FIREBALL
RED HOT
CANNABIS GUMMIES

# Machine Manual


## MT NANO 60 X Blister Machine

SERIAL # 20-055

## Forward

This manual describes the basic functional operation of the MTNANO 60X small blister machine, key components, PLC Program, set-up procedure, schematics, various layouts, and parts listings and more…

***Part 1*** Functional description, machine layout and Machine Specification

***Part 2*** Transportation and installation

***Part 3*** Machine Operation

***Part 4*** Preventative Maintenance

***Part 5*** Input/output PLC Schedules and Control Panel Layout

***Part 6*** Electrical Schematic and Pneumatic Schematic

***Part 7*** Key Components Parts Listing and Recommended Spare Parts

***Part 8*** Troubleshooting guide and Maintenance

***Part 9*** Specifications Sheet

***Part 10*** PLC program ladder logic

## TABLE OF CONTENTS

## *Part 1 - Machine Specifications and Description*

## (1.1) Functional Description

The model referenced in this manual is to be considered a small-scale blister machine capable of thermoforming plastic films into various shapes. The machine is designed to be operated by a single operator to automatically form, fill, seal, perforate then cut off blister units into single or multiple counts.

**Basic Description:**

The MT NANO 60 Blister Machine is a small unit approximately 36” in overall length by 18” in width and a height of approximately 22”. The machine is designed to thermoform rigid plastics and some semi-rigid films supplied primary on a roll approx. 250mm maximum in diameter. The plastic film supplied for this machine must be of suitable grade used for thermoforming and/or cold forming applications. The plastic film (web) is loaded on the front lower right-hand side of the machine and held into place by a pneumatic film holder. The film advances through the machine by a set gripper operated by a servo motor attached to a linear slide mechanism. As the web or material is indexed through the machine it will first be preheated by a set of preheat plates, which come in contact with the web for a short period of time. By coming in contact with the plastic web the web becomes heated to a point in which it then can be pressure formed in the forming station utilizing air pressure. After the web has been formed, the machine will then cycle one index and a new cycle will begin. The web is then advanced downstream, filled with product, sealed, perforated and die-cut depending on what options are required.

*Film (web) Holder*

The forming film is held on the machine by a simple shaft and film holder assembly. As the machine indexes the web will rotate around the shaft spinning off film at the machines rate of index.

The lidding film is held on the machine in the same manner. As the machine indexes the lidding material will rotate around the shaft spinning off lidding stock through a small festoon roller system which will apply tension to the film holder after each machine index.

*Pre-Heat Station*

The pre-heat station consists of two matching aluminum plates mounted on separate holders and are controlled by independent heat controllers. The lower pre-heaters are mounted directly to the lower forming lift plate. When the machine is started the upper and lower preheat plates comes in contact and/or forms gap between the web. When the machine is stopped both preheat plates retract to allow web to cool.

During normal machine operation the pre-heat plates with intermittently actuate and contact the web during the forming cycle.

Heat for both the left and right preheat plates are controlled by independent digital temperature controllers which are accessible via the operator control panel. The temperature of the plates is monitored by the heat controllers and sensed by an RTD probe located inside each preheat plate.

*Forming Station*

The forming station is located near the lower left portion of the machine just past the pre-heat station. The forming station is operated by a pneumatic cylinder. The station contains a lower and upper forming die or mold. When the pre-heated film passes through the forming station from the pre-heat station, the lower forming die will raise and clamp onto the film. When the forming station is fully closed air pressure is introduced through the upper die and forced down onto the film and into lower forming die. This creates the form on the film. After this operation is achieved the lower die will retract to allow the formed web to pass through the station. A plug assist unit can also be activated assist in the forming operation *(if equipped)*

*Printer*

The printer is located near the center upper portion of the machine atop the sealing station. The print is placed on the lidding material from a ribbon via thermal transfer as the web advances through the printer from the lidding material unwind and before it merges with the forming material to be sealed in the sealing station.

*Sealing Station*

The sealing station is located near the center portion of the machine just past the filling station. The sealing station is operated by a pneumatic cylinder. The station contains a lower and upper sealing die. The lidding material unwind positioned directly on top the sealing station provides the lidding material to be merged with the forming material. When the combined films pass through the sealing station from the forming station, the lower sealing die will raise and applies pressure onto the film. The upper seal die is heated with a digital heat controller this creates a seal by melting the inner layer of the lidding maternal to the outer layer of the forming material. After this operation is achieved the lower sealing die will retract to allow the formed and sealed web to past through the station. The temperature of the upper sealing die is monitored by the heat controller and sensed by an RTD probe located inside the upper seal die heater plate.

*Deck Plate and Guides*

When the formed web passes through the forming station it is then guided by a deck plate or guide normally machined out of aluminum. This plate is located between the forming station, sealing station, perforation station and the cut-off stations.

*Indexing Grab and Pull*

The indexing of the web through the machine is controlled by a set of grippers mounted onto a servo driven slide unit. The initial pulse signal (go) is trigger from a PLC

unit and resets the index counter to zero. When the servo drive is told to advance it will advance until it reached the preset number on the counter.

*Perforation / Embossing Station*

The Perforation station consists of a steel rule die set when the package format requires perforation. It can also double as an embossing station and would contain steel type to emboss control numbers onto the formed web material. The perforation station is located near the right-hand portion of the machine just past the sealing station. The station is operated by a pneumatic cylinder. The station contains a lower and upper perforation die or embossing die. When the formed web passes through the station from the sealing station, the lower perforation or embossing die will raise and applies pressure onto the film. This will either create a perforation in the web or emboss a number onto web. After this operation is achieved the die unit will retract to allow the formed web to past through the station.

*Cut-Off Station*

The cut off station consists of a die set, which is designed to die punch final radius on package. It can also consist of a waste knife to cut up trim and waste after the die-cutting operation. The cut-off station is located on the right-hand side of the machine just past the pinch roller assembly. The station is operated by a pneumatic cylinder. The station contains a lower and upper die punch set. When the formed web passes through the station from the pinch roller assembly, the lower die set will raise and pushes through the upper die punch assembly. The cut units fall directly onto a slide.

*Main Control Panel*

The operator control panel mounted on the front of the machine consists of 5” touch screen operator interface panel. The operator interface panel contains several menus which control on/off functions in additional to cam settings, program recipes and troubleshooting info. Inside the control panel mounted behind the machine is the PLC unit, 24vdc-power supply, relays, heat control units, servo drives and main fuses. All of the machine logic is preformed inside the PLC (programmable logic controller). The PLC is programmed by a software program specifically written to communicate with the operator interface. The PLC consist of a CPU (central processing unit), input and output modules. The CPU is the logic center for the PLC directing all logic to and from the input modules. The input modules are feed by inputs from the operator interface control. The out-put modules control all pneumatic valves, stepper motor driver, and printer function, and various other functions.

*Pneumatic System*

The pneumatic system on the machine consists of a main air pressure regulator a pressure regulator for perforation and forming air pressure. A single bank of (8) 24VDC four- (4) way solenoid valves mounted onto a gang style manifolds. These valves control the directional operation of the main functions of the machine such as forming station, sealing station, perforation station, cut-off, and various other machine functions.

*Main Frame*

The main frame of the machine is constructed of solid aluminum plates and a fully welded enclosure. The main station plates, and control panel are mounted onto the main frame. The frame consists (4) leveling pads.

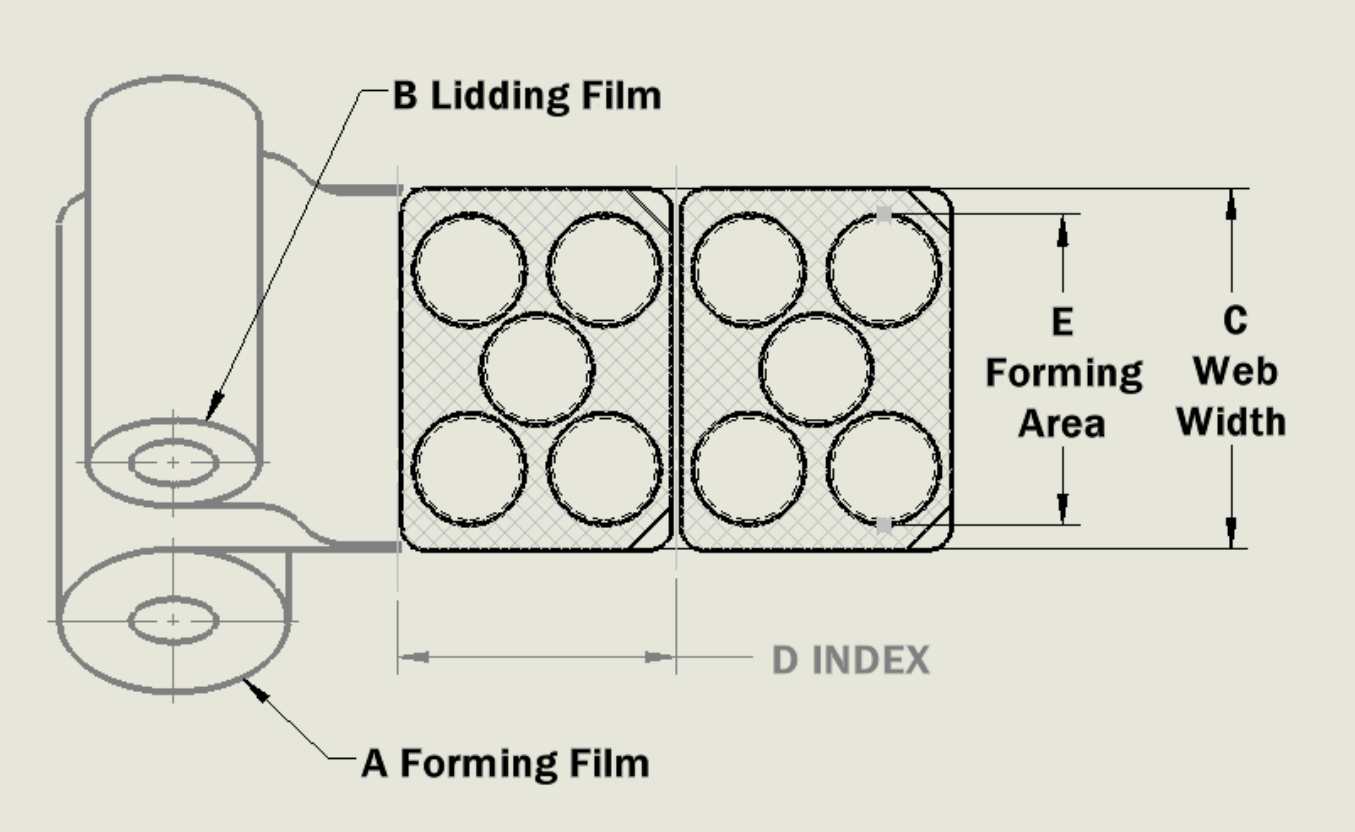
*Optional Equipment*

The MTNANO 60 is equipped with the following optional equipment. Some of these units have separate operational manuals and will be supplied as a supplement to this manual.

| Optional Equipment | Manufacturer |
|---|---|
| Servo Pumps | FMI |
| Savage Tank (20 GAL) | SAVAGE BROS |
| Digital Printer | MARKEM |

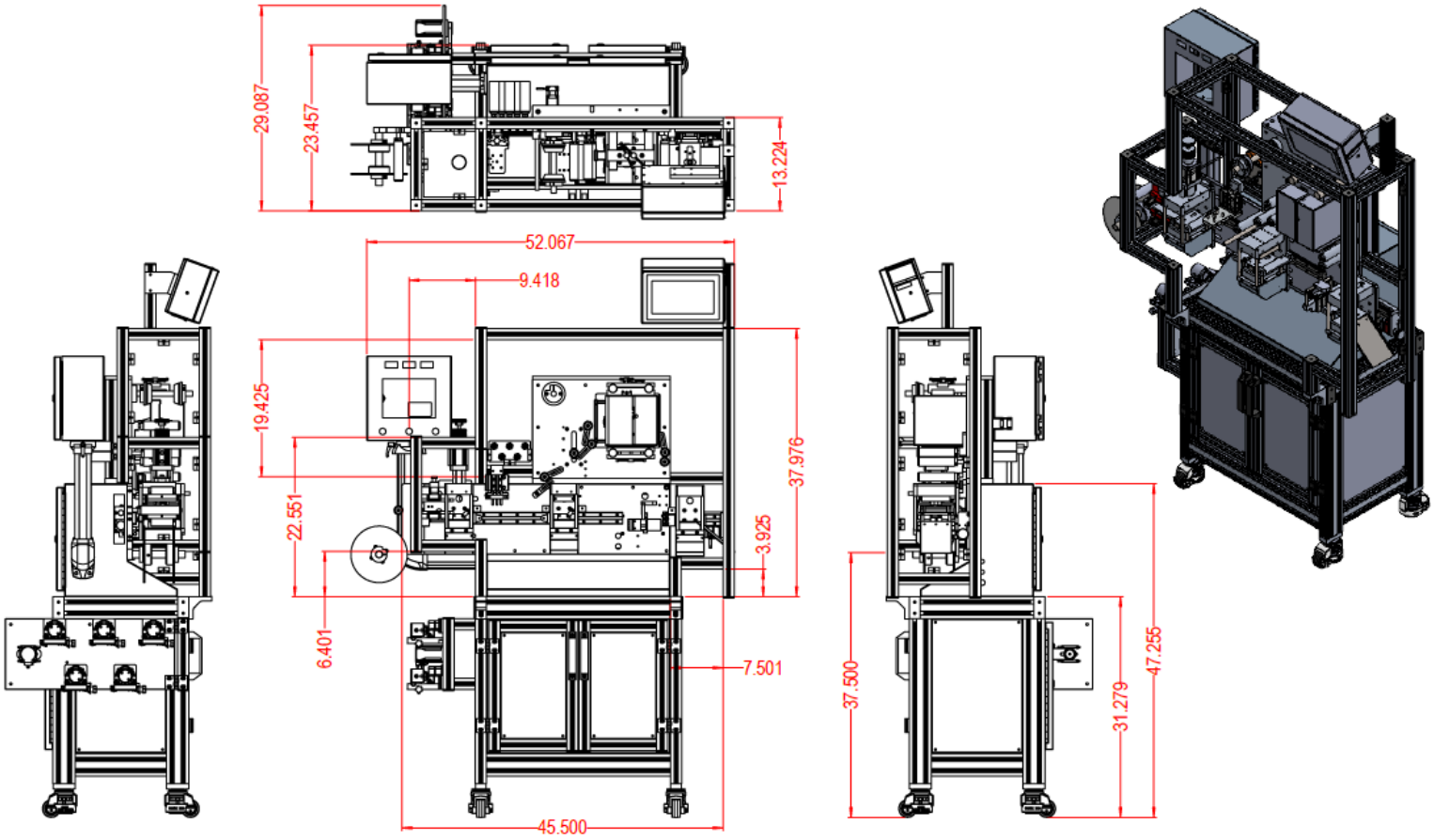
## (1.2) Machine Layout (general)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| **Min** | - | - | 80 mm | 20 mm | 30 mm |
| **Max** | 250 mm OD | 200 mm OD | 100 mm | 75 mm | 80 mm |



## (1.3) Machine Specifications

| Parameter | | Details |
|---|---|---|
| Operating Speed | | Approx. 40 Cycles per Min / Max Based on Feeding |
| Utilities | Electrical Supply | 9A @ 110 V , 1 Ph, 60hz |
| | Air Pressure | 6 Bar |
| | Air Consumption | 3-5 CFM |
| Format Dimensions | Format Area | 100mm X 70mm |
| | Max Forming Depth | 16mm |
| | Standard Foil Width | 80mm |
| Film & Foil Details | Forming Material | PVC, PVdC, Alu, Aclar, PET, PP, COC (max 15mil) |
| | Forming Roll | Outer Ø 12" , Core Ø 3" |
| | Lidding Material | Aluminum & CR foils |
| | Lidding Roll | Outer Ø 10" , Core Ø 3" |
| Noise Levels | | 20 dB |
| Changeover Time | | 10-20 minutes |
| Machine Dimensions | | 46" long x 24" wide x 76" high |
| Machine Weight | | 550 Lbs (net) |



## *Part 2* - Transportation and Installation

### (2.1) Transportation

Transportation of machine from one facility to another will require that machine be lifted onto a platform and blocked to secure from moving. Full crating may be required in some instances. The machine can be lifted onto a crate or platform with a forklift truck.

**Room to Room moving**

The MTNANO 60 is equipped with (4) leveling pads mounted underneath the enclosure. Machine can be lifted onto a table with assistance from several people or a lifting device. A lifting device is recommended for placement of machine

**CAUTION** Do not attempt to move on casters up or down an incline.

## (2.2) Installation

Installation of machine should be performed as follows:

1) Make sure machine is on a sound, hard level surface.
2) Level machine in both directions using a torpedo type or equivalent bubble level
*3)* Lower leveling pads (4) until castors raise off the ground (2-5mm) *(Figure 1)*
*4)* Install main air line (*Figure 2)*

**Caution** Never operate machine on castors. Machine must be leveled and installed on leveling pads prior to operation.

*Figure 1*

*Figure 2*

## (2.3) Storage

If the MT NANO 60 machine is to be stored for a long period before or after installation, the machine should first be inspected and cleaned.

1) Store machine and components in a clean dry area

2) Cover with a breathable fabric or cloth to protect from dust and dirt

3) Drain and purge air lines

# *Part 3* - Machine Operation

## (3.1) Steps of Operation

1. Turn on main power switch located on right side of the enclosure.
2. Check main air pressure regulator for air pressure.
3. Load film onto un-wind shaft assembly. Film to unwind either clockwise or counterclockwise depending on seal surface.
4. Thread film through machine. Release advance clamp to allow film to pass through advance clamp section.
5. Close all guards before operation
6. When pre-heat temperature has reached set-point machine is ready to cycle.
7. Turn on all required stations from operator interface.
8. Turn machine on by Start button located on operator interface.
9. Re-check air pressure settings and temperature settings as per predetermined set-up parameters

## (3.2) Machine Setup and Setup Sheets

**It is recommended to construct a set up sheet as shown below. This sheet is used to record program setting and parameters**

**PRODUCT** _____

**FILE NAME**_____

### CAM & STATION SETTINGS

| CAM | DESCRIPTION | x | y |
|---|---|---|---|
| C01 | Index | 8 | 75 |
| C02 | Web Clamp | 9 | 58 |
| C03 | Advance Clamp | 4 | 62 |
| C04 | Forming Station | 22 | 90 |
| C05 | Forming Air | 32 | 70 |
| C06 | Forming Plug | 30 | 40 |
| C07 | Sealing Station | 33 | 76 |
| C08 | Perf. Station | 34 | 75 |
| C09 | Knife Cut Station | 55 | 70 |
| C10 | Filler Pump | 25 | 60 |
| C11 | Filler Nozzle | 80 | 90 |
| C12 | Printer Signal | 50 | 60 |
| C13 | SPARE | 0 | 0 |
| C14 | SPARE | 0 | 0 |
| C15 | SPARE | 0 | 0 |
| C16 | SPARE | 0 | 0 |
| C17 | SPARE | 0 | 0 |
| C18 | SPARE | 0 | 0 |
| C19 | SPARE | 0 | 0 |
| C20 | SPARE | 0 | 0 |

| STATION | DESCRIPTION | STATE |
|---|---|---|
| S01 | Index | OFF |
| S02 | Forming Station | OFF |
| S03 | Sealing Station | OFF |
| S04 | Perf. Station | OFF |
| S05 | Knife Cut Station | OFF |
| S06 | Filler Station | OFF |
| S07 | Printer Station | OFF |
| S08 | Registration | OFF |
| S09 | Heater Control | OFF |
| S10 | Test | OFF |
| S11 | Pump Purge | OFF |
| S12 | SPARE | OFF |
| S13 | SPARE | OFF |
| S14 | SPARE | OFF |
| S15 | SPARE | OFF |
| S16 | SPARE | OFF |
| S17 | SPARE | OFF |
| S18 | SPARE | OFF |
| S19 | SPARE | OFF |
| S20 | SPARE | OFF |

## SETUP HEATERS

| | | *on* | *off* |
|---|---|---|---|
| **PREHEAT LOWER** | **TEMP:** | **109.9 C** | |
| **PREHEAT UPPER** | **TEMP:** | **110.2 C** | |
| **SEAL HEAT** | **TEMP:** | **147.0 C** | |

## AIR PRESSURE

| | *Pressure (bar)* |
|---|---|
| **MAIN AIR PRESSURE** | **110** |
| **FORMING PRESSURE** | |
| **PERFORATION PRESSURE** | **110** |

## MOTOR SETTING

| | *VALUE* |
|---|---|
| **INDEX LENGTH** | **Profile 1** |
| **SPEED** | **20** |
| **REGISTRATION** | **ON [ ] OFF [ X ]** |

| **PRESET** | |
|---|---|
| **KNIFE CUT PRESET** | 1 |

| **VERSION** | |
|---|---|
| **PLC** | MT2022ADP001 |
| **HMI** | MT2022ADS001 |
| **MT** | MT2022SMM001 |
| **MT** | MT2022OMM001 |

| **MOTOR** | |
|---|---|
| **SPEED (CYCLES/MIN)** | 20 |
| **INDEXER SLIDE PROFILE** | 1 |
| **REGISTRATION PROFILE** | 2 |

## (3.3) Operation Instructions

### Forming Station

#### Forming Unwind

- Place the forming material roll onto inner spool.
- Place outer spool and push into place film can be unwound in either direction inwards/outwards depending on orientation of sealing layer. (*Figure 3)*

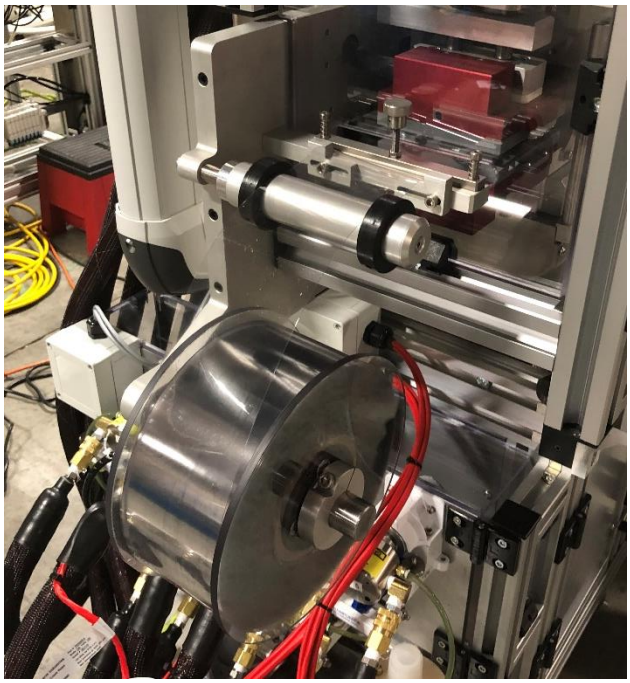


*Figure 3*

#### Forming Station (W/O Plug Assist)

- Forming station in-feed guide could be adjusted to accept different film widths by loosening the two-set screw on film collars and adjusting to the desired width then fastening the screws back. (*Figure 4)*

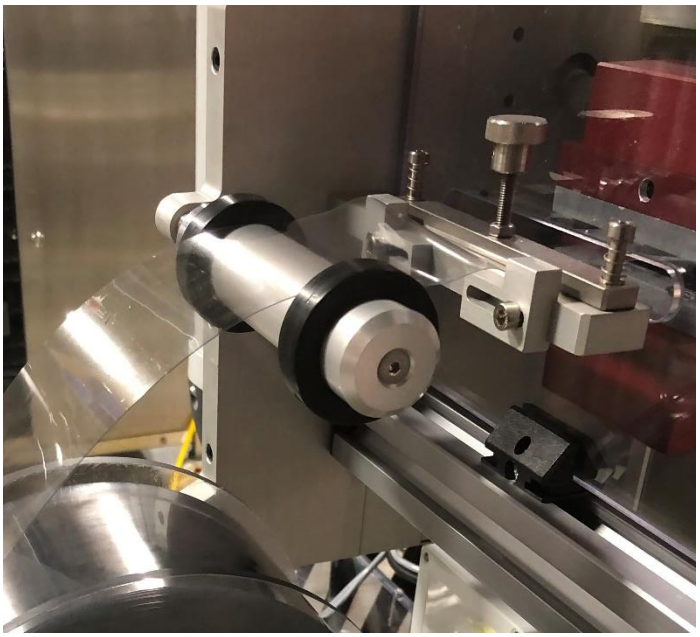


*Figure 4*

- The per-heaters can be changed for  different index/format sizes by removed screw located on top and bottom per-heat plates. (*Figure 5)*

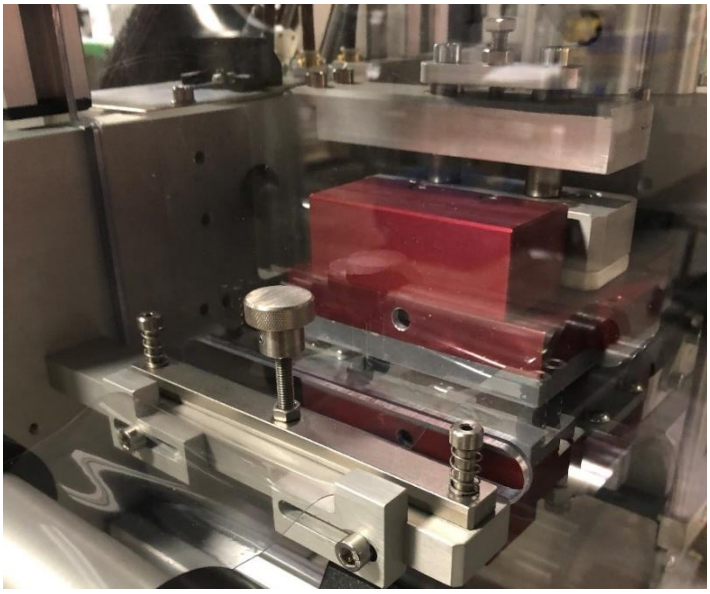


*Figure 5*

- The Forming Station is non-adjustable in the X/Y planes. Tooling is designed for different index sizes:  *(Figure 6)*


*Figure 6*

- The Forming station lower form die is easily exchangeable
- Remove upper forming die first.
- Lift lower forming die off (2) dowel pins located on bottom base plate. *(Figure 7)*

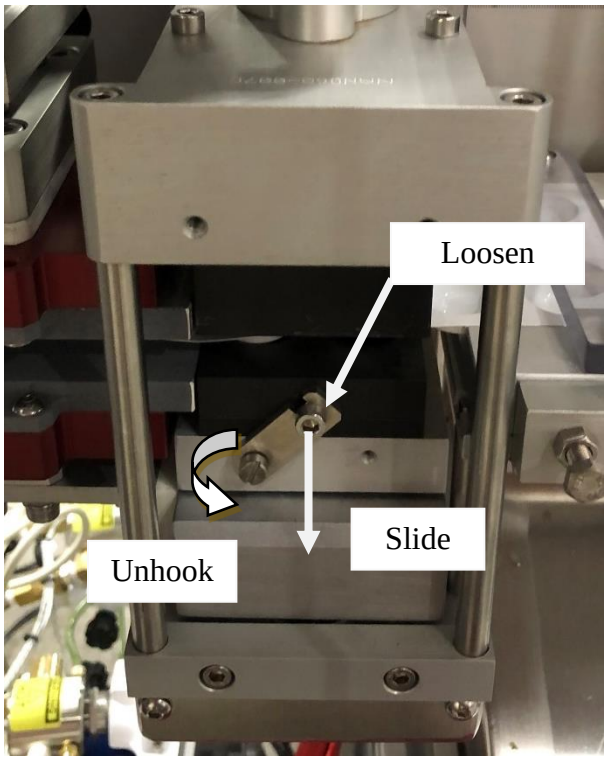



*Figure 7*

Upper form die is removable as well:

- Loosen (4) screws mounted on upper forming station housing.
- Make sure orientation of upper die matches lower die before mounting *(Figure 8)*

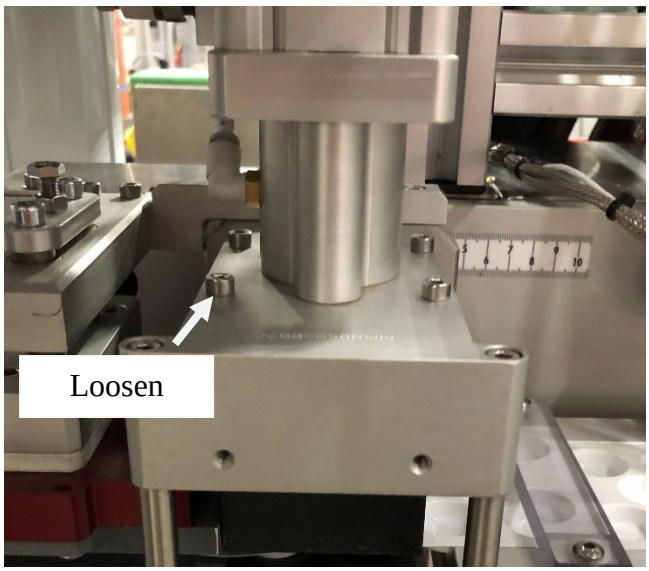



*Figure 8*

**Sealing Unwind**

- Place film onto unwind film holder. (*Figure 9)*
- Thread film through rolls and printer unit. *(Figure 9A)*

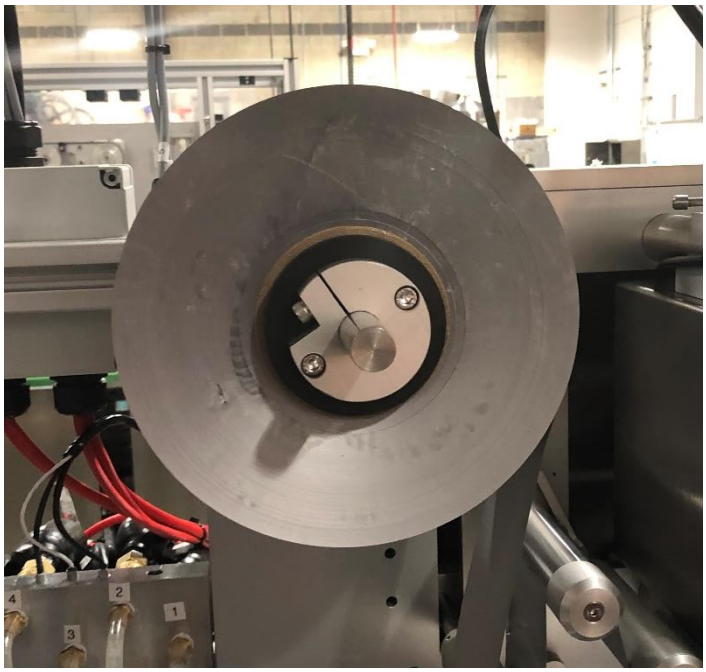


*Figure 9*

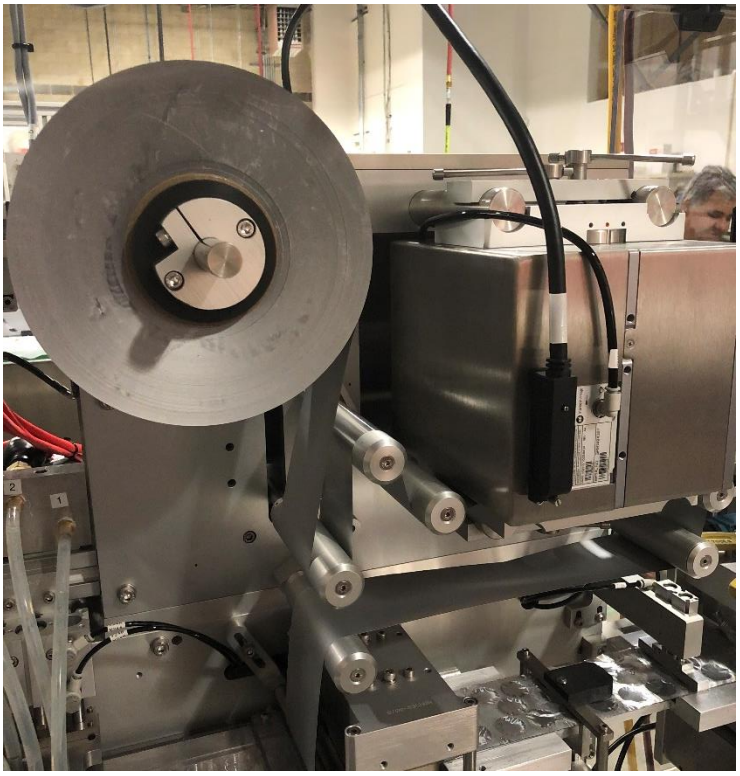


*Figure 9A*

## Sealing Station

**The Sealing station lower seal die is exchangeable:**

- Remove upper sealing die first.
- Lift lower sealing die off (2) dowel pins located on bottom base plate. (*Figure 10)*

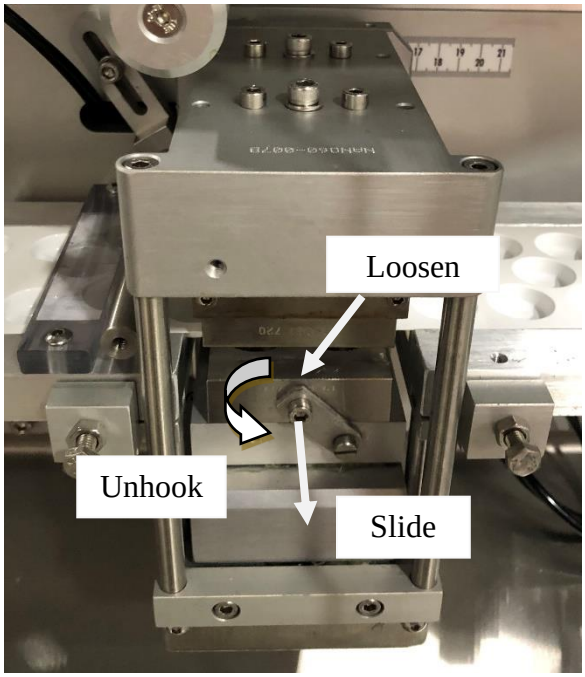



*Figure 10*

**Upper sealing die removal:**

- Loosen (2) screws mounted on upper sealing station housing.
- Make sure orientation of upper die matches lower die before mounting. *(Figure 11)*

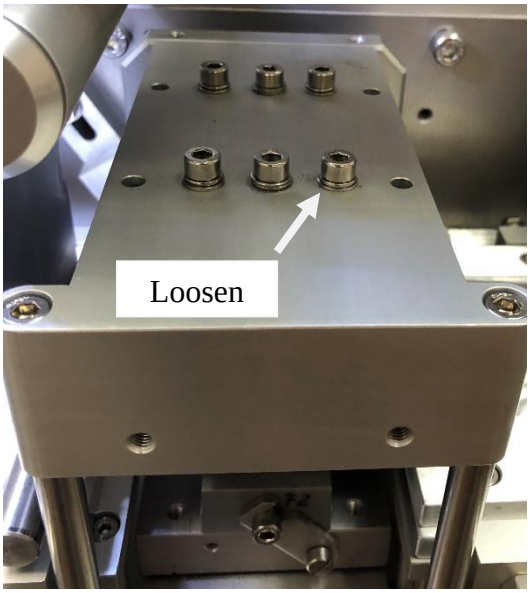



*Figure 11*

## Perforation Station (Optional)

### Lower Perf. Die

- Remove upper perforation die first.
- Lift lower perforation anvil off (2) dowel pins located on bottom base plate. *(Figure 12)*

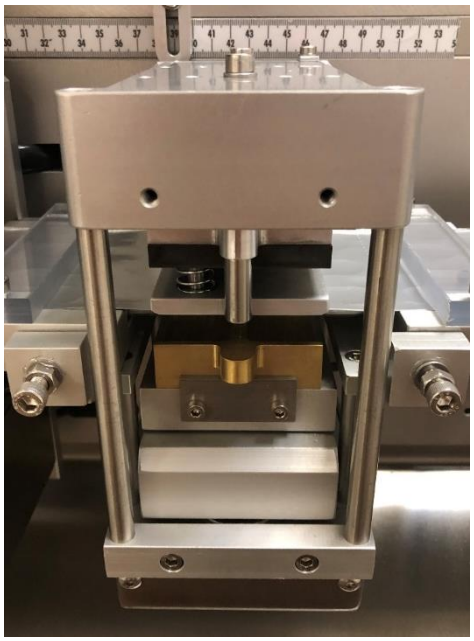


*Figure 12*

### Upper Perforation Die Removal

- Loosen (4) screws mounted on upper perforation station housing.
- Make sure orientation of upper die matches lower die before mounting. *(Figure 13)*

*Figure 13*

## Cut-Off Station

- The standard cut-off dies do not need any adjustments.
- Simply move cut-off knife to proper positioning for cutting (usually center between sealed blisters) The station will adjust in the “X” axis via a control knob with an indicator to record settings. (*Figure 14)*
- To change knife set, remove from station be removing (2) screws located on top of die set.
- The upper die is held on with (2) screws form the top housing. *(Figure 15)*

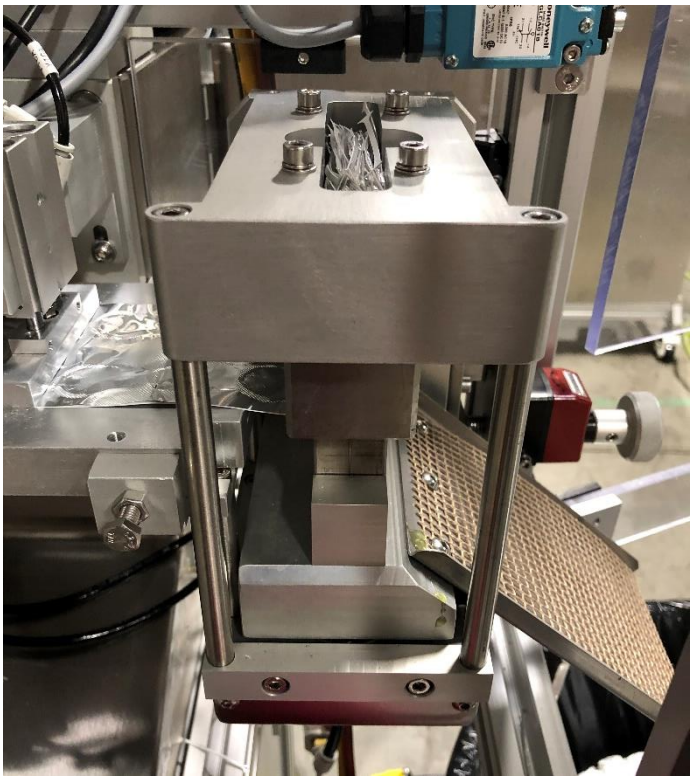


*Figure 14*

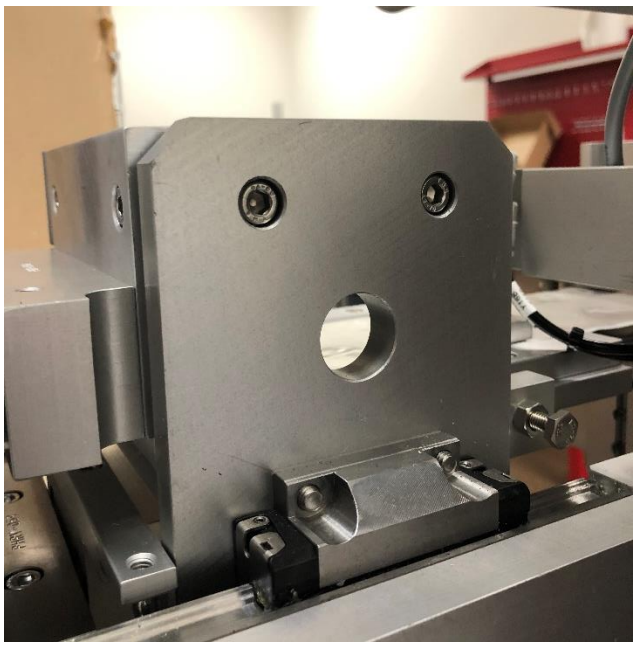


*Figure 15*

## Web Guides

You can remove/adjust the web guides

- To remove, inner web guide lifts off from guide housing. Inner web guides are held in place with dowel pins
- To adjust position relative to tooling, loosen the (2) screws from the underside of web guide. (*Figure 16)*

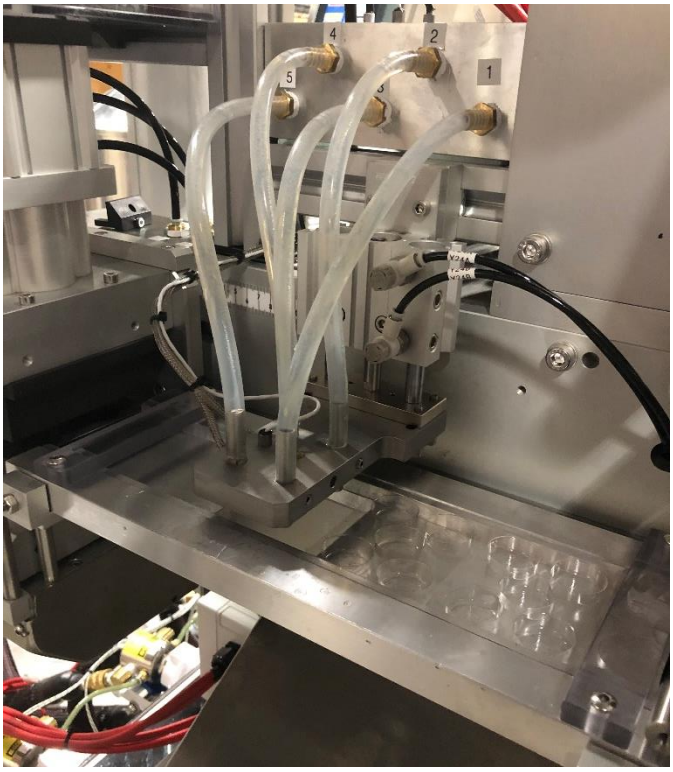



*Figure 16*

## Main Drive (Grab and Pull) Index

- The main drive is equipped with stepper motor and advance arm mounted on a liner slide
- Adjust grippers in advance arm to pull film through machine. *(Figure 17)*

*Figure 17*

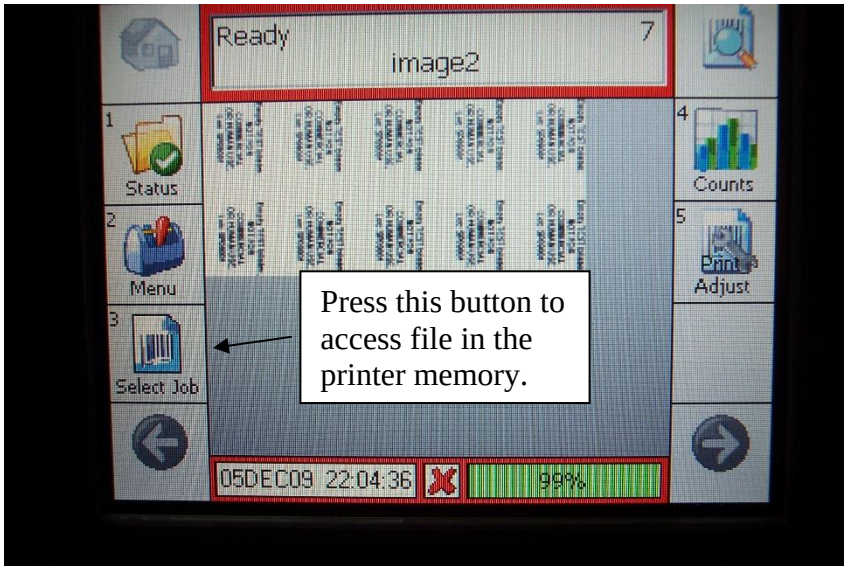
## Printer and Registration (OPTIONAL)

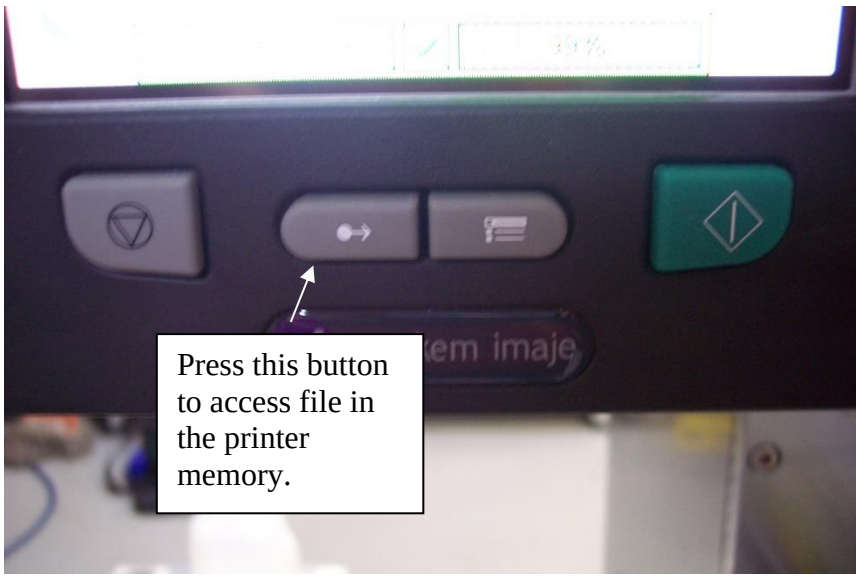
### Printer

- If the printer is to be used, re-thread the lidding material through the printer's unwind rollers.
- Download the desired printer file via the printer control panel.
- Turn the printer station on and specify CAM settings.

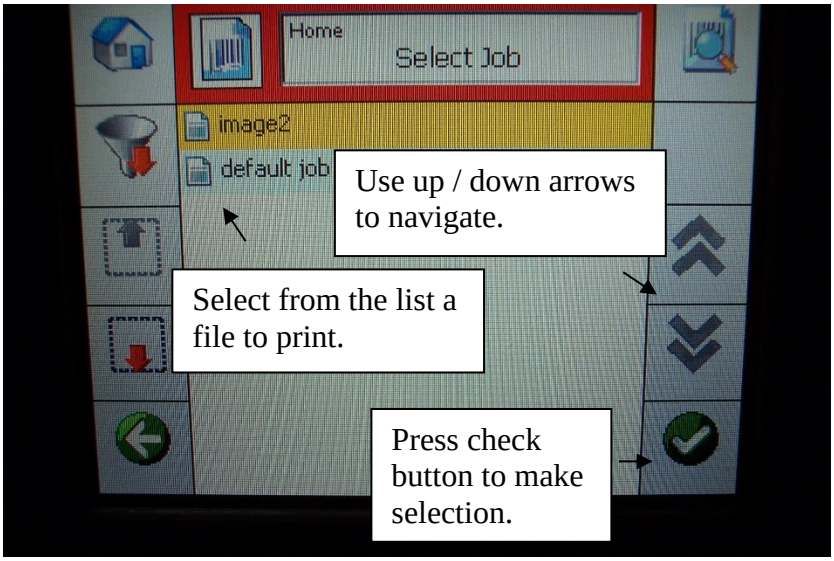
How to select a file from a USB memory stick or memory on printer to be printed.

To select a file from the printer memory, press the Select Job (3) button on the Main screen or press the shortcut push button at the bottom of the screen.

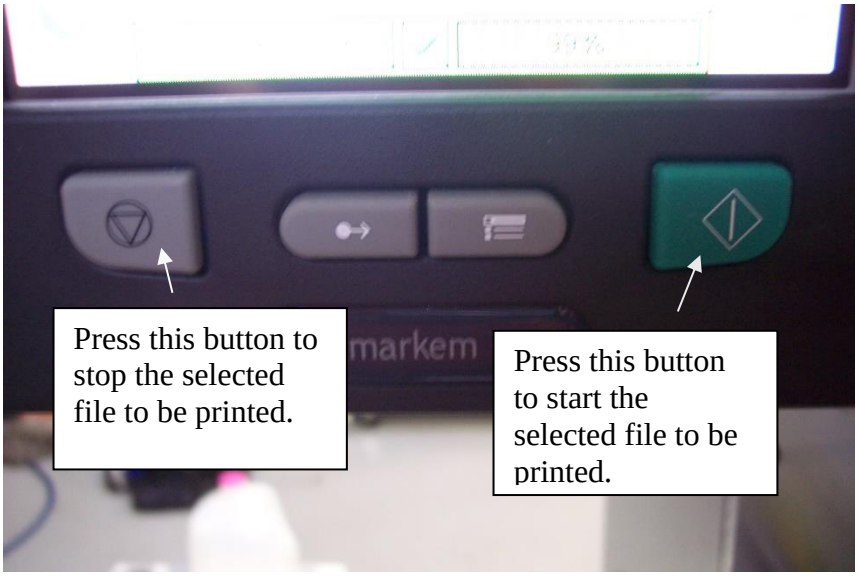


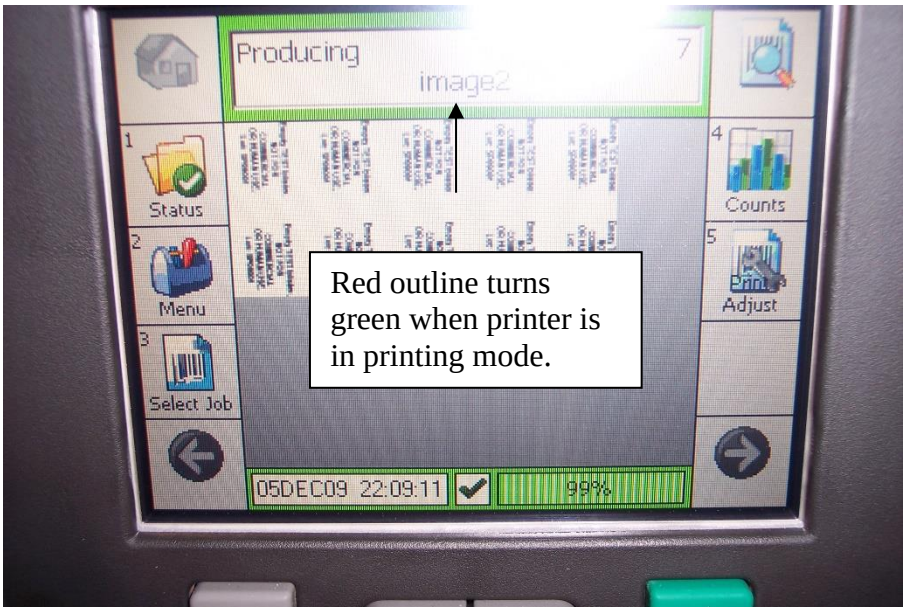
The picture below shows the Select Job screen. Select the file from the list to print.




After selecting the file, you are ready to start printing. Press the Start Print button located at the bottom of the screen.



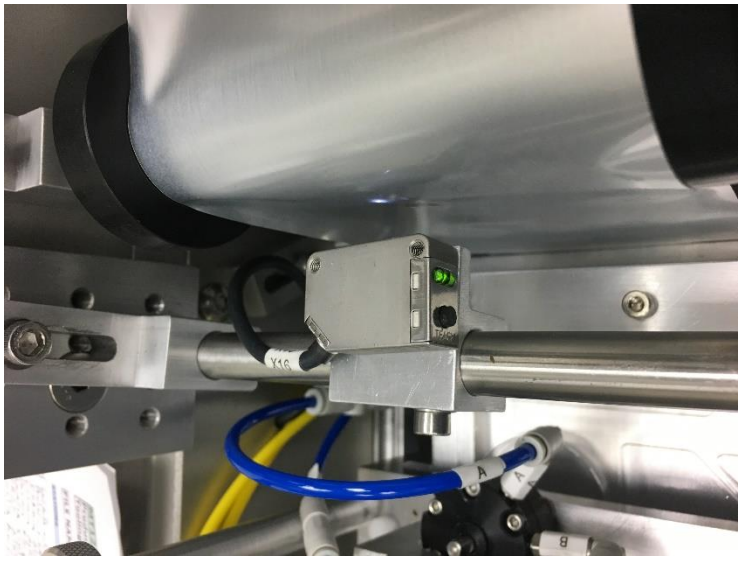
When the file is loaded, and the printer is in run mode the red outline box will turn green. The printer is now waiting for the print trigger.



## 1. Registration Sensor (Optional)

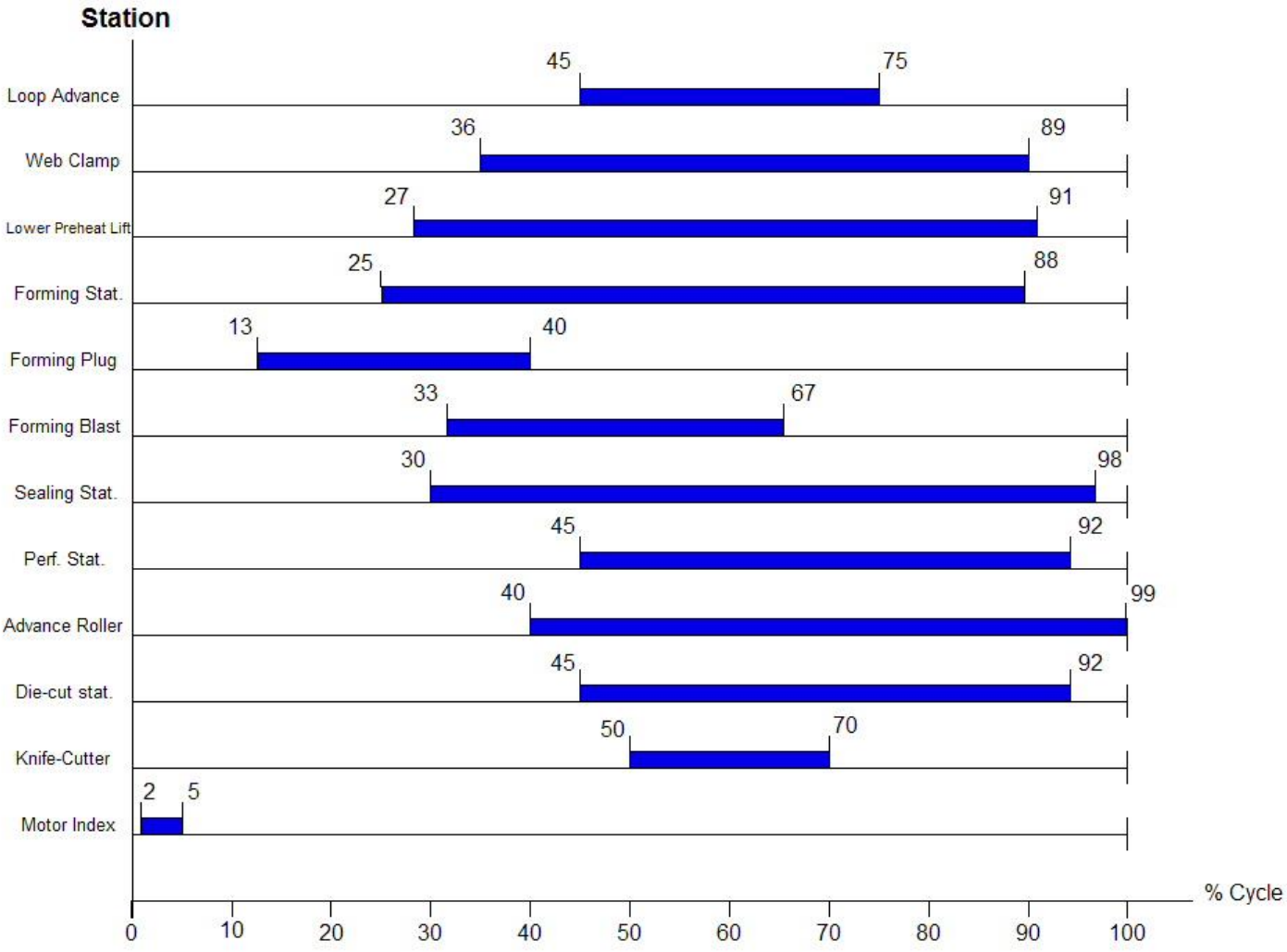
- If equipped, the film registration eye/sensor can be turned on/ off from the screen under STATIONS. The registration *(see below*) eye can be adjusted for sensitive by the “learn” button located on eye. See manufactures spec sheet for details
- The registration system is coupled with a cam setting to ensure that a premature pulse does not short index the machine. This cam setting can be adjusted on the “cam” screen on HMI.
- Proper set up is as follows:

a) Manually place film over desired position on blister when blister is in correct machine position
b) Teach color sensor the eye mark (see product data sheet for instructions)
c) Turn on registration sensor form HMI screen under stations
d) Adjust registration window cam to active close as possible to the end on the stroke. This will insure the most accurate positioning
e) The registration and two options.
f) **Option #1:** machine will index a pre-programmed, when the eye is signaled, the machine will automatically shorten the stroke by value entered in the HMI. The shorten stroke will be the next stoke after eye mark is detected.
g) **Option #2:** machine will index to a pre-programmed stroke. When the eye mark is detected during the “registration widow” cam value. The machine will automatically stop in this position

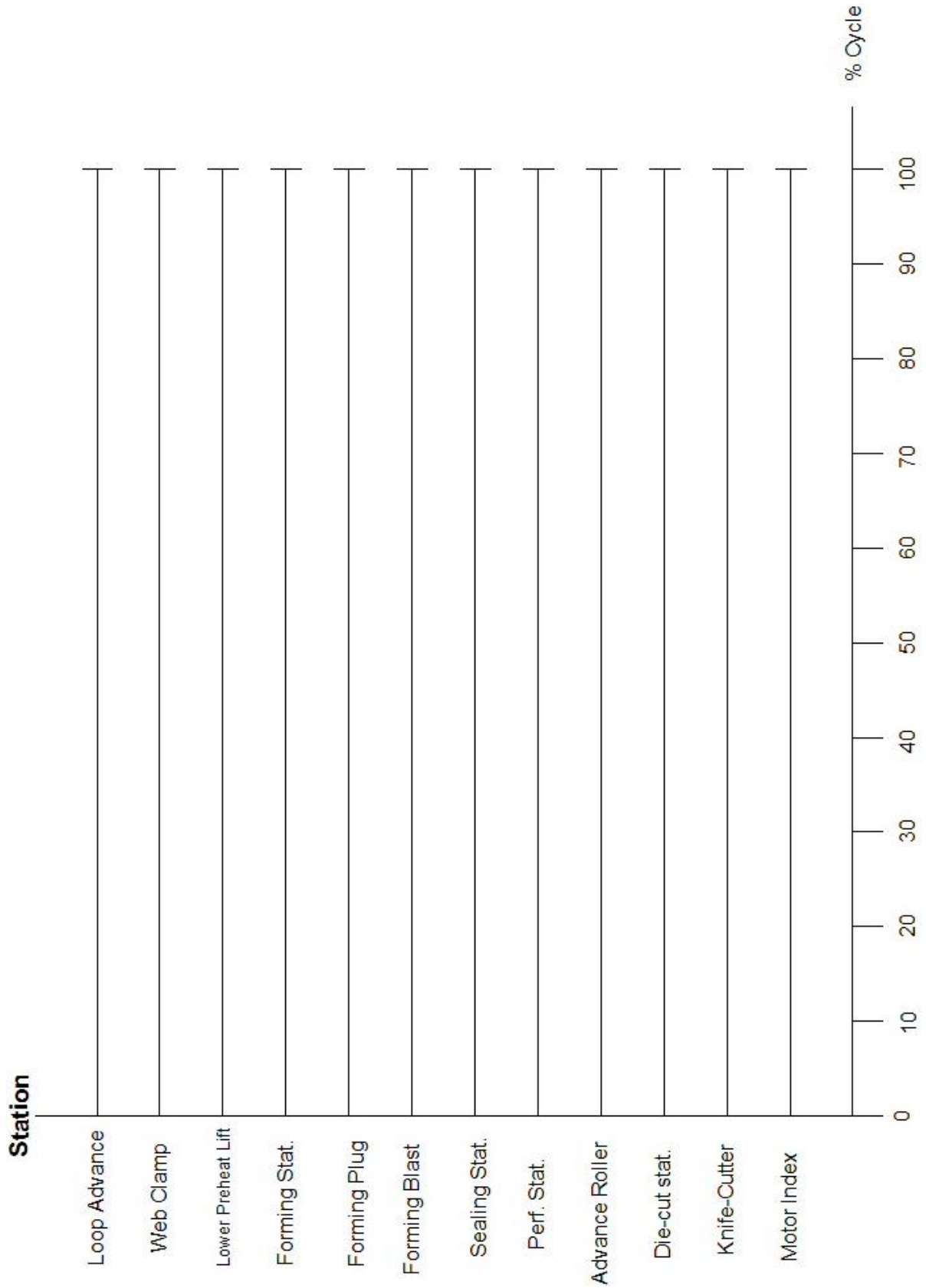


## (3.4) Timing Charts

Below is an example CAM Settings Timing Chart that could be used as guideline to reproduce your own:




You can create your own timing chart using the blank timing chart for CAM Settings shown on the next page:


Station
Loop Advance
Web Clamp
Lower Preheat Lift
Forming Stat.
Forming Plug
Forming Blast
Sealing Stat.
Perf. Stat.
Advance Roller
Die-cut stat.
Knife-Cutter
Motor Index
0
10
20
30
40
50
60
70
80
90
100
% Cycle

## (3.5) Safety

**CAUTION**

***DO NOT TOUCH INSIDE OF MACHINE DURING OPERATION***
***DO NOT FORGET TO PUSH EMERGENCY STOP BUTTON WHEN ADJUSTING OR SETTING THE MACHINE***
***DO NOT REMOVE SAFETY COVER OR SWITCH***
***THIS MACHINE IS OPERATED BY HIGH TEMPERATURE AND HIGH PRESSURE, SO IT COULD BE DANGEROUS TO YOU.***
***DISCONNECT MAIN AIRLINE BEFORE PERFORMING MAINTAINANCE ON MACHINE***

*READ AND STUDY THIS MANUAL CAREFULLY BEFORE OPERATING THE MACHINE.*

The following instructions are to be strictly adhered to in order to make good use of and to operate the machine safely:

- Retain the documentation furnished along with the machine. This documentation is an integral part.
- Become thoroughly familiar with this documentation and operate in compliance with the instructions described therein.
- Keep this manual in a dry and safe place protected from sun rays, and easily available for consultation.
- Do not install the machine in areas exposed to bad weather or in environment where there is risk of explosions.
- Do not position the machine on unsteady or unsuitable surfaces.
- Unqualified personnel should never be allowed to inspect or to tamper with the machine.
- Do not modify or disassemble any machine component without prior written authorization.
- Do not lay any object on the machine, with special concern for the product feeding area.
- Do not use the machine for any purpose other than that for which it has been designed for.
- Connect the unit to efficient grounding.

- Fix and protect the electrical cable adequately.
- Power rating is to be as marked on power tag.

- Make sure the section of the power cable is adequate to accommodate the machine amperage.

- Do not force the machine operation by overriding electrical safety guards.

- Carryout recommended maintenance service according to schedule.

- Replace damaged safety guards or safety devices immediately.

- Check that all safety guards are integral and active before starting the machine.

- Do not attempt to repair the machine if no skilled technician is present

- Regulations and technical standards of energy supply (electricity, compressed air, etc.) are to be strictly observed.

- If any irregularity, improper adjustment, or material defect occurs during machine operation, the user is to notify the supplier immediately by telephone or fax to get suitable assistance.

- No change that might affect the safety, function, or longevity of the machine is to be executed without the supplier's consent. If it is indispensably necessary, the supplier should be informed before action to provide suitable advice.

- The user is liable for any and all consequences of improper use and/or deviation from machine's original purpose.

- The buyer is obliged to strictly observe the supplier's maintenance instructions provided in the manual accompanying the machine.

- After machine's first usage, machine operators must regularly check all safety mechanisms to ensure that they are fully functional. Safety mechanisms, locks, clutches and Emergency Off mechanisms are to be regularly inspected for reliability by a trained expert.

- Even after "Emergency Off" button has been activated and covers have been opened, the heating units for various stations still require caution. Avoid contact with heated elements as they could cause serious damage to human body or product/packaging materials.

## *Part 4* - Preventative Maintenance

| PM description | Lubricant | Adjustment | PM Interval 250 hours | PM Interval 12 Months |
|---|---|---|---|---|
| Clean Machine Surfaces | | | | |
| Check and clean air filters | N/A | | | |
| Lubricate forming station guide shafts | Light food grade oil | | | |
| Lubricate sealing station guide shafts | Light food grade oil | | | |
| shafts (coat only) | | | | |
| Lubricate perforation station guide shafts | Light food grade oil | | | |
| Lubricate die-cutting station glide | Light food grade oil | | | |
| shafts (coat only) | | | | |

## *Part 5 - Input / Output PLC Schedules and Control Panel Layout*

## (5.1) Input/Output PLC Schedule

The following describes typical Inputs and Outputs on the PLC:

Legend: X = Input Designation Y= Output Designation

| 16-PT DC INPUT X00 - X15 | | | 16-PT DC INPUT X16 - X31 | | |
|---|---|---|---|---|---|
| **X** | **DESCRIPTION** | **STATE** | **X** | **DESCRIPTION** | **STATE** |
| X00 | Master Control Relay | ON | X16 | Registration | OFF |
| X01 | Guard Doors | OFF | X17 | SPARE | OFF |
| X02 | Indexer Slide Moving | OFF | X18 | SPARE | OFF |
| X03 | Indexer Slide at Home | ON | X19 | SPARE | OFF |
| X04 | Indexer Slide at Target | ON | X20 | SPARE | OFF |
| X05 | Indexer Slide On | ON | X21 | SPARE | OFF |
| X06 | Indexer Slide Alarm | ON | X22 | SPARE | OFF |
| X07 | SPARE | OFF | X23 | SPARE | OFF |
| X08 | Filler Home Done | OFF | X24 | SPARE | OFF |
| X09 | Filler in Position | ON | X25 | SPARE | OFF |
| X10 | Filler Pulse Ready | ON | X26 | SPARE | OFF |
| X11 | Filler Ready | ON | X27 | SPARE | OFF |
| X12 | Filler Moving | OFF | X28 | SPARE | OFF |
| X13 | Filler Alarm | ON | X29 | SPARE | OFF |
| X14 | Start Push Button | OFF | X30 | SPARE | OFF |
| X15 | Stop Push Button | ON | X31 | SPARE | OFF |

| 16-PT DC OUTPUT Y00 - Y15 | | | 16-PT DC OUTPUT Y16 - Y31 | | |
|---|---|---|---|---|---|
| **Y** | **DESCRIPTION** | **STATE** | **Y** | **DESCRIPTION** | **STATE** |
| Y00 | Indexer Slide Go to Home | OFF | Y16 | SOL-0101 Web Clamp | ON |
| Y01 | Indexer Slide Go to Target | OFF | Y17 | SOL-0102 Advance Clamp | OFF |
| Y02 | Indexer Slide Alarm Reset | OFF | Y18 | SOL-0103 Forming Station | OFF |
| Y03 | Indexer Slider Stepper On | ON | Y19 | SOL-0104 Forming Air | OFF |
| Y04 | Indexer Slide Data Bit 0 | OFF | Y20 | SOL-0105 Forming Plug | OFF |
| Y05 | Indexer Slide Data Bit 1 | OFF | Y21 | SOL-0106 Sealing Station | OFF |
| Y06 | Indexer Slide Data Bit 2 | OFF | Y22 | SOL-0107 Perf. Station | OFF |
| Y07 | Indexer Slide Data Bit 3 | OFF | Y23 | SOL-0108 Knife Cut Station | OFF |
| Y08 | Filler Motor Home | OFF | Y24 | SOL-0201 Filler Nozzle | OFF |
| Y09 | Filler Alarm Reset | OFF | Y25 | SOL-0202 SPARE | OFF |
| Y10 | Filler Forward Jog | OFF | Y26 | SOL-0203 SPARE | OFF |
| Y11 | Filler Reverse Jog | OFF | Y27 | SOL-0204 SPARE | OFF |
| Y12 | Indicator Audible | OFF | Y28 | SPARE | ON |
| Y13 | Indicator Light Green | OFF | Y29 | SPARE | OFF |
| Y14 | Indicator Light Yellow | OFF | Y30 | Heater Control | OFF |
| Y15 | Indicator Light Red | ON | Y31 | Printer Signal | OFF |

## (5.2) Operator Interface

This section describes basic screens and functions of the MT125X machine. This is for reference only! Actual HMl screens may vary from project to project.

**Main**

→ On turning the machine on, the following screen is displayed:


→ Pressing the ON button starts the machine. The following screen is displayed indicating that the machine is in running mode.

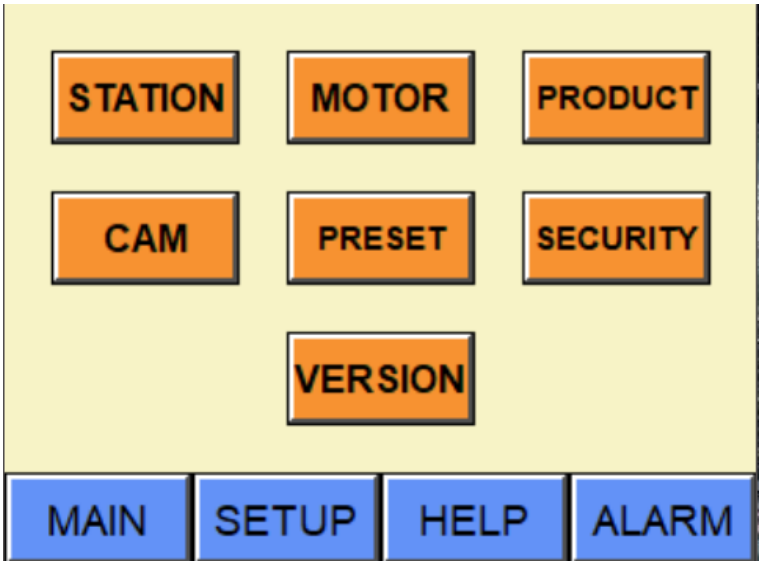
→ Different screens can be accessed from the toolbar of the main screen to control different stations and change settings. The toolbar is displayed on all screens for convenience.

→ Note: Sequence for startup procedure is as follows

- Enter Security Code, supervisor, or operator
- Load appropriate program number
- Home motor
- Turn on desired stations

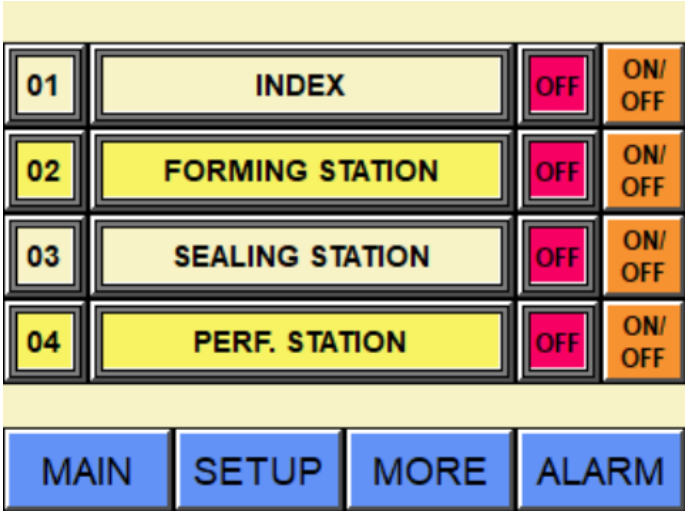
## Setup

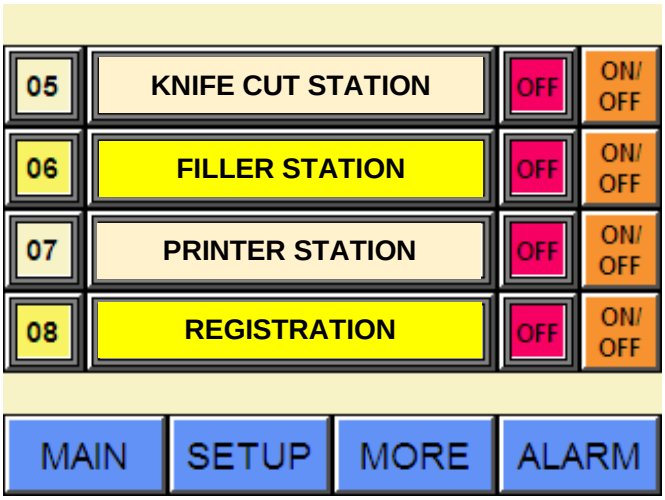
→ Setup screen allows access to different facets of the machine to change status, settings, etc.

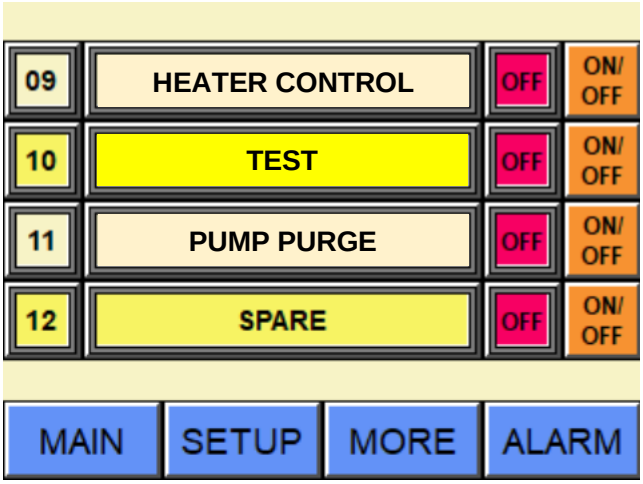


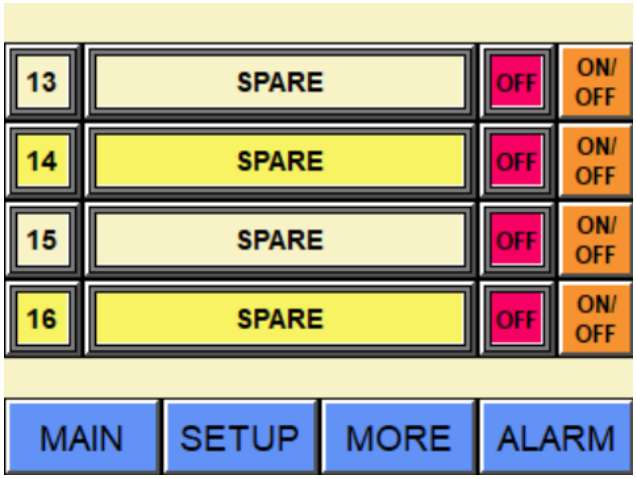

## Setup-Stations

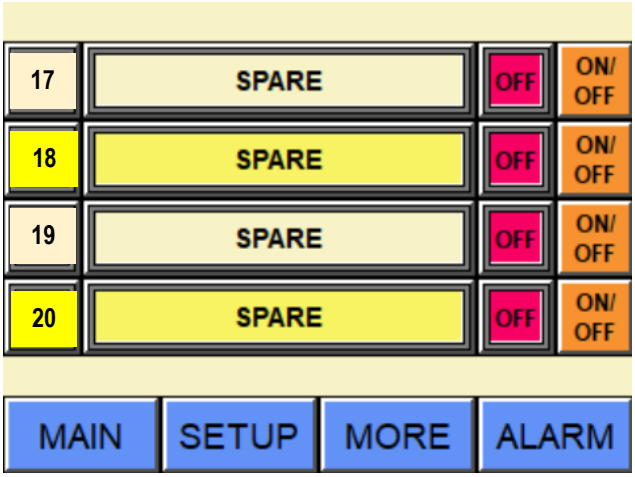
→ Pressing Stations allows access to turn different stations ON and OFF.
→ Pressing stations displays the following screen.
→ Pressing ON/OFF turns individual stations on and off as desired.
→ Pressing more allows viewing of more stations:



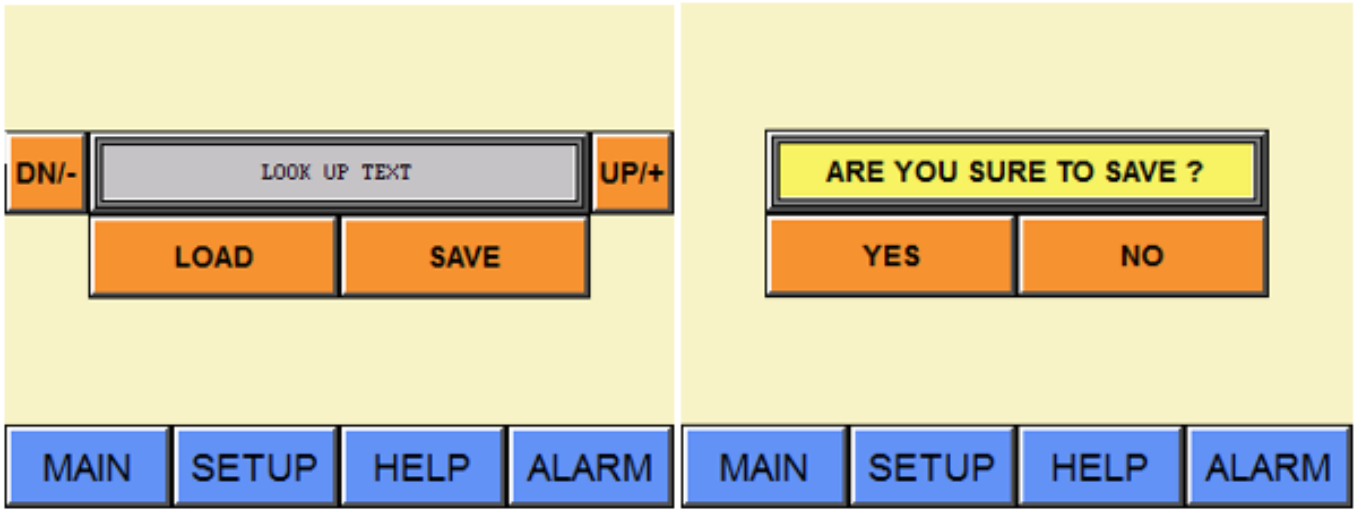



→ MT NANO 60 has the ability to store up to 10 products and their CAM settings. A product could be saved by going to SETUP, PRODUCTS and pressing SAVE. To retrieve a product, select the desired product by pressing the up and down buttons to scroll through different products and then pressing LOAD.

## Product

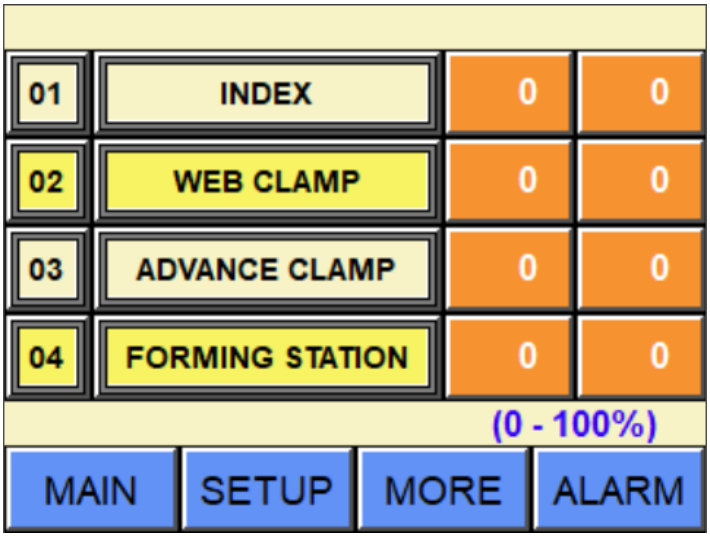



## Setup-Heaters

→ Heaters are setup from each individual heater controller mounted directly blow the HMI panel. Initial parameters for band settings and related functions have been factory set. The temp settings can be changed by pressing the arrow keys up/down to desired set point than entered.

## Setup-CAM

→ From the Setup menu, press CAM Settings. The following screen is displayed:




→ CAM Settings allows to set the timing of where each individual station, roller or cutter etc. turn on and off in the machine cycle. The values correspond to the percentage value of the time of a full machine cycle, i.e. 100% is a full machine cycle. For example, if the advance roller starts at 40%, then it starts at
Time = (0.4 X cycle time)

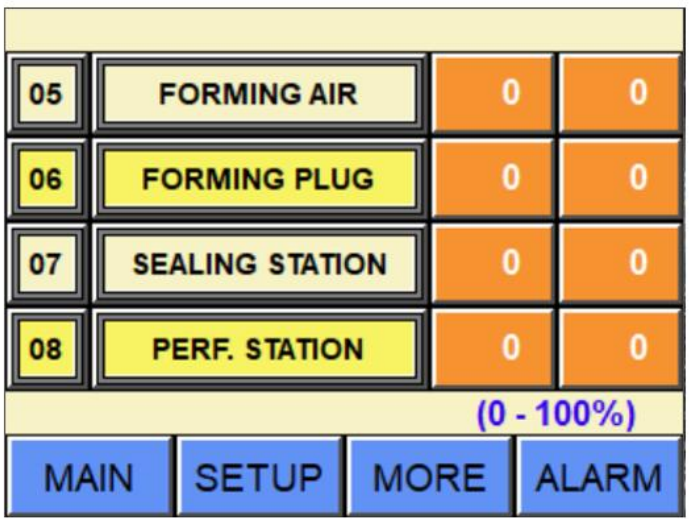
Use the following formula to calculate the CAM Setting:

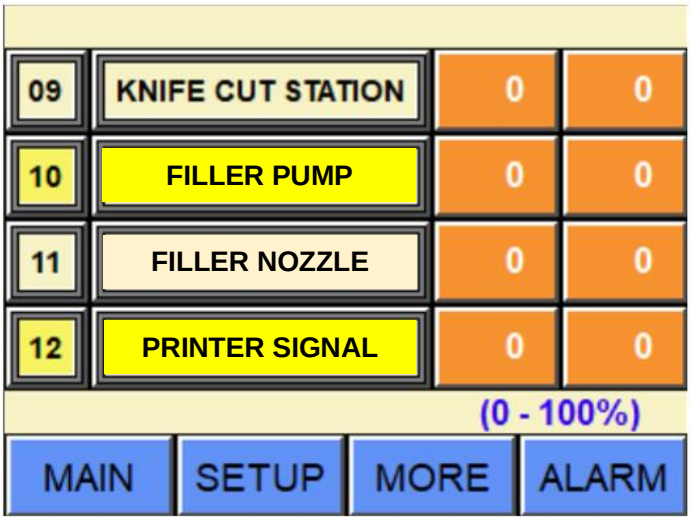
$$CAM(Start) = \frac{StationStartTime}{MachineCyde} \times 100$$

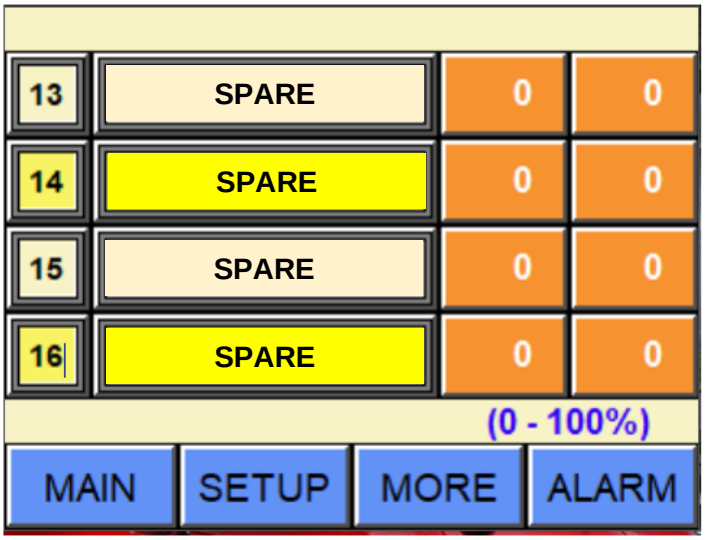
$$CAM(Stop) = \frac{StationStopTime}{MachineCyde} \times 100$$

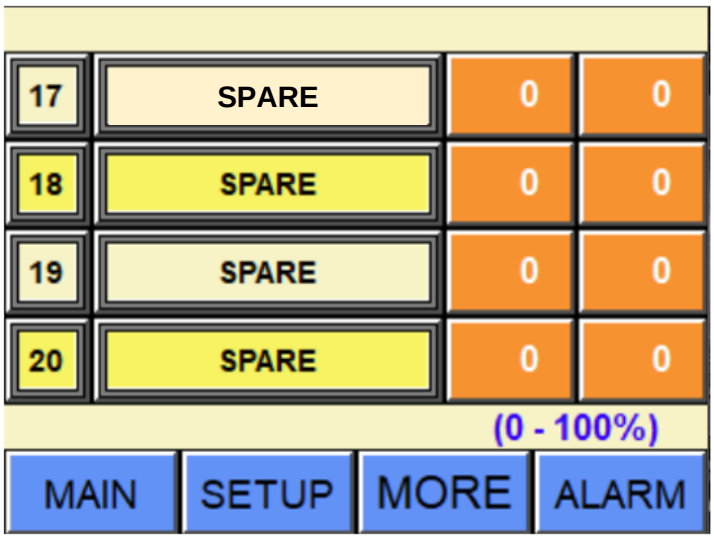
→ To change the CAM Settings, press SP button. A numeric keypad and a dialogue box pop up requiring a password. Enter the password and then enter the desired CAM setting.

→ More CAM's could be displayed by pressing MORE.



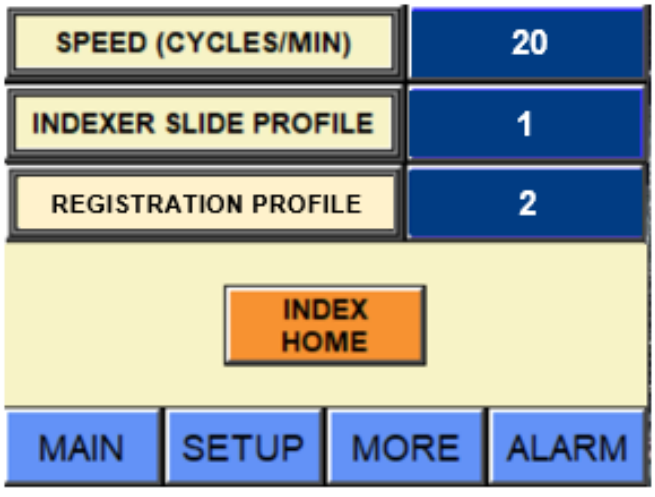




**Setup-Motor**

→ Selecting Index Motor to enter parameters individually.



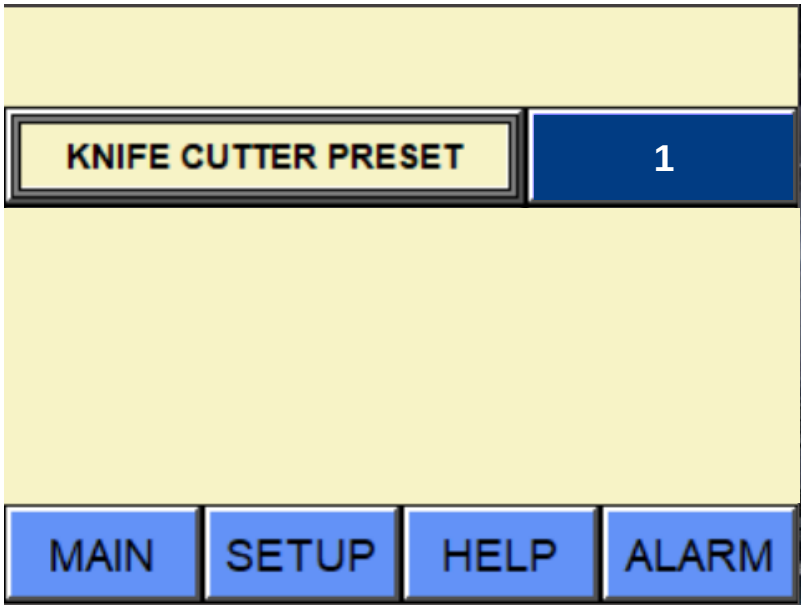
→ Selecting INDEX MOTOR from the main motor screen allows changing the mode, index, and the speed of the machine.
→ The index is per-programmed for factory. New index profiles are added when tooling sets are installed by MACTEC PACKAGING TECHOLOGIES

**Setup-Counters**

→ Counter setting such as cut off and other settings are set using this screen
→ Cut-off = number of indexes before knife is enabled
→ Rows per index = tablets across web (max 3) this is used to calculate total product using the data collection

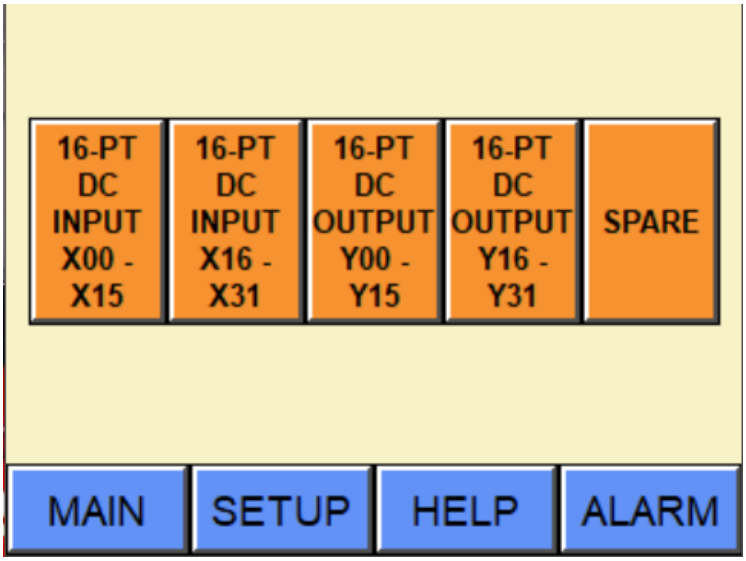
**Counter**

→ When equipped with a product detection sensor, and or vision system a set up screen will be programmed in order to turn on/off sensors. Press the Inspection button in the main screen. A pre-programmed shift register will determine the correct number if indexes before dying–cutting and stop the die cutting for one fill cycle if a reject is detected. Rejected package will pass though the die-cutter and into waste knife.



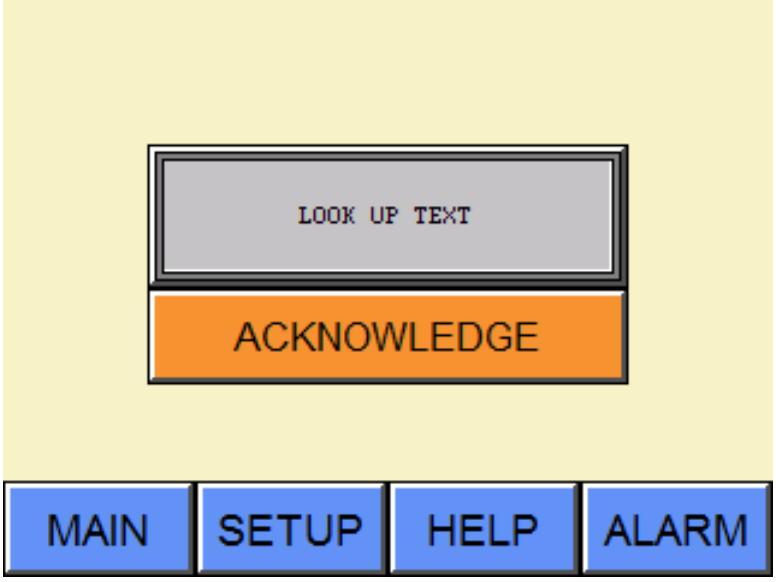
## Help

→ On pressing HELP, the following screen is displayed, select the Input/Output you wish to monitor/monitor and change.



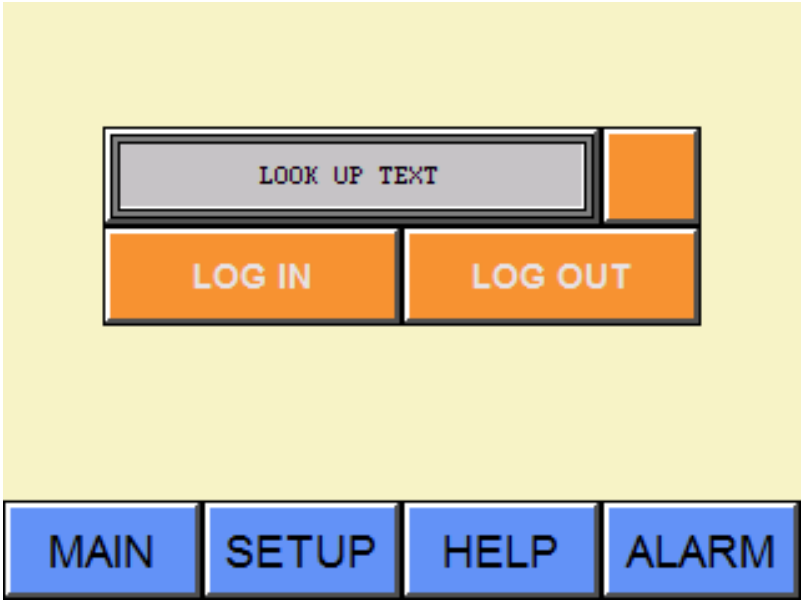

## Alarm

→ The ALARM screen displays the causes of a fault stop. An example of such display is shown in the screen below. After fixing the fault, press acknowledge and turn the machine back on.



**Security**

You can access two (2) levels of security though the “security” screen. Passwords for each level are required.

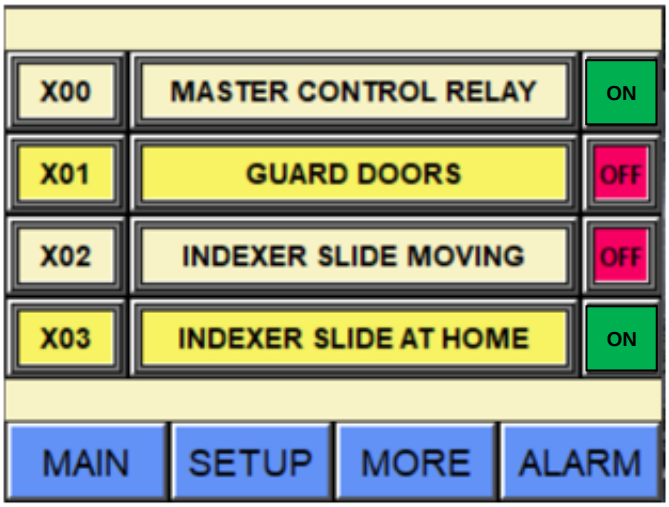


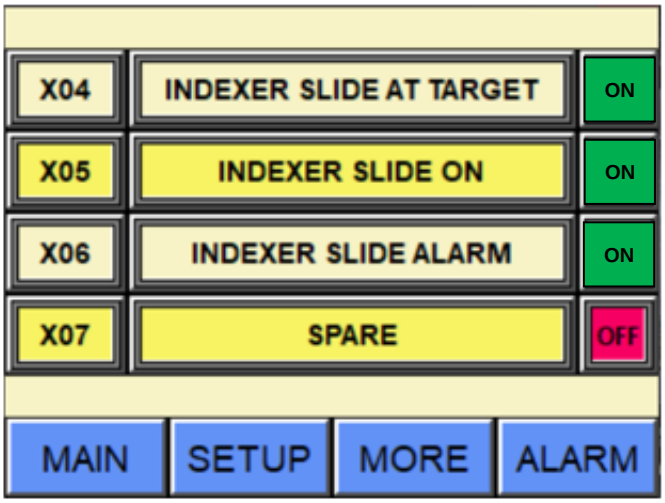

| Level | Code # |
|---|---|
| Operator | 2010 |
| Supervisor | 2011 |

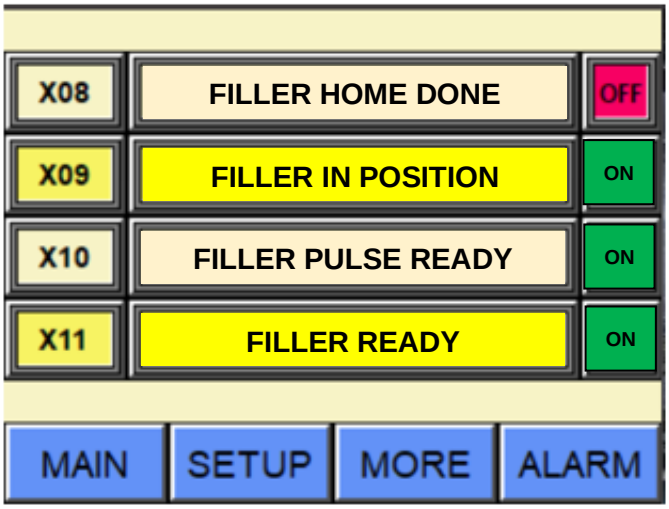
**Digital Inputs/Outputs**

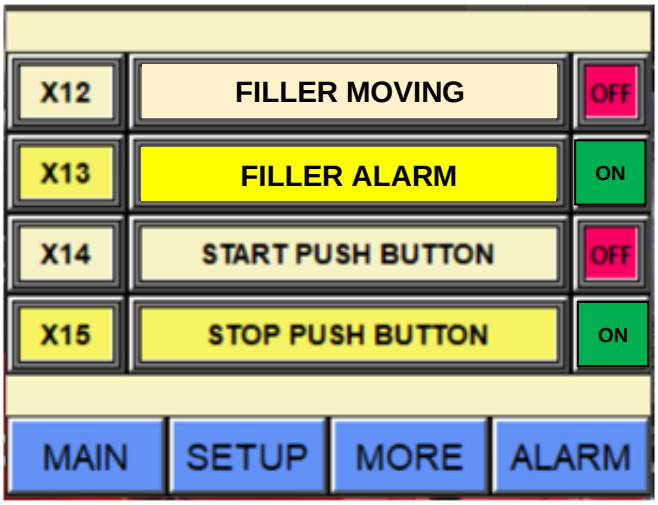
Both digital inputs/output status can be displayed on the screen. Status of each can also be changed by turning on/off button.

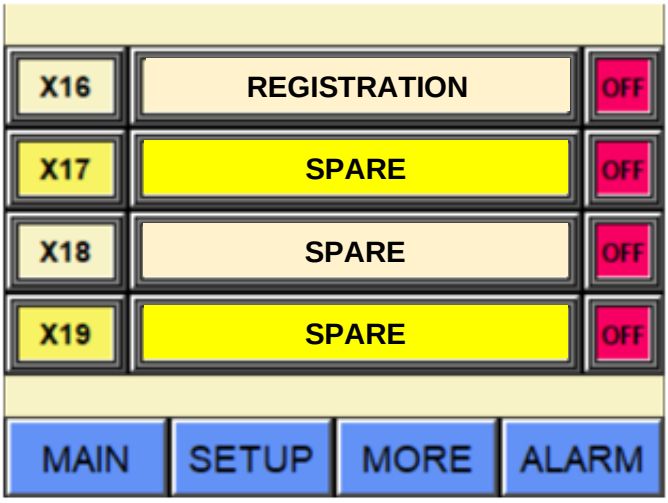
Note: Changing status of input/output can result in improper operation of machine. Care must be taken when using this function to make sure input/output is returned to its original status.

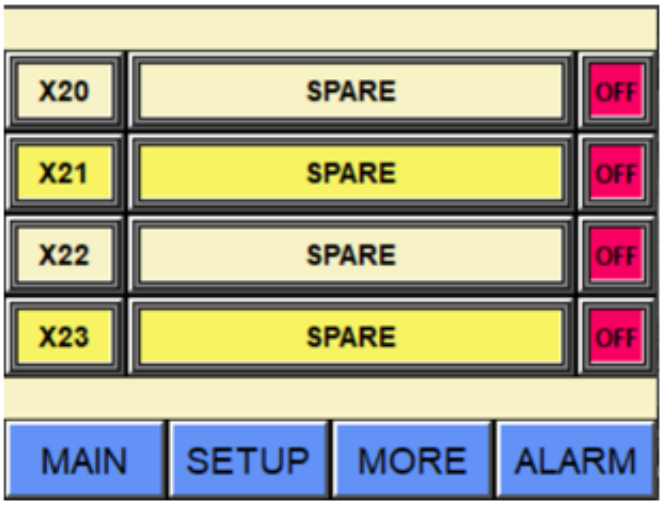

X00
MASTER CONTROL RELAY
ON
X01
GUARD DOORS
OFF
X02
INDEXER SLIDE MOVING
OFF
X03
INDEXER SLIDE AT HOME
ON
MAIN
SETUP
MORE
ALARM

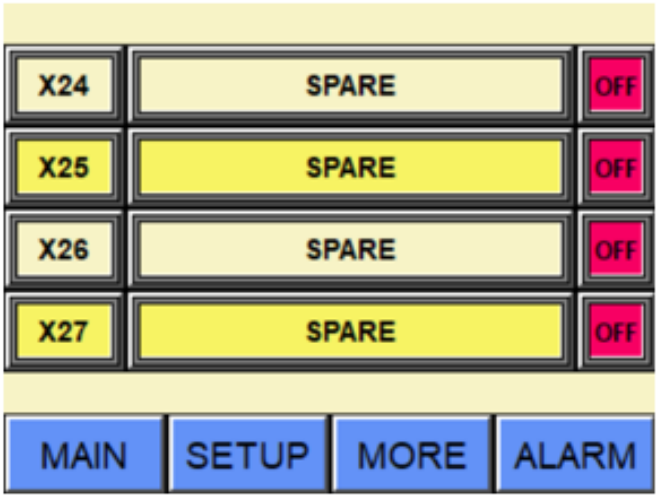

X04
INDEXER SLIDE AT TARGET
ON
X05
INDEXER SLIDE ON
ON
X06
INDEXER SLIDE ALARM
ON
X07
SPARE
OFF
MAIN
SETUP
MORE
ALARM

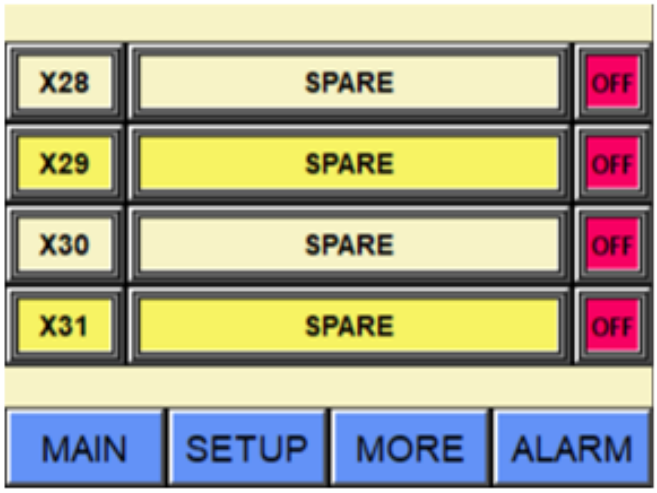

X08
FILLER HOME DONE
OFF
X09
FILLER IN POSITION
ON
X10
FILLER PULSE READY
ON
X11
FILLER READY
ON
MAIN
SETUP
MORE
ALARM

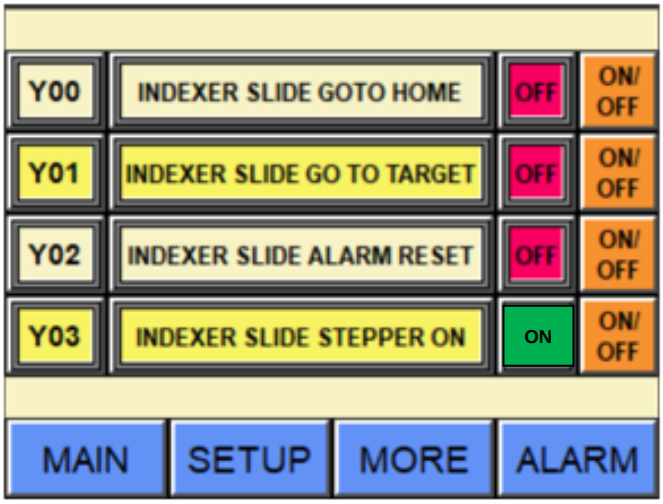

X12
FILLER MOVING
OFF
X13
FILLER ALARM
ON
X14
START PUSH BUTTON
OFF
X15
STOP PUSH BUTTON
ON
MAIN
SETUP
MORE
ALARM

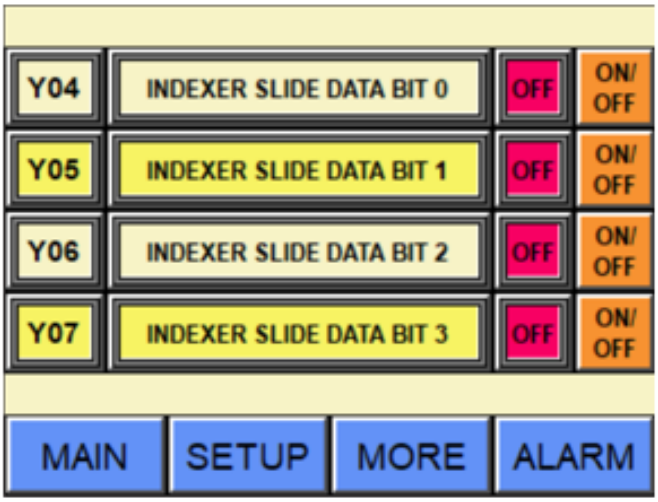

X16
REGISTRATION
OFF
X17
SPARE
OFF
X18
SPARE
OFF
X19
SPARE
OFF
MAIN
SETUP
MORE
ALARM

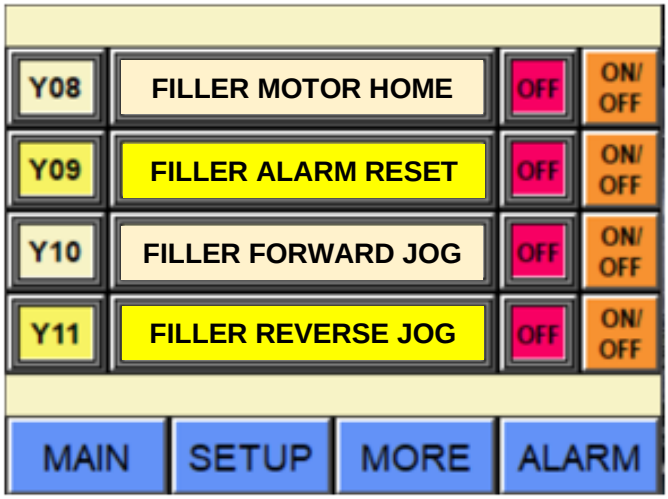

X20
SPARE
OFF
X21
SPARE
OFF
X22
SPARE
OFF
X23
SPARE
OFF
MAIN
SETUP
MORE
ALARM

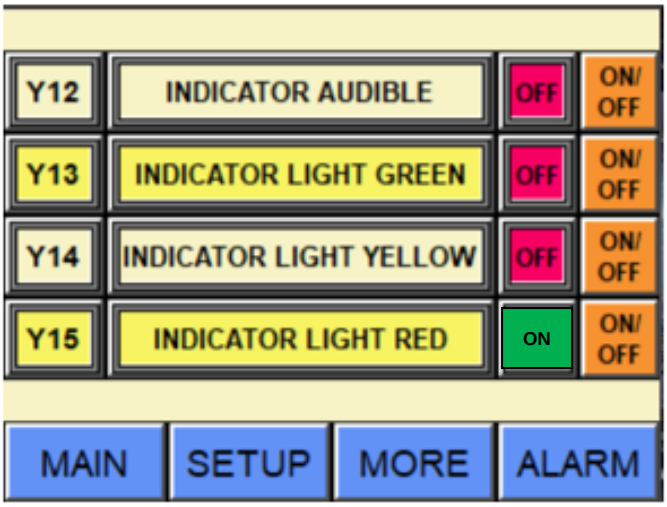

X24
SPARE
OFF
X25
SPARE
OFF
X26
SPARE
OFF
X27
SPARE
OFF
MAIN
SETUP
MORE
ALARM

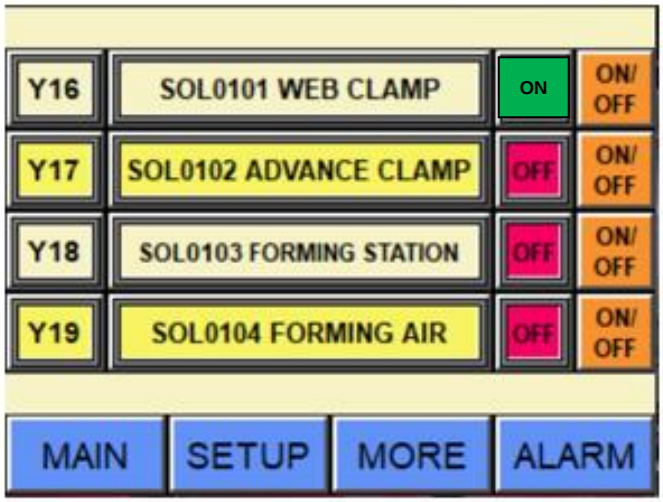

X28
SPARE
OFF
X29
SPARE
OFF
X30
SPARE
OFF
X31
SPARE
OFF
MAIN
SETUP
MORE
ALARM

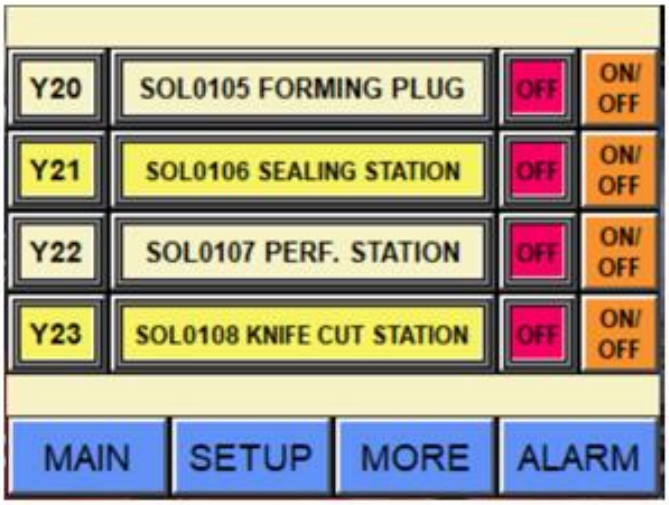

Y00
INDEXER SLIDE GOTO HOME
OFF
ON/ OFF
Y01
INDEXER SLIDE GO TO TARGET
OFF
ON/ OFF
Y02
INDEXER SLIDE ALARM RESET
OFF
ON/ OFF
Y03
INDEXER SLIDE STEPPER ON
ON
ON/ OFF
MAIN
SETUP
MORE
ALARM

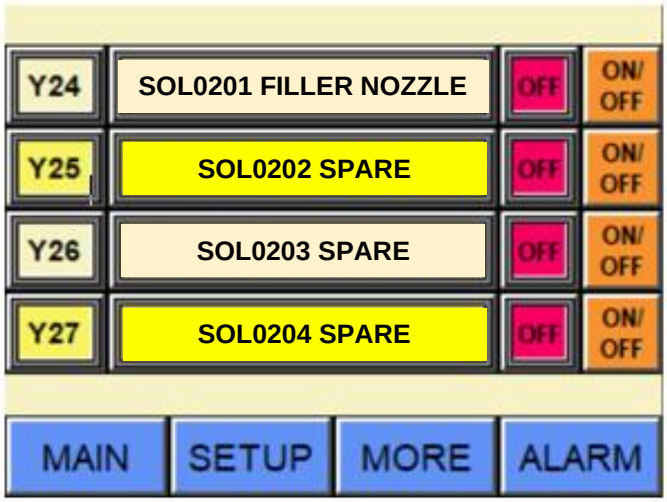

Y04
INDEXER SLIDE DATA BIT 0
OFF
ON/ OFF
Y05
INDEXER SLIDE DATA BIT 1
OFF
ON/ OFF
Y06
INDEXER SLIDE DATA BIT 2
OFF
ON/ OFF
Y07
INDEXER SLIDE DATA BIT 3
OFF
ON/ OFF
MAIN
SETUP
MORE
ALARM

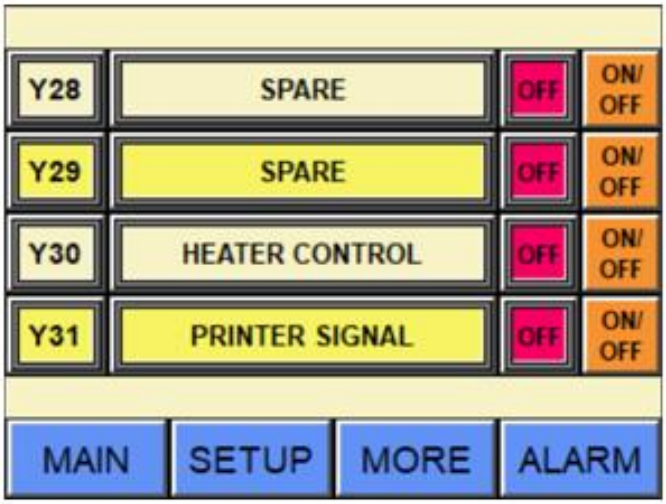

Y08
FILLER MOTOR HOME
OFF
ON/ OFF
Y09
FILLER ALARM RESET
OFF
ON/ OFF
Y10
FILLER FORWARD JOG
OFF
ON/ OFF
Y11
FILLER REVERSE JOG
OFF
ON/ OFF
MAIN
SETUP
MORE
ALARM


Y12
INDICATOR AUDIBLE
OFF
ON/ OFF
Y13
INDICATOR LIGHT GREEN
OFF
ON/ OFF
Y14
INDICATOR LIGHT YELLOW
OFF
ON/ OFF
Y15
INDICATOR LIGHT RED
ON
ON/ OFF
MAIN
SETUP
MORE
ALARM



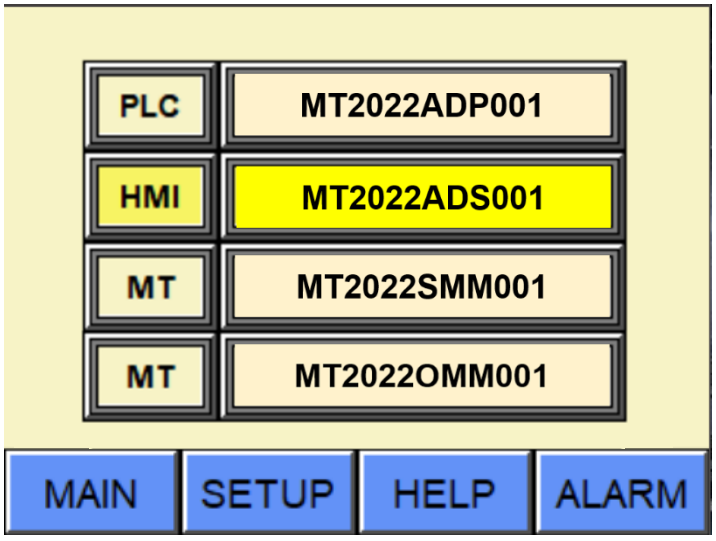




**Version**

You can access the PLC, HMI, and Motion software version through this screen.



# *Part 6* - Schematics

## (6.1) Electrical Schematic

Refer to Mactec Packaging Electrical Drawing

## (6.2) Pneumatic Schematic

Refer to Mactec Packaging Pneumatic Drawing

## *Part 7* - Key Components Parts Listing and Recommended Spare Parts

### (7.1) Key Component Parts Listing

Listed below are the major purchased components for the MT Nano 60X Blister Machine:

| ITEM # | MACTEC Part No. | Description |
|---|---|---|
| 1 | MT-NCQ2B63-25DC | 63bore x 25mm Stoke Compact Cly. |
| 2 | MT-NCQ2WB50-20DCZ | 50mm Bore Compact Cly. |
| 3 | MT-SS5Y5-45FU-8U-N7-C6-Q | 8 Stat. Manifold Base |
| 4 | MT-SY5140-5FU-Q | Valve 24vdc |
| 5 | MT-AC20D-N03G-V-CZ | Filter/Mist Sep. Main Air Reg. Combo w/ Lockout Valve |
| 6 | MT-CXSJM10-10 | Dual Cly |
| 7 | Series 205 PLC HDM-1 | PLC |
| 8 | MT-CQ2B63-25+0DCZ-XC11 | Cutter Cylinder |
| 9 | LEY25A-100-R16P1 | Stepper Linear Cly. |
| 10 | AES1135 | Safety Controller |
| 11 | AD-SSR210-22-DCZ | Heater Relays |
| 12 | PSP24-240S | Power Supply |
| 13 | SL4824-VR | Heat Controller. |

## *Part 8 - Troubleshooting* Guide *and Maintenance*

### (8.1) Troubleshooting Guide

Troubleshooting guide to some common problems:

| ***Problem*** | ***Cause*** |
|---|---|
| **Machine fails to start** | Guard open<br>Air pressure too low<br>No Power on to PLC unit<br>Acknowledge Alarm Fault on Operator Panel<br>Machine not homed |
| **Machine starts but only Indexes one cycle** | Loose or opened guard |
| **Indexes short of set stroke** | Sticking in pre-heat station and/or plates<br>Web advance stopping short of stop block<br>Sticking or jammed stationary clamp<br>Tension to great on web unwind roll |
| **Machine runs but stops Intermittently** | Guard opening or loose |
| **Knife unit fails to cut** | Switch turned off<br>Digital counter has not reached pre-set<br>Counter not re-setting<br>Film Jam |
| **Pre-heat not reaching or exceeding temperature** | Broken or loose RTD<br>Heater element failure |
| **Inconsistent forming** | Improper seating between upper and lower form dies<br>Air pressure for forming set to low<br>Pre-heat station not operating properly or incorrect temperature<br>Sticking in preheat station |
| **Inconsistent Sealing** | Unbalanced Seal Dies<br>Loose or broken RTD<br>Air pressure too low |

# *Part 9* - Specifications Sheets

## (9.1) Specifications Sheets

All specification sheets will be provided upon request. MACTEC can provide component specification sheets for all commercially purchased components only. Specifications and/or drawings related to custom machined parts are proprietary MACTEC information.

# *Part 10* - PLC Program Logic

## (10.1) PLC Program Logic

Mactec's Programs are considered "confidential" Contact Mactec Packaging Technologies LLC, if a download or back-up copy is required.