience.

According to feedback and our service experience, the most important factor to maintain the initial precision and effectiveness of the machine is to use it properly and maintain it in a timely manner.

The key of our success is our ability to manufacture presses to our customers' specifications to meet their needs & provide the best customer's experience.

Please call our sale manager or the local office if you have any questions while reading this manual or using the machine.

To utilizing the unit properly, please read this manual carefully. Appreciated to purchase our equipment!

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Safety of operation

This manual is written in order to become familiar with all the functions and possible applications of our machine. It contains important instruction about how to use the machine safely; according to the purpose designated.

Following these instructions is not only essential to avoid risks. It also reduces repair costs and down-time and increases the products reliability and service-life. Anyone who works with the machine should follow the instructions in this manual, particularly the safety related instructions.

Additionally local rules and regulations relating to environmental safety and accident prevention may be applied.

User-responsibility

Only allow persons to work with the machine who are familiar with the general instructions on how to work safely and to prevent accidents. The use of the instrument should have been instructed duly *THE SAFETY Chapter* and the warnings in this manual should have been read and understood.

Before commencing work anyone appointed to work with the machine should pay attention to the general regulations to working safety and accident prevention. The safety chapter and the warnings in this manual should have been read and understood.

4. Dangers

This machine is designed and manufactured according to advanced technical standards and recognized safety regulations. However, improper use of the machine for work may result in a danger to the life and health of the operator or others, or damage to the machine or other property. Therefore the machine should only be used for its designated purpose, and in a perfect technical condition, Any defect that could have a negative effect on safety should be repaired immediately.

5. Designated purpose

The ***electronically controlled program of Azimuth machines*** is specially designed for pressing and riveting sheets of various materials.



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AZIMUTH will not be held liable for damage resulting from improper use. Designated purpose also includes properly observing all instructions in the operation manual, and adherence to inspection and maintenance schedules.

6. Copyright

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This operating manual is intended solely for the user and his personnel. Infringement of this restriction may lead to legal action may be taken if this restriction is infringed upon

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SAFETY INSTRUCTIONS & INSTALLATION

1. Equipment in particular note of the parts are attached to some safety warning sign, please fully comply with the warning instructions on the nameplate.
2. Carefully read and understand the instructions manual, warnings and warning nameplate content before, do not perform operation if you do not comply with the contents described or ignoring warnings may result in serious injury or death.
3. Correct operation is the customer's responsibility.

1. Warning Nameplate Maintenance

- A. Attached to the device for all warnings nameplate, must confirm that the above content to see things clearly. If the above when stained with dirty stains, use a cloth, water or soapy water to remove dirt stains, do not use organic solvents or gasoline for cleaning.
- B. Warning plate breakage, loss, or the above text, identify unclear when shown, please replace new warning nameplate. Please make sure to replace the warning nameplate nameplate as the original warning.
- C. Replace posted warning nameplate member, you'll need to replace the new warning nameplate.

2. Nameplate Description

Rotating or moving parts:

- A. It posted a warning on the device nameplate parts of the rotating parts or moving parts, in order to prevent injuries, Prohibition close during the machine is running.





It indicates that part of a rotating rollers, etc., do not touch during working.



It indicates that part of a rotating gear, etc., do not touch during working.



Represents the part during equipment operation have material top out, in order to prevent injuries, Prohibite close to Machine during working.



B. It indicates that the site has a high - voltage, turn off the power before open the door or open the cover,if not, it may result in death or serious injury.



ATTENTION OF MOVING MACHINES

1. Use rope for lifting operations.
2. Workers doing crane lifting operation of this device must have the relevant qualifications:
 - A. Mobile cranes special training completion certificate.
 - B. Hook operation skills training completion certificate.
3. Handling equipment should clear away before moving all types of processed or unprocessed work pieces, and check if the various types of fasteners on the device is loose and tighten them.

ATTENTION BEFORE OPERATION

1. Before using the equipment, develop operational plans to exclude security risks:
 - A. Before using the equipment, develop operational plans so that all relevant workers thoroughly understand the meaning of all signals, marking and symbols.
 - B. In preventive measures, we should be careful to check the security measures, in order to confirm that there is no security risk at the beginning of the job.
2. Put on labor appliances: It is very dangerous during work without helmet, goggles, dust masks and work gloves.



ATTENTION DURING OPERATION

1. To comply with the rules of operation:
 - A. Do not work when the protective cover is removed or the case open.
Do not climb over the security fence or physically probe into the fence.
 - B. If being gripped or involved, the person might get a major injury or death.

The operator shouldn't leave their jobs during equipment operation, and should always pay attention to all parts of any abnormal (abnormal sound, smell, heat, vibration, etc.).

They should cease operation immediately & Contact Azimuth. Where the operator can not rule out the fault, they shall promptly notify the maintenance staff.

When the operator leaves the device, or during the device adjustment, cleaning or lubrication, it should be stopped and powered off.

2. Lubricating, refueling and cleaning of the machine is prohibited during operation.
3. When abnormal display lights up or abnormal stop, please quickly deal with it.
 - A. Abnormal display lights up: for unknown reasons, stop running immediately.
 - B. After resetting, observe for a while to confirm the issue is solved.

ATTENTION AFTER OPERATION

1. When the operation ends, it is necessary to turn off the power switch.
2. The machine has to be stopped when doing maintenance.
3. Be careful to not let water/coolant get into electrical system
4. Water getting into the internal operating panel and control panel, will cause malfunction. Do not clean with steam and water.



ATTENTION OF MAINTENANCE

1. Warning

A. Unrelated persons are not allowed to enter:

- a. Non-maintenance workers can not shut down the ongoing maintenance work.
- b. When oscillating tools, pay special attention to people around. When the job postural isn't stable, pay more attention.

B. Hazardous actions:

- a. In the maintenance operation, the deputy should be configured of two or more personnel.
- b. When an emergency occurs, deputies to be able to immediately stop the machine. Touching the moving part is prohibited.
- c. Getting involved with the body or the turning shaft, rollers, chains, etc., will lead to personal injury.

C. Be careful when removing components with internal pressure

- a. Filter, pneumatic cylinder and high-pressure air line sometimes.
- b. When these parts being disassembled Be careful to prevent high-pressure gas and debris sprayed into the eyes and the skin, causing significant damage.
- c. Slowly release the pressure, when the gauge is displayed as "0", then disassemble.

D. Oils/Grease

- a. You can not mix different types of oils.
- b. Changes in composition can cause performance degradation.
- c. When using a clean grease, be careful not to mix impurities and moisture.



Mechanical Overview

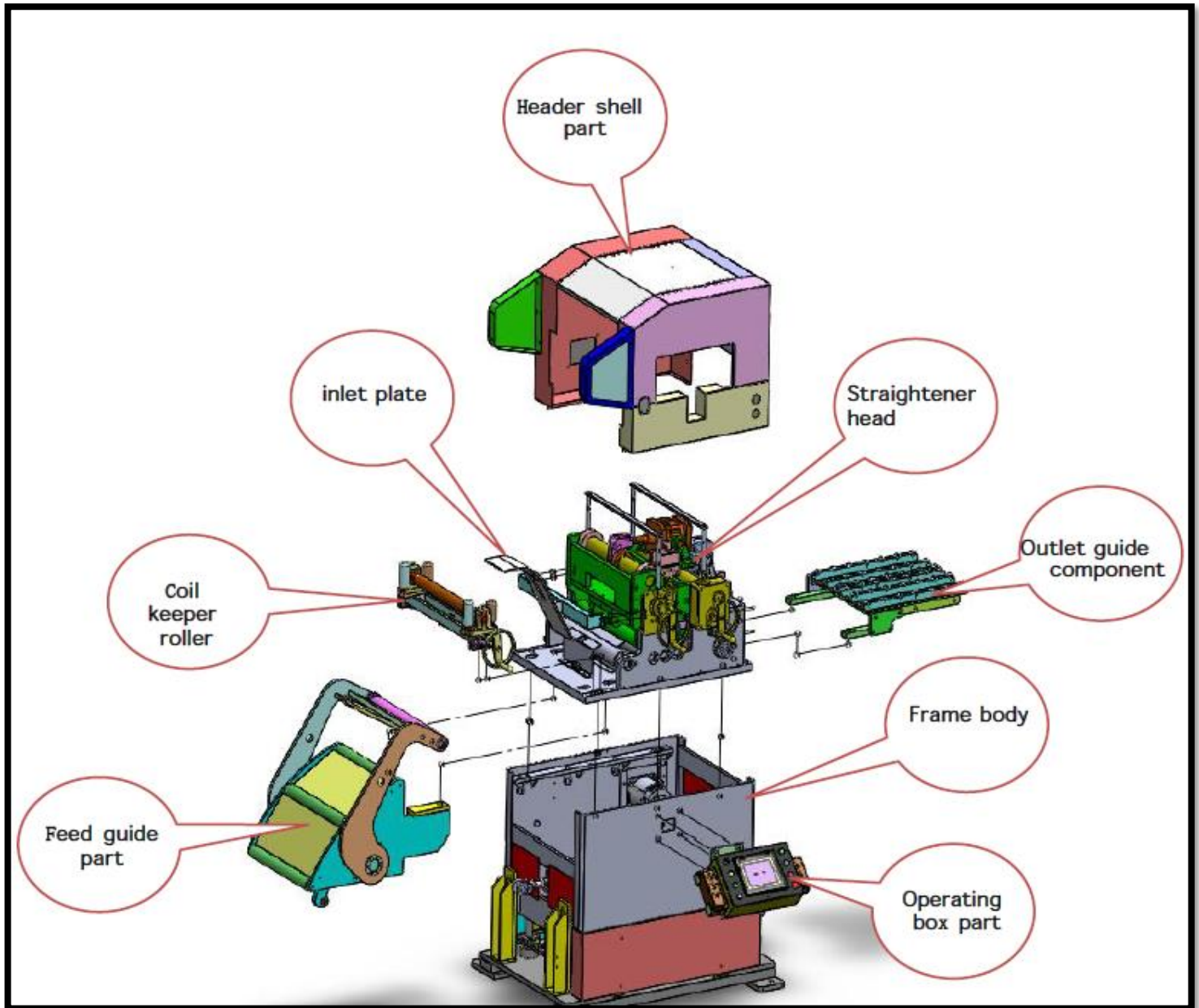


FIGURE 1- MECHANICAL OVERVIEW

This section shows an overview of the Servo Straightener Units.



Adjusting Feed height Adjustment

In order to corresponding to the height of the stamping devices, you have to adjust the feeding height of the straightener feeder.

Following diagram shows how to adjust the feed height

1. Unlock the three bolts on both front and back sides of the straightener feeder before adjusting
2. Press the feeding line height button on the touch panel to adjust the height casually.
3. Fasten the locking bolt and screws after adjustments .

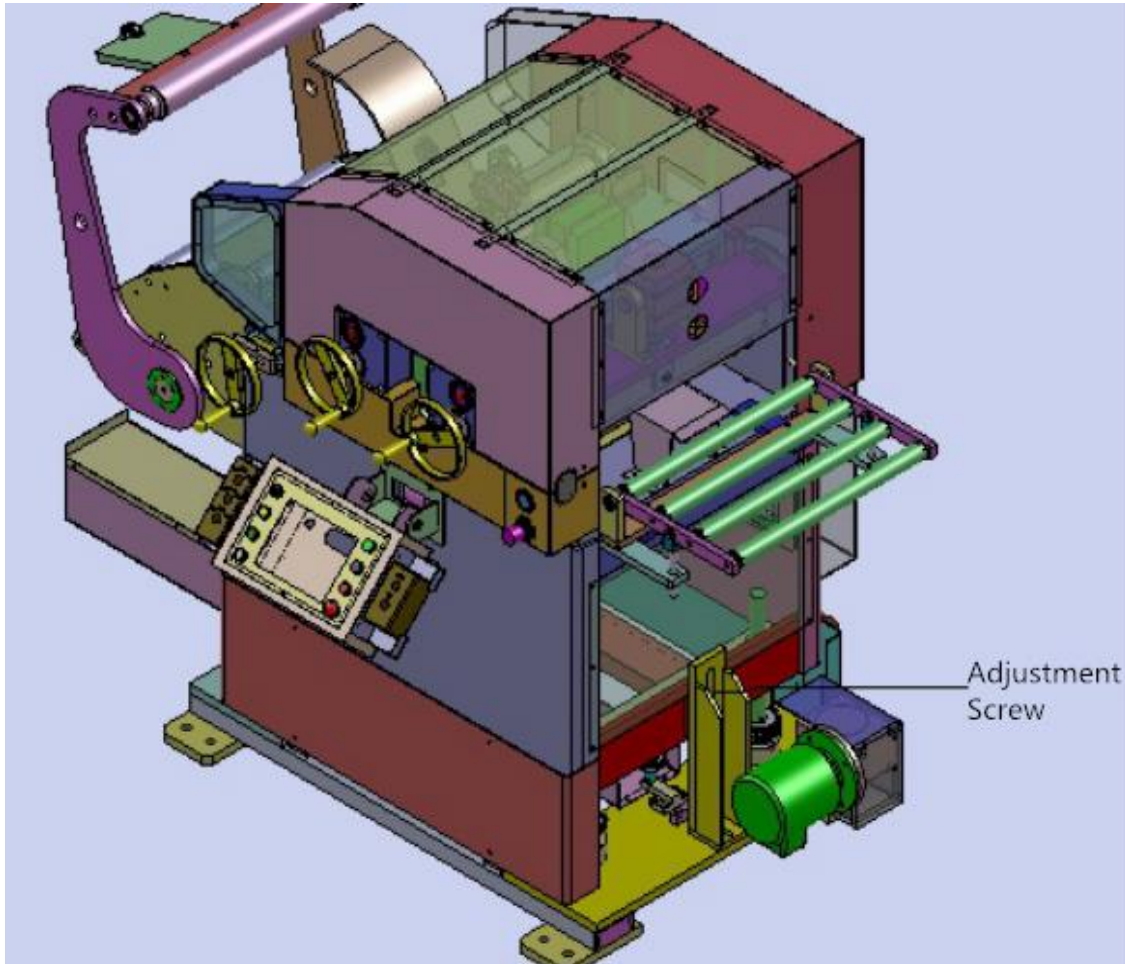


FIGURE 2 - PASSLINE ADJUSTMENT DISPLAY



Guiding rolls

The guiding rolls are guide in the entrance of the servo Straightener-Feeder unit. Both rolls operate separately in order to achieve the alignment of the material to the tool & die.

Separate the rolls in manual model

Rotate the hand wheel to adjust the distance between two guiding wheels to corresponding coil width

The materials should pass through the center of the mold and should be parallel with the roll feeder .

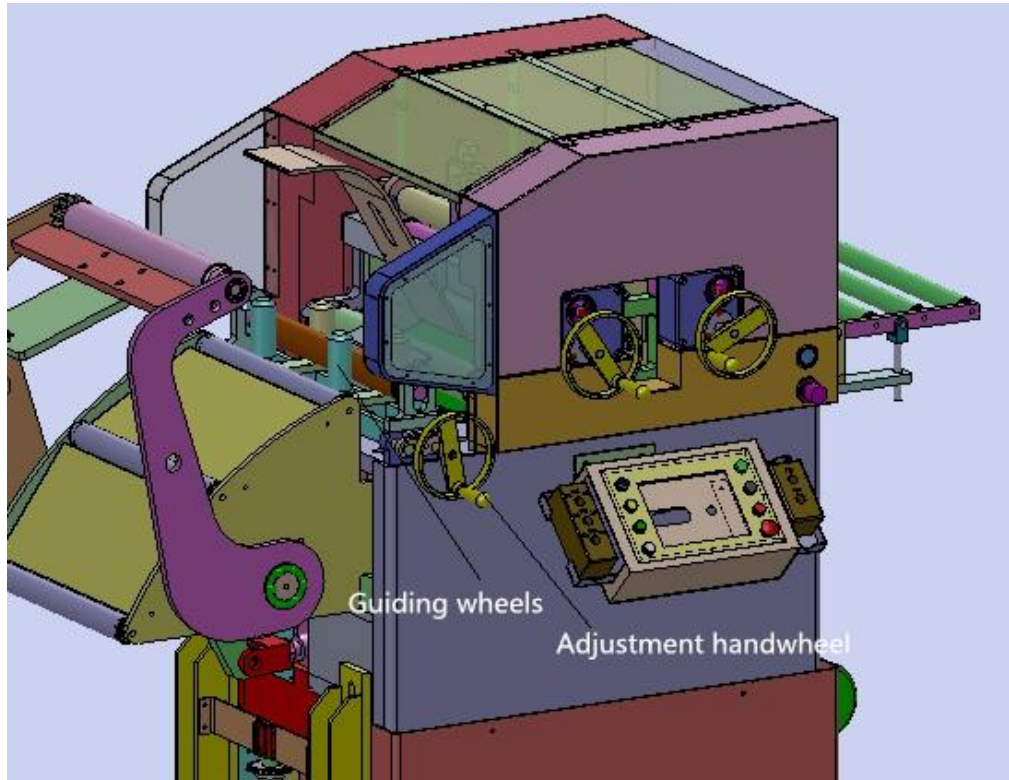


FIGURE 3- ENTRANCE ROLLS GUIDE



Straightener Adjustment

This section covers the straightener adjustment & how to properly adjust the straightener based on your material. The coil strip will be straightened after passing the straightening rolls.

The straightening value is what we refer to the running angle of straightening rolls to which is related to the straightening effect.

The straightener is adjusted by two CAMS controlled by the handwheel shown below.

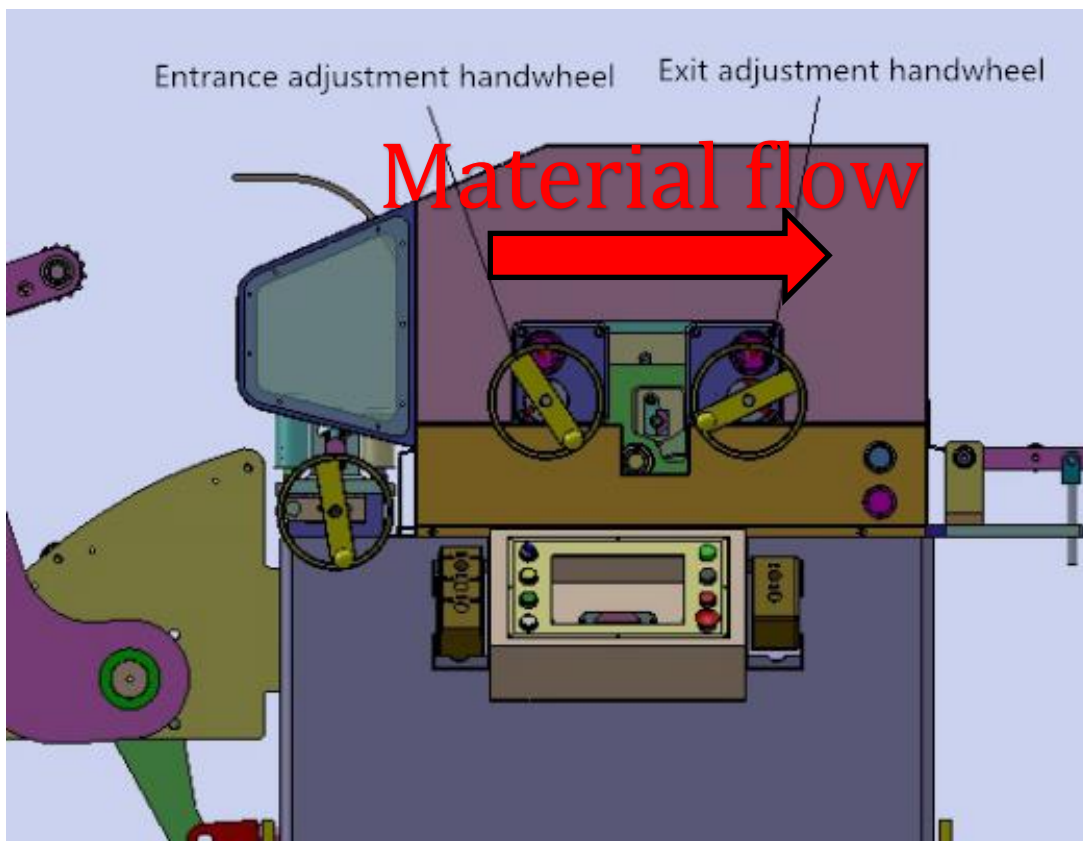


FIGURE 4 - STRAIGHTENER ADJUSTMENT

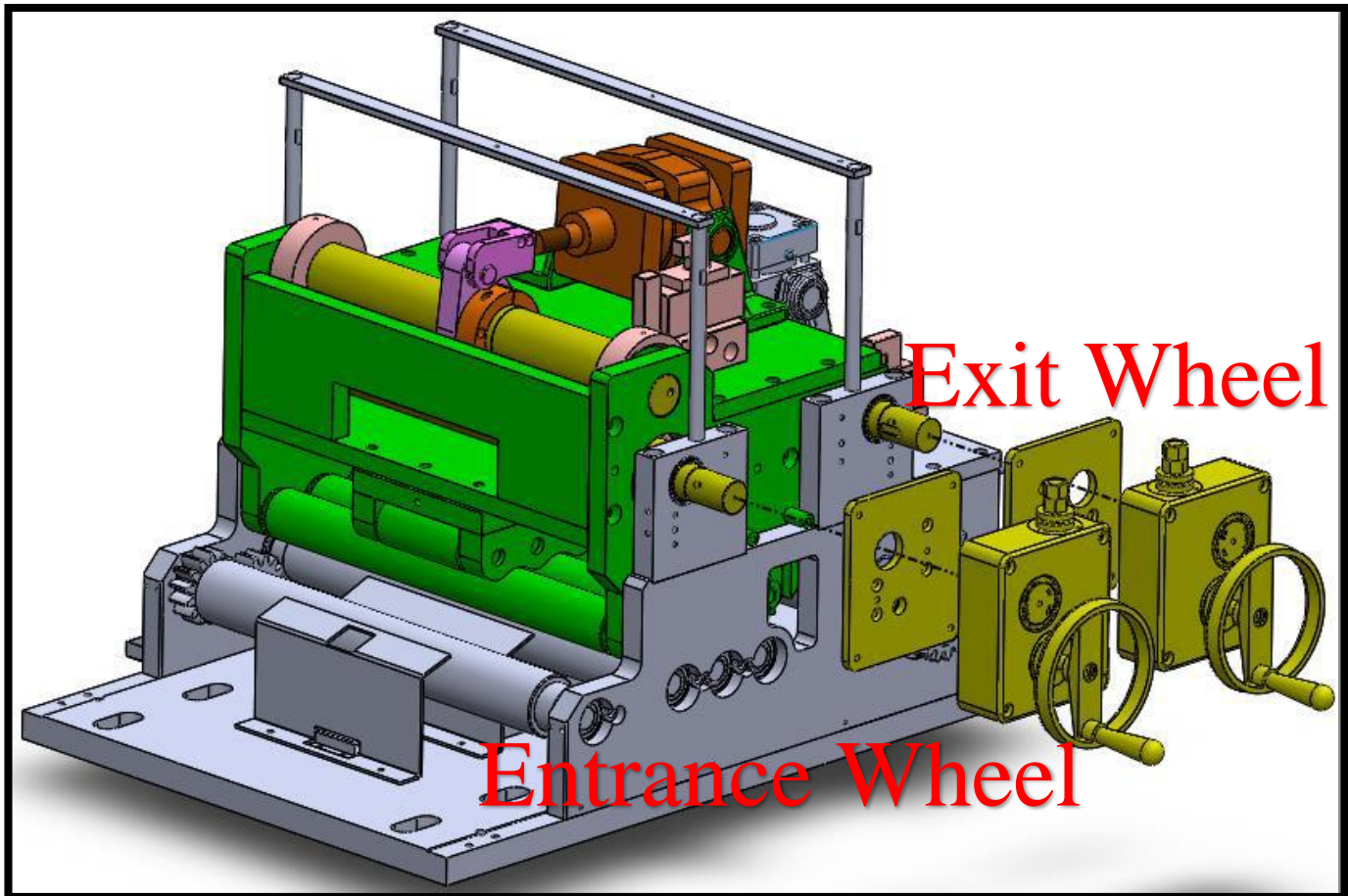


FIGURE 5 - STRAIGHTENER ADJUSTEMENT2

During adjustment, operate the Servo feed motor in manual mode to rotate forward and reverse, and adjust repeatedly until the correction effect is satisfactory.

Please note that repeating the process of straightening might be necessary due to different material. Do not repeat the process more than 5 times with the same material length as the mechanical properties of material might change.



The picture below represents the actual configuration of the straightener rolls.

The entrance handwheel should tilt the upper rolls 4-5-6-7 while **the exit handwheel** should incline & adjust parallelism of the all 4 rolls.

When both handwheel at same value (for example, +2mm), the distance between the upper rolls & lower rolls should be near 2mm.

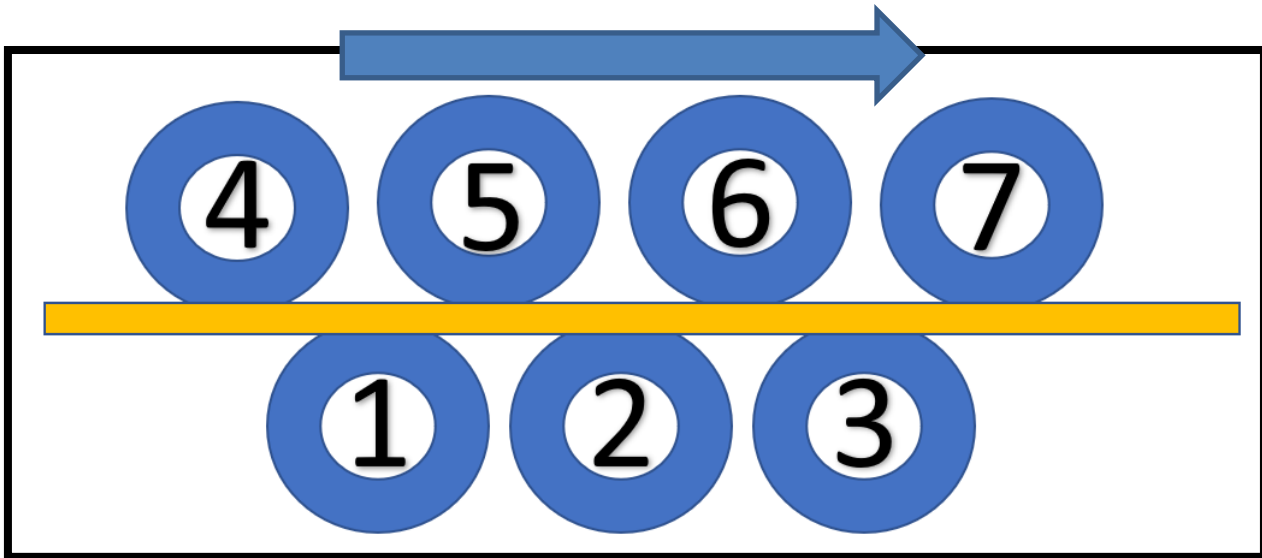


FIGURE 6 - STRAIGHTENER ROLLS CONFIGURATION

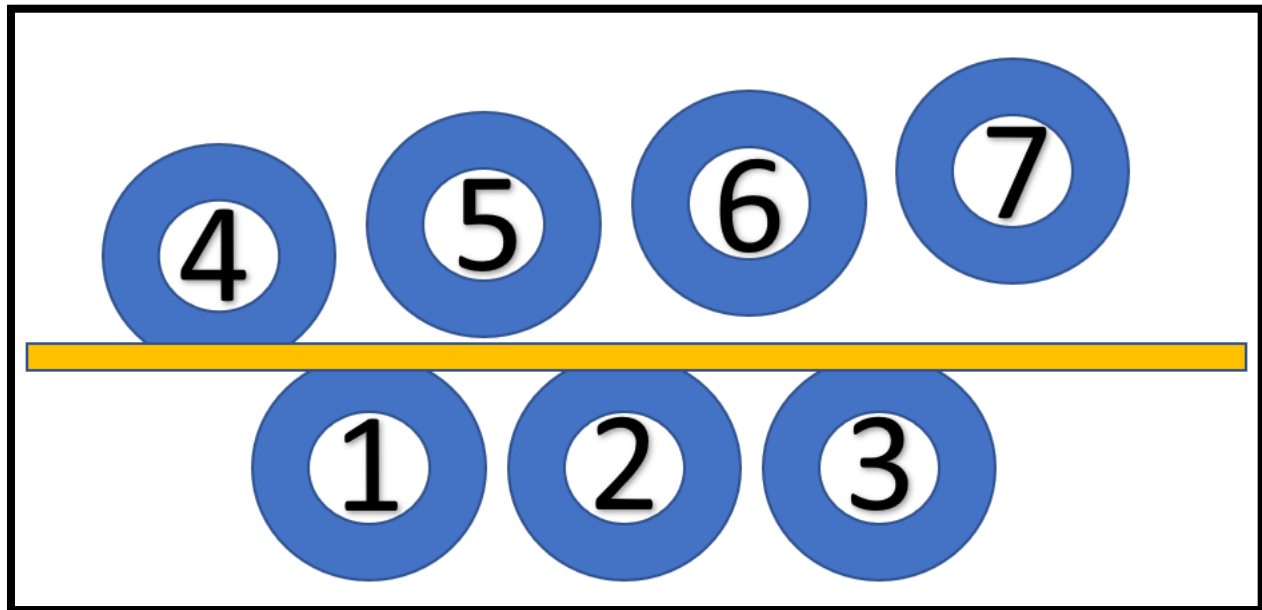


FIGURE 7 STRAIGHTENER ROLLS - NEGATIVE ENTRANCE WHEEL



Percentage of penetration

The percentage of penetration will vary based on these actual parameters :

1. Coil Diameter
2. Material
3. Loop between Decoiler & straightening unit

The reference percentage of penetration can be calculated by the table below

Always start with a 15% of penetration on the entrance rolls. For example :

Thickness	.060"
Entrance value	-.010"
Exit value	.060"

Slightly increase the entrance value if you are not having a proper result.

The exit value shouldn't be less than the actual material thickness.



Machine Capacity

The machine straightening capacity is for reference only. Please always refer to the servo torque value when operating the machine. The chart below shows the actual machine maximum thickness based on width of material.

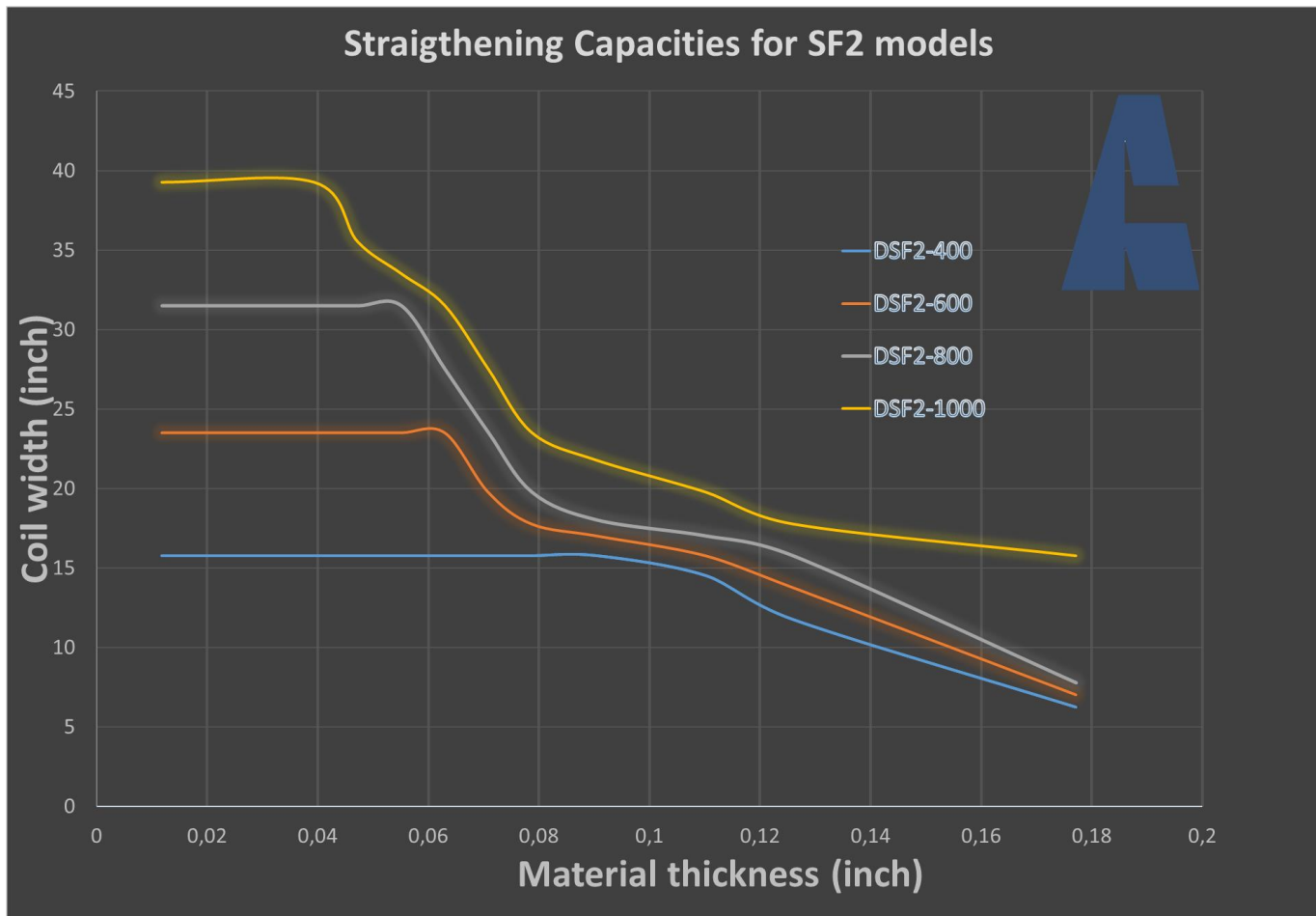


FIGURE 8 - STRAIGHTENER CAPABILITIES



THICKNESS (INCH)	AZ SF2-400	AZ SF2-600	AZ-SF2-800	AZ-SF2-1000
0,011811024	15,75	23,5	31,5	39,25
0,039370079	15,75	23,5	31,5	39,25
0,047244094	15,75	23,5	31,5	35,5
0,05511811	15,75	23,5	31,5	33,5
0,062992126	15,75	23,5	27,5	31,5
0,070866142	15,75	19,75	23,5	27,5
0,078740157	15,75	17,75	19,75	23,5
0,090551181	15,75	17	18	21,75
0,11023622	14,5	15,75	17	19,75
0,125984252	11,75	13,75	15,75	17,75
0,177165354	6,25	7	7,75	15,75

FIGURE 9 – SF2 STRAIGHTENER CAPABILITIES 2



Feeder Adjustment

This section covers the basics adjustment of servo feeder. The feeding rolls are at the very end of the structure. The pressure regulator at the front adjust the pressure of the feeding rolls.



FIGURE 10 - FEEDING ROLLS ADJUSTMENT

Pull out the adjustment knob (until the orange sign out), and then turn the adjustment knob to adjust the pressure of the discharge roller.

Twist clockwise, the pressure of the roller will be strengthened, twist counter clockwise, the roller The pressure will be reduced.

Push the button and fasten it until the orange sign hides after finishing adjustment.

If the material slips during feeding, it is probably due to weak pressure. On the other hand, overpressure may cause abrasion on the material or twisting of the material.



Adjusting the PLS outputs (Feed, reset cam & Pilot Release)

In order to synchronize the feeder with the stamping press properly, you need to adjust the cam switch of the stamping press to control the feeding and the automatic release.

Operating the press in “INCH MODE” of the stamping press to setting the cam switch.

For the stamping equipment using electronic cams, please set contact closure to “ON” and contact opening to “OFF”. Due to different electrical circuits, sometimes “ON/OFF” setting is opposite.

Feed signal

The feed start signal is set by the cam switch when the stamping equipment leaves the bottom dead center. Find the perfect timing between the opening of the tool & die.

Verify the angle value & add an hypothetical 10 degrees to this value. This value means that the feeder will start advancing material once receiving the signal. **(IE : This value should be between 180 & 360 degrees). You could always start with an hypothetical value of 270 degrees to your feed signal).**

Please note that the feed signal must be ON during the entire feeding sequence. If not, a “feed sequence” fault will occur.



Optimizing your feed signal

Below is an example of feed signal calculation :

Let's say you want to run your press $A = \pi r^2$ at 60 SPM. For some reason, you want to complete your feed sequence before 40 degrees because the stopping time of your press is long.

You input an hypothetical value of 270 degrees as your feed signal ON

Your part length is 6".

Feed signal on	270
Feed signal OFF	40
DWELL	$360-270+40=130$ degrees
Press speed	60 stroke per minutes
Press speed in degrees per seconds	$60*360/60=360$ degrees per seconds
Part length	6"
Feeder max speed	20" per seconds

FIGURE 11 - SCENARIO OF FEEDING CALCULATION

With the inputs above, you can determine if your scenario is achievable.

Feed time

$$\text{LENGTH} / \text{FEEDER SPEED} = 6"/20"/\text{seconds} = 0.300 \text{ SECONDS.}$$

Press timing between feed

$$\text{DWELL} / \text{Press speed in degrees per seconds} = 130/360 = .361 \text{seconds}$$

Feeder capacity

$$\text{Feedtime}/\text{presstiming} = .3/.361 = 83\%$$

Since we are under the feeder capacity, this means this scenario is viable. In the scenario above, we are not taking ACCELERATION & DECELERATION in consideration.



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Reset CAM

The reset CAM is a signal telling the feed that the press made a complete rotation. The reset CAM prevents a ‘double signal’ & prevents double feed.

The reset CAM should always be BEFORE the PILOT RELEASE signal, if needed.



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Pilot release

The pilot release is a signal that make the feeder release the pressure from the rolls. In order to achieve a proper release follow these steps :

1. Find & locate the pilots inside the tool & die.
2. Operate the press in " INCH" mode & make sure that the feeder is set to manual mode
3. Jog the press until you reach the entrance of the pilot pins.
4. Once you find the proper positioning, take the pilot angle in memory.
5. Input those value in your press control, -10 degrees as the OPEN ANGLE.
6. Closing angle should be at bottom dead center, which is 180 degrees.



Control Overview

This sections cover the control overview of the straightener-feeder unit.

Main Screen



FIGURE 12 - MAIN SCREEN

You can always access the main screen by pressing on the Azimuth logo in the top left corner of the [navigation bar](#).

The [setpoints and deviation](#) of the encoders for the straightner is found on the left. The current position is the measure of where the rolls are right now, the deviation from the recipe is how far the current value is from the one set in the recipes. You can set, temporarily, the setpoints of the front and back adjustment positions. For this to become permanent they must be transferred to the recipe using the transfer button below.

By selecting [Auto](#) or [Manual](#) you can toggle how the feeder is operated. In Auto mode the press is responsible for operating the feeder through the [different signals](#). In Manual mode the straightner is operated manually through the screen and push buttons.



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Machine state **will show messages** about what the machine is doing at the very moment, and will also show the torque for the last move the feeder has performed. This can be very useful when debugging.

The **active recipe title** and its values will **display the values** the feeder is currently using.



Manual Mode

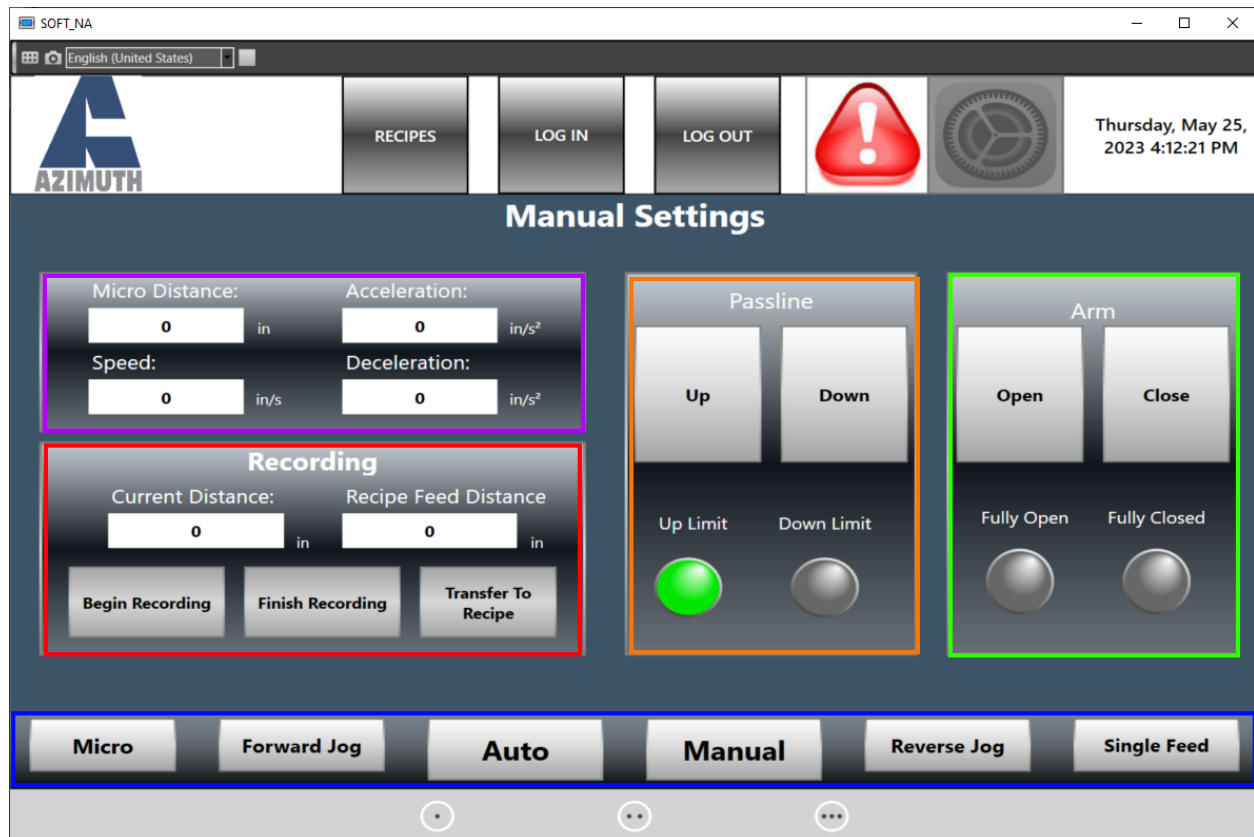


FIGURE 13- MANUAL MODE SCREEN

There are **four important settings** to operate the feeder manually :

1. *Micro Distance* : Length to feed when operating in micro mode.
2. *Speed* : Velocity of the advance of material
3. *Acceleration* : How quickly the feeder will reach its set speed. Note that if set too low the feeder may never reach its intended speed. The higher this setting is, the faster the straightner reaches its velocity but too fast and the rolls risk slipping and thereby losing precision.
4. *Deceleration* : How quickly the feeder goes from its set speed back to a standstill. As with acceleration, if decelerating too quickly the material may slip from the rolls.



Instead of presetting a length to feed, it's possible to **record the length** advanced manually with the jog forward and reverse buttons. When you begin recording the feeder "zeros" on the current position and records all variations until demanded by the operator to finish recording, at which point it's possible to send the recording length to the current recipe.

The passline, which is the height of feeder, **can be adjusted up or down** until the limits are reached (represented by the two luminous indicators).

The **positioning arm can be moved** towards or away from the entry roll using the controls on the screen. The luminous indicators on the screen show if the positioning arm is fully closed, or if it has reached the limit of its open position.

The **feeder can be operated manually** either in jog or in micro mode. Micro performs a feed of a preset length determined by the Micro Distance setting. Jog will move the feeder forward or reverse for as long as the controls are activated, either via a physical button or via the HMI. To enter Micro mode simply press the button and notice that the background color of the button has changed to indicate that micro is active.

A single feed can be performed by pressing and maintaining the single feed button, note that this feed uses the values in the current loaded recipe.



Bringing material to the tool & die

This section cover the procedure to bring material to the tool & die properly.

1. Open the entrance & exit straightener adjustment. Make sure to remember the actual adjustment of your straightener unit.
2. Open the Entry ARM to leave room for material to be properly “pinched”.
3. Manually advanced material until you reach the servo feed rolls.
4. Readjust the straightener value

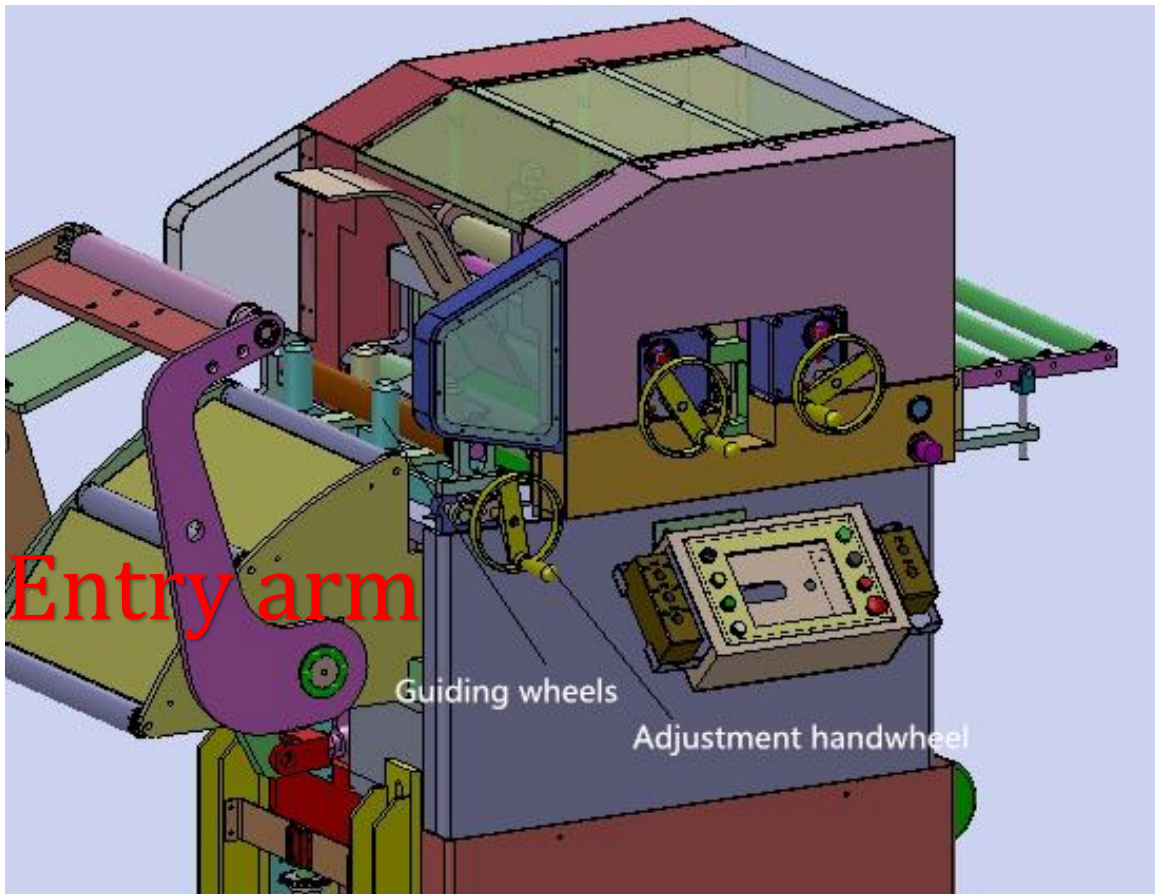


FIGURE 14- HOW TO PASS MATERIAL THROUGHT SF UNIT



Recipes

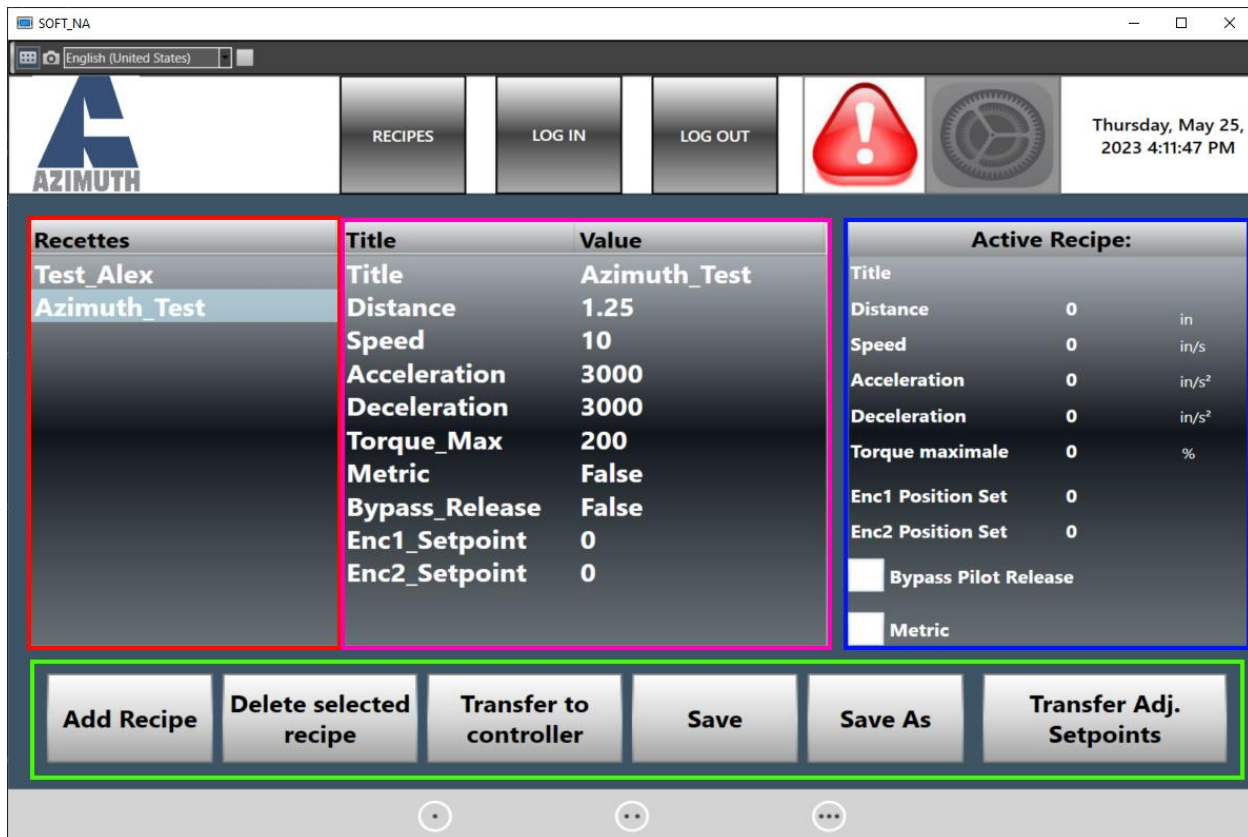


FIGURE 15 - RECIPE SCREEN

Recipes are a set of variables recorded that you can recall and make active whenever required.

There is a **list of recipes**, when selected in the list, the **values of the recipe** will be displayed on the screen. Note that those values will not become active until the recipe is transferred to the controller.

The **currently active recipe and its values are shown**, it is read only and cannot be modified therefrom.

Various actions can be performed on the saved recipes. A new recipe can added, an existing one can be deleted or transferred to the controller (*note : transferring to controller will not remove the recipe, but rather make it active so that its values are used*). If any modifications are made then the recipe can be saved, note that recipes **must be saved** in order for them to retain their values when the machine is powered down. Any new modifications to be can



be made under a new name by saving the recipe as a new one. The current adjustment setpoints of the

Straightener, can be transferred in the currently selected recipe, thereby saving the current location of the straightening system.

Components of a recipe

Title: The name of the recipe.

Distance: The distance the feeder will advance. This is in metric, if metric below is selected.

Speed: This is the speed at which the feeder will move.

Acceleration: How quickly the feeder will reach its speed. Increasing it makes the feeder accelerate faster.

Deceleration: How quickly the feeder will stop. Increasing this value makes the feeder decelerate faster.

Max Torque: Represents the force in that the motor is allowed before giving an alarm. Note that there is also *a max torque in the maintenance menu* that applies when not in auto mode.

Metric: Check when you want the recipe to be in metric. Note that this only applies to the recipe, *to change the overall unit* you need to go to the maintenance menu. Be warned that checking metric **will not automatically convert the distance**; this needs to be done manually.

Bypass release sequence: Bypasses the release part of the sequence, allowing the feeder to operate without releasing the pilot.

Enc1 and Enc2 position set: Position setting of the encoders on the straightening system, this is the raw value stored in the recipe.

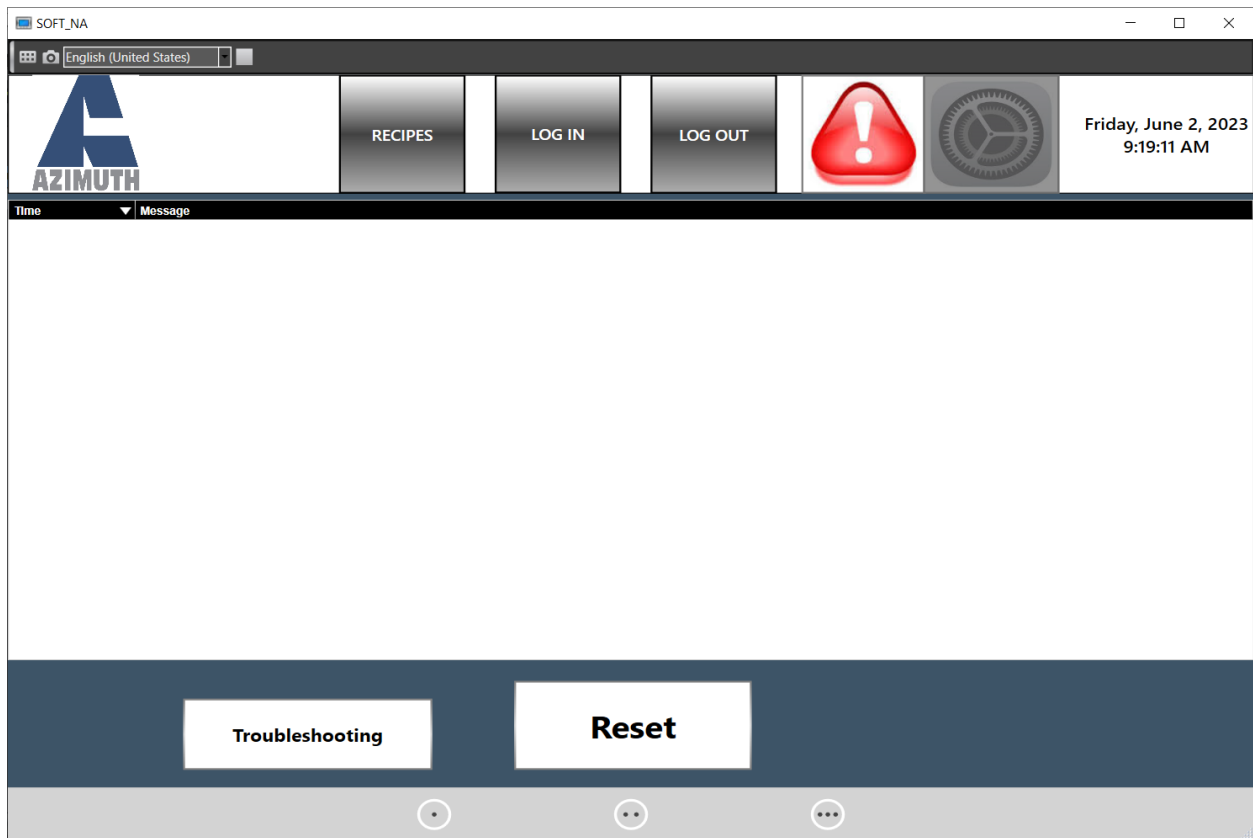


FIGURE 17 - ALARM SCREEN

Alarms

The alarms screen will display alarms and allow you to reset them. Note that if the *press gives out a fault signal*, then the press controller will need to be reset before the alarm on the feeder. The troubleshooting screen is strictly for advanced fault-finding with the PLC, HMI or Servo Drive.

FIGURE 16- ALARMS SCREEN



Troubleshooting

Alarm	Possible Problem	Solution
Sequence Error	The feeder received a feed signal while waiting for a reset or release signal.	Make sure the controller's output are properly configured and that all wiring is properly connected.
Feed Signal Lost	The feed signal was lost during feeding.	Make sure the cam angle settings for the feed are properly set on the press controller, or increase the speed of the feeder. Make sure that all wiring is properly connected.
Max Torque	The maximum torque set in maintenance (if in Manual) or in the recipe (if in Auto) has been reached.	Inspect the mechanics of the feeder and die to make sure nothing is blocking it from operating properly. Make sure the proper material is selected. The max torque value is set too low or the machine is forcing more than it should – set it higher. Make sure a recipe is selected upon start-up.
Pilot Manual	The pilot release is manually activated.	Turn the selector on the side of the feeder to the proper position
Press Fault	The press controller is giving an error.	Clear the fault with the press controller. Make sure everything is properly wired.
Safety Activated	A safety has been activated.	Check all E-Stops and doors. Verify proper wiring.
Servo Drive Error	An error with the servo drive has occurred.	Press reset and if the error comes back then lookup the error code on the drive inside of the panel and take appropriate measures.

FIGURE 18 - TROUBLESHOOTING TABLE



Feeder Signals & Press Communication

Communication between the press and the feeder is done through five different signals. Four are sent from the press to the feeder, and one is sent from the feeder to the press.

The tables below explain the different signals that are exchanged between the feeder and the press.

SIGNALS FROM THE PRESS TO THE FEEDER

Feed	Initial signal that triggers a feed cycle from the feeder. The signal must be maintained while the feeder is feeding.
Reset cam	After a feed signal, the press must send a reset signal before the feeder can repeat.
Release	Releases the pressure on the material by operating a solenoid-controlled valve. This part of the sequence can be bypassed .
Error	A fault condition has occurred in the press and therefore the feeder must stop. Please visit section 3.4 for more detail.

SIGNALS FROM THE FEEDER TO THE PRESS.

Error	A fault condition has occurred in the feeder and therefore the press must stop. Please visit section 3.4 for more detail.
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Maintenance Settings

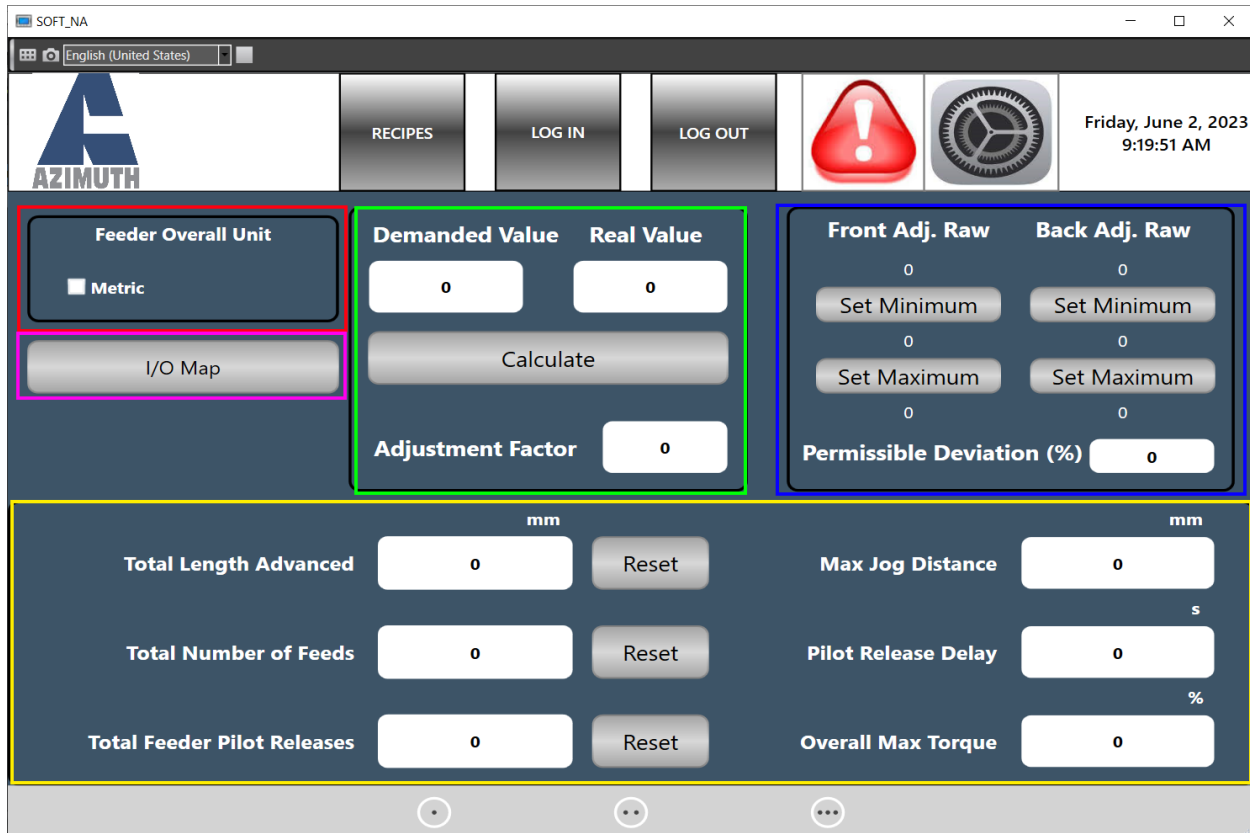


FIGURE 19 - MAINTENANCE SCREEN

The **overall unit type of the feeder** can be changed to metric. Please note this *only applies to manual mode*, recipe units are set individually for each recipe.

An **adjustment factor** can be set in order to compensate for constant feeding length deviations. Please note that this *factor does not apply* to recording lengths with the manual function. The factor can be calculated automatically by entering the value demanded, the one entered on the screen, and the real value physically measured from the piece fed through.

The feeder keeps **some statistics** on its usage. The maximum jog distance allowed prevents the feeder from accidentally feeding too long of a distance in case of an electrical control issue. The pilot release delay is a timer that controls how long the pilot is supposed to take in order to physically move to its closed position. It helps prevent the feeder from feeding



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while the rolls are still partially opened. The overall max torque is the value taken into account when not operating in auto mode – otherwise the value from the recipe is used.

The [encoder on the front and back straightening rolls](#) can be recalibrated, which is not something that should ever be necessary unless the encoders must be changed, please contact us before doing so. The permissible deviation from the recipe setpoint on the encoders can also be modified, which is how far from the setpoint to go before triggering an alarm.