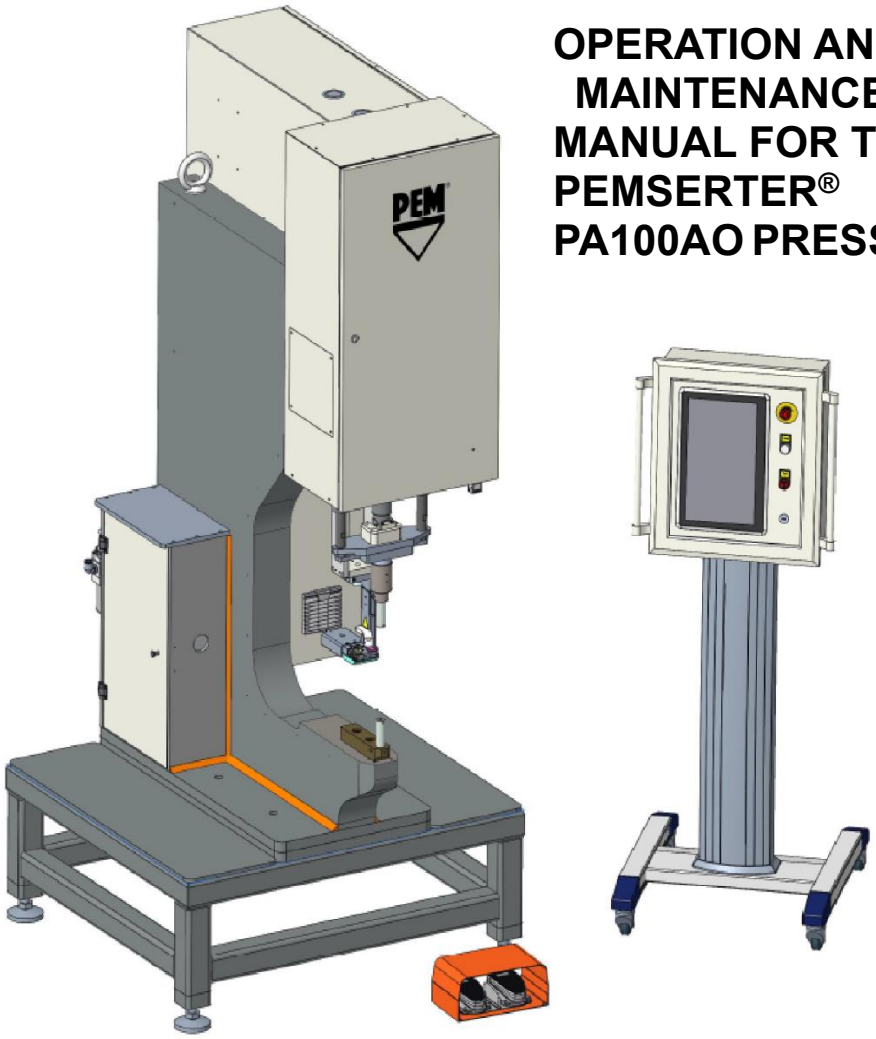
PennEngineering®

OPERATION AND MAINTENANCE MANUAL FOR THE PEMSERTER® PA100AO PRESS



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OPERATION AND MAINTENANCE MANUAL

PEMSERTER® Hardware insertion machine

MODEL: PS100AO-PAC

SERIAL NUMBER:

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Preface

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Read Manual Before Operating Machine!

SECTION 1
INTRODUCTION

Use:

- This equipment is used for the riveting of some PEM screws, nuts and studs fastening products.
- This equipment is composed of a touch screen, a safety punch, a feeding system, a tooling fixture, and an electrical system. The product to be riveted can be sent to the tooling fixture through the feeding system as required, and the product to be riveted can be riveted through the safety punch Press to the workpiece to complete the riveting process, the above process can also be done manually.
- According to different processes and workpieces, the tooling fixtures corresponding to different products can be replaced to achieve the purpose of riveting and connecting different products.

Features:

- Unique precise pressure riveting force and energy-saving riveting power consumption.
- Computer control system with touch screen interface.
- The riveting algorithm is intelligent, can display the pressure-position curve, and has the function of parameter memory and curve memory.
- Provide simple and precise control for operators. The design of the machine setting, operation, maintenance and fault diagnosis is simple and easy to use.

Specifications:

• Riveting Force	10~100kN
• Control System	Air-Over-Oil
• Air requirements	6~7bar Φ16 mm dia. minimum line flow
• Long	1272mm
• Width	1080mm
• Hight	2560mm
• Weight	2300kg
• Electrical	AC120-230V（+/- AC 23 V）, 50/60Hz
• Short-Circuit Rating	6kA
• Air Consumption	approx. 20 liters/sec air at 1 Atm (15 Scfm) 6 insertions per minute
• Electrical Power Consumption	approx. 500 Watts with auto feed bowl running
• Ambient Temperature	5°C~40°C （41°F ~ 104°F）
• Transport/Storage Temperature	-13°F to +130°F (-25°C to +55°C) and for short periods not to exceed 24 hours up to 160°F (70°C)
• Ambient Humidity	30% ~ 95% (Not reflective of inlet air)
• Installation Altitude	Max 1000m
• Installation requires	horizontal installation on load-bearing ground

- EMC requires horizontal installation on load-bearing ground
- Light requires adequate illumination at the operating points and areas

SAFETY

The Rivet Installation Machine 6SS210001 was designed to conform to applicable ISO, ANSI, OSHA, CEN and CSA safety standards.
The Rivet Installation Machine 6SS210001 conforms to the essential requirements of the following directives:

Machinery Directive: 2006/42/EC
Electromagnetic Compatibility (EMC) Directive: 2014/30/EU
Low Voltage Directive: 2014/35/EU

MEASURES TO PREVENT MISOPERATION

- The equipment shall be provided with a permanent, clear and easily identifiable mark or signage .The signs or signs shall have the main characteristics required for safe use of equipment, such as rated parameters, connection mode, grounding mark, danger mark, special operation method and operation conditions, etc.

- Electrical control circuit with emergency stop button specified in safety requirements to prevent the occurrence of misoperation. At the same time, the device is equipped with interlock or limit protection device, safety grating, etc.

- Through the above safety device, if there is any wrong operation, the equipment will stop running in an emergency and send an alarm message the equipment can operate normally only after the warning information is processed.

- Riveting nuts approved by PEM shall be used in this equipment, and riveting workpiece on this equipment shall also be approved by PEM.PEM shall not be liable for any operation accident or loss caused using rivet and rivet pressure parts not approved by PEM.

Please read and follow the safety precautions listed as below.

SAFETY PRECAUTIONS

- Always use safety goggles when operating or maintaining the rivet installation machine.
- Ear Protection is recommended.
- Always shut off the electrical power and remove the power cord before servicing the Hardware insertion machine.
- Before using the Hardware insertion machine, make sure that a shutoff device has been fitted on the air supply line and the location is easily accessible, so that the air supply to the rivet installation machine can be shut off in an emergency. Make sure that surge protection is installed in the electrical supply to the rivet installation machine.
- Check the air hose and fittings regularly for wear.
- Use only approved parts for maintenance and repairs.
- Do not use chipped, cracked or damaged accessories and tools.
- Attach airline securely.
- Keep body parts away from moving parts.
- Never wear jewelry, loose clothing or anything that could get caught in moving parts.
- If a new user is operating the pull riveting machine, be sure these instructions are readily available.
- Do not use the Hardware insertion machine in any way, other than for its intended purposes.
- Do not modify the Hardware insertion machine in any way.

- Fasteners are blown at a high velocity. Tubing must always be secured before machine is operated. Check integrity of tubing before use.
- Non-professionals are prohibited from disassembling this equipment.
- All personnel operating this equipment must be trained and qualified before they can take up the post of operation.

WARNING: Immediately upon receipt of your hardware insertion machine, establish a "Maintenance Code" for your supervisor/maintenance personnel only, as it is possible, however difficult, to operate the rivet installation machine without the standard safeguards in place in the Maintenance Mode. Only trained personnel should use the Maintenance Mode. PennEngineering is not responsible for improper maintenance mode procedures, which result in a loss of operation of the press or operator safety.

Label	Definition
	General Warning Label – There are items that require attention. These are specified in the operator's manual.
	Eye Protection Label – Eye protection must be worn when operating the press.
	Ear Protection Label – Ear protection must be worn when operating the pull riveting machine.
	Fastener Mandrel Point Label – Keep hands away from area.
	Electrical Shock/Electrocution Warning Label –Electrical shock hazard. Do not touch

WARRANTY

PennEngineering® warrants that this product, when correctly used according to directions and under normal operating conditions, will be free from defects in material and workmanship for a period of one (1) year from the date of purchase.

This warranty shall not apply to any product which has been altered, changed, or repaired, normal maintenance excluded, except as authorized by PennEngineering®. This warranty shall not apply to any product that has been subject to misuse, negligence, or accident.

The purchaser's exclusive and sole remedy shall be limited to repair, modification, or replacement at the discretion of PennEngineering®. In no event shall PennEngineering® be liable for the cost of any indirect or consequential damage. In no case shall PennEngineering® liability exceed the purchase price of the product.

This warranty is exclusive and in lieu of all other warranties. No oral or written information by PennEngineering®, its employees, representatives, distributors, or agents shall increase the scope of the above warranty or create any new warranty.

Should any questions or problems arise concerning your rivet installation machine, contact the PennEngineering® Service Department. Toll-free telephone number +86(512) 5726-9310.

Set-up, Training and Repair Service is available to you as long as you own your rivet installation machine. Free telephone instruction and Service is available for the lifetime of your rivet installation machine by calling the PennEngineering® Service Department.

SECTION 2
IDENTIFYING AND LOCATING MAJOR COMPONENTS OF HARDWARE INSERTION MACHINE

Dentify the main components of the Hardware Insertion Machine.

This section introduces the user to the major components of the press.

Main Frame

The frame is the structure of the press. The main section is made of solid steel with welded components that form the base and the other support sections. All parts are directly or indirectly mounted onto the frame.

Main Cylinder/Ram

The ram force of the press is exerted by a hydraulic cylinder called the Main Cylinder. It is mounted directly onto the frame surrounded by the front enclosure. Attached to the main cylinder, at the back end, is a sensor probe called a Linear Transducer, which reads the location of the main cylinder piston. Attached to the end of the main cylinder rod is the safety assembly, described in Section 3. The main cylinder rod is referred to as the Ram.

Operator control

Except for the foot switch, all the control buttons of the operator are located on the door of the front chassis. These control buttons include touch screen, emergency stop button, power on (ON) button, power off (OFF) button, buzzer, and spotlight button.

- **Touch screen-**This is the main interface of the hardware insertion machine control system (Programmable Automation Controller (PAC)). The touch screen is used for system operation, control, parameter setting and automatic feeding adjustment and configuration, user feedback and fault diagnosis. The touch screen can display text and graphic information and enables the operator to make selections by touching the buttons on different parts of the screen. The program has set the touch screen to automatically enter the screen saver mode when it is idle every 10 minutes and clear the content displayed on the screen. To resume the operation of the screen, just touch anywhere on the screen. In Chapter 6 of this manual, the screen display in various situations is explained in detail.

- **Emergency stop button-**Press this button to disconnect the power supply to the quick exhaust/air supply valve (see the air supply input system on page 8). When the pressure is exhausted, all pneumatic actions are stopped. In an emergency stop condition, all outputs are shut down. The control system remains online and detects the emergency stop signal.

- **Power ON/OFF knob switch**- This knob switch can be used to turn on/off the power to the press control system, if the press power is on, then the green light of the electrical cabinet is on. If the power is cut off, it will also cut off the power of all moving elements including the quick exhaust/air supply valve.

- **Buzzer** - This buzzer is controlled by the PAC and is used to indicate to the operator when the press or operation requires special attention.

- **Foot switch**-The foot switch is a switch used by the operator to control the working cycle of the riveting machine. It frees the hands of the operator and can be used for the operation of the workpiece.

Pneumatic/Hydraulic Enclosure

The Pneumatic/Hydraulic Enclosure on the right side of the press houses all the major components of the Air-Oil System that control the main cylinder. These components include the computer-controlled pressure regulator system, the ram valve assembly which includes the ram valve and the booster valve, the Air-over-Oil tanks, the Air-Oil booster, and the hydraulic safety valves.

Electrical Enclosure

The Electrical Enclosure, under the Pneumatic/Hydraulic Enclosure, houses the Programmable Automation Controller (PAC) and various electrical components and distribution terminals. Electric Power and the Foot Pedal connect to this enclosure. The door is key-locked and located on the back is the electrical on-off switch. This switch must be ON for the press to be powered on. Turning off this switch removes all power to the press. The electrical power cord plugs in next to the switch. Removing the power cord can be used to lock out all power to press when performing maintenance.

Vibratory Feeder Bowl (Automatic Fastener Feeding Component)

The Vibratory Feeder Bowl, on the left side of the press, is used for automatic feeding of fasteners. It is an electrically driven device, which holds and moves different types of fasteners. Various types of tooling components are attached to the bowl to orient the fasteners being fed out of the bowl. The vibratory bowl comes equipped with a "Universal Escapement" adapter, which is used for all nut-type tooling and some stud-type tooling. The Vibratory Feeder Bowl is controlled by a dial and a switch on the Bowl Control Box, above the bowl.

- **Bowl Amplitude Dial -** The bowl's amplitude or force of vibration is regulated by a dial control. The amplitude adjustment is used to control the feed rate and performance of the automatic feeding process.
- **Bowl Three Mode Switch -** A 3 position switch is used to select whether the bowl is always on, always off or automatically controlled by the PAC. When the switch is set to auto, the PAC turns on the bowl during run mode and during diagnostics. During run mode the PAC will turn the bowl off if there is a period of inactivity. The PAC will restart the bowl automatically when the next fastener is fed. When loading or unloading fasteners, turn the bowl ON/OFF as desired. Return the switch to AUTO when finished.

Shuttle Support Assembly (Automatic Fastener Feeding Component)

The Shuttle Support Assembly located next to the Vibratory Feeder Bowl is used to hold and actuate tooling shuttle components, route air supplies and hold the Stud-in-tube-Sensor and "Puffer" Flow Control Valve. The Shuttle Air Cylinder on the Shuttle Support Assembly actuates tooling shuttles. The shuttle receives the parts fed from the vibratory feeder bowl, singulates the parts and feeds them out to the punch/anvil area. The Shuttle Support Assembly is aligned with the vibratory feeder bowl. Proper alignment is important to the functioning of the shuttle tooling.

- **Stud-in-tube Sensor -** The PAC uses this ring sensor to monitor and control the feeding process of stud-type tooling.

- **Puffer Flow Control Valve -** This valve controls the air flow to the Vibratory Feeder Bowl tooling attachments and is used to regulate various aspects of the escapement and nutgate performance.

Slide and Gripper Assembly (Automatic Fastener Feeding Component)

The Slide and Gripper Assembly mounted to the top of the frame throat is used to hold top-feed tooling components and has two pneumatic actuators. The two actuators are a linear slide cylinder and a parallel acting gripper. The gripper is used to actuate the tooling jaws that hold fasteners. The gripper opens and closes to receive and release fasteners. The gripper is attached to the end of the linear slide. The linear slide is used to move the gripper and jaws from its retracted position out to the punch position. This system is used to feed fasteners out to tooling punches. The Slide and Gripper Assembly also holds tube extension tooling for stud-type tooling. The Slide and Gripper Assembly can be removed for special workpiece accessibility.

Anvil holder Assembly

The Anvil Holder Assembly mounted to the bottom of the frame throat is used to hold the anvil tooling components and has a single air cylinder. The Bottom Feed Cylinder is used to actuate Bottom Feed Nut Tooling Modules.

Tooling Valve/Storage Enclosure

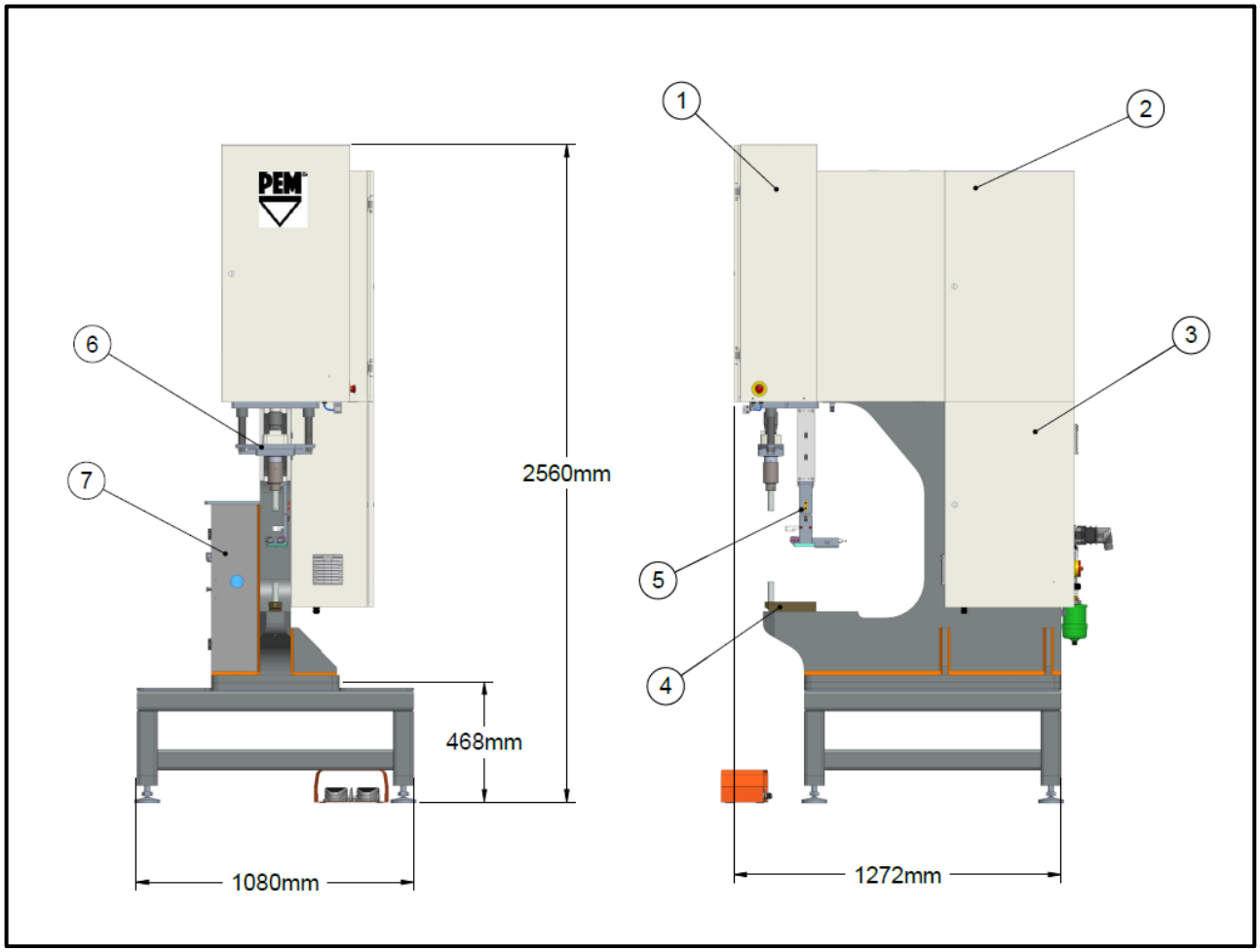
The Tooling Valve/Storage Enclosure is located underneath the Vibratory Feeder Bowl. Behind the door is another enclosure that contains the pneumatic valves that control the different tooling actuators and blowers. Under that enclosure is the Tooling Air Accumulation Tank. The tank provides a steady supply of compressed air to the tooling valves for consistent tooling feeding performance.

Air Supply Inlet System

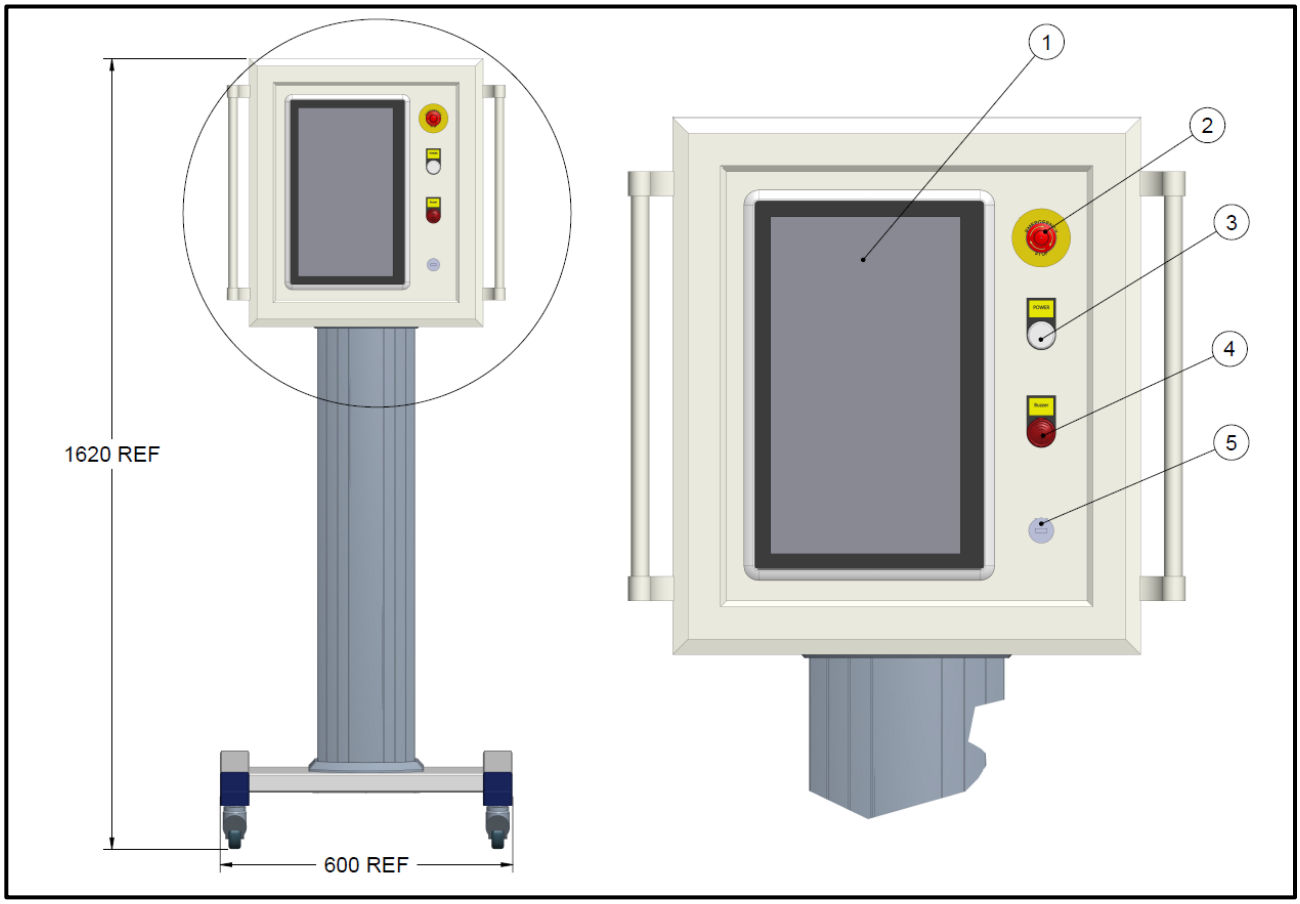
The supply of compressed air enters the press in the back through a system, which includes a filter/regulator and an electrically controlled quick exhaust/supply valve. The regulator is manually set to control the supply line pressure. Turning on the quick exhaust/supply valve supplies air to the press. When the quick exhaust/supply valve is turned off the valve closes and exhausts all downstream compressed air in the press quickly.

Tooling Storage Cabinet (Optional)

The Tooling Storage cabinet is located on the left side of the press.

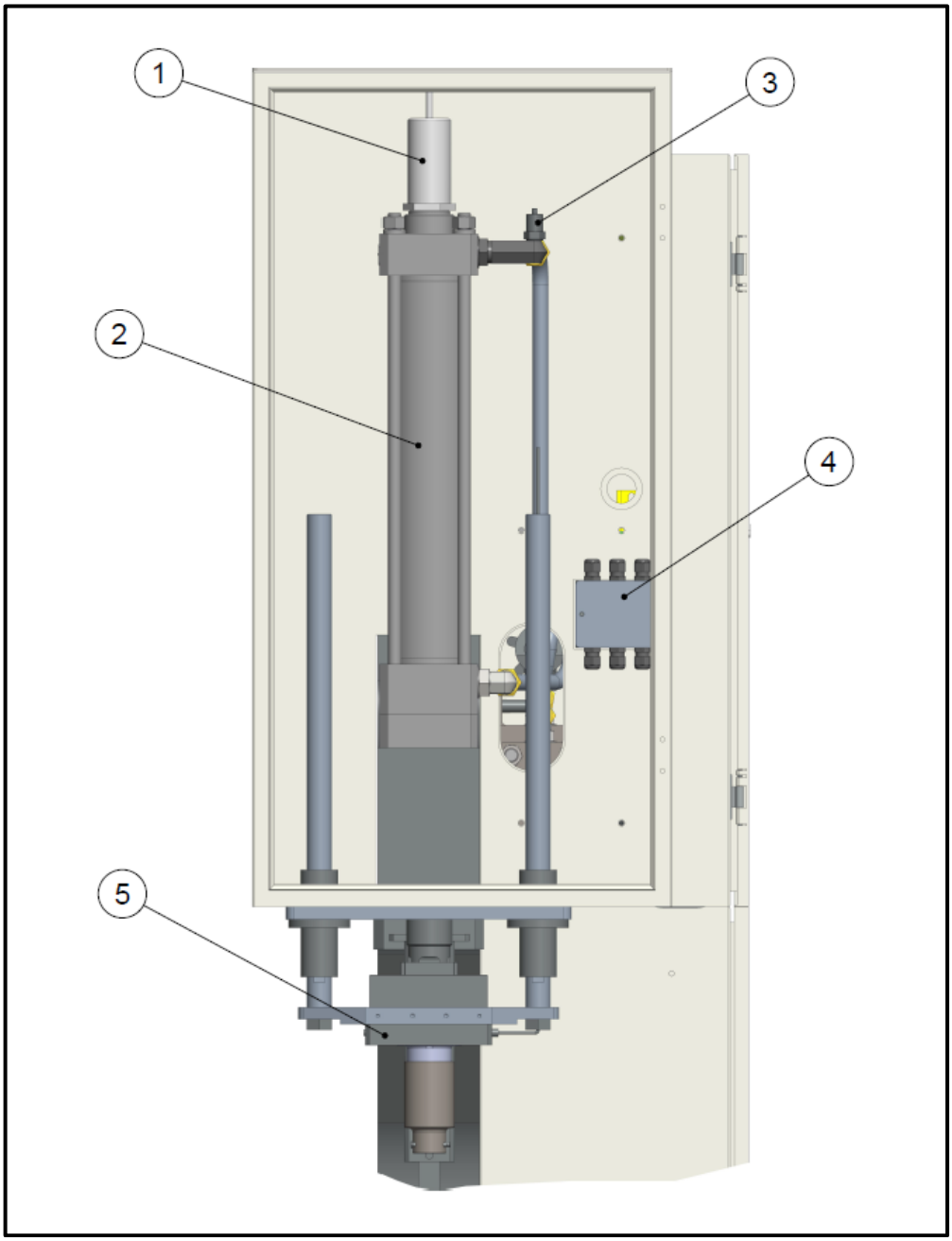


NO.	DESCRIPTION
1	MAIN CYLINDER ENCLOSURE
2	PNEUMATIC / HYDRAULIC ENCLOSURE
3	ELECTRICAL ENCLOSURE
4	ANVIL HOLDER ASSEMBLY
5	SLIDE AND GRIPPER ASSEMBLY
6	GUIDING SAFETY ASSEMBLY
7	TOOLING VALVE/STORAGE ENCLOSURE
FIGURE 2-1 SERIES PA100AO-PAC PRESS	



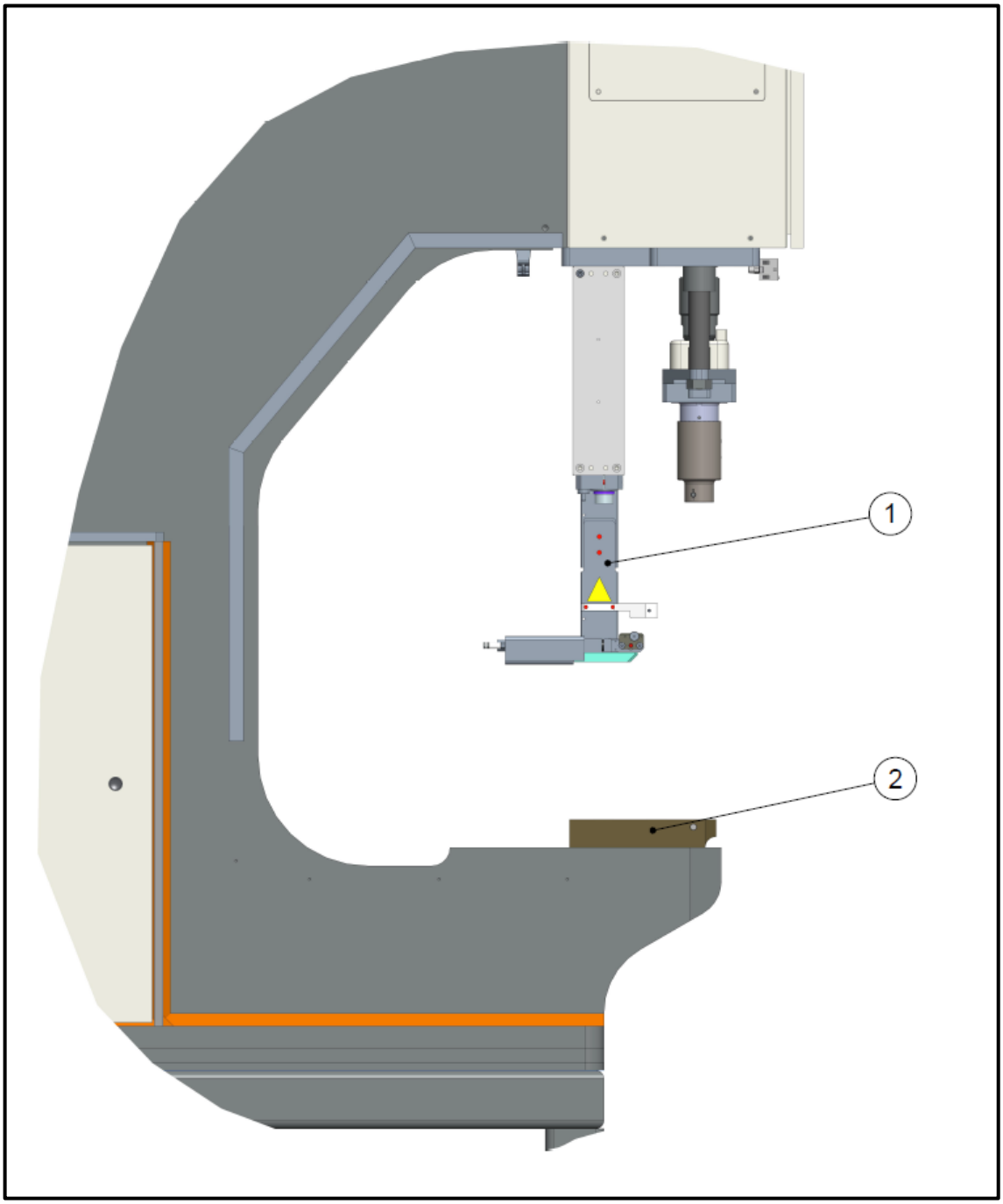
NO.	DESCRIPTION
1	TOUCH SCREEN PC
2	E-STOP BUTTON
3	POWER LIGHT
4	AUDIBLE BEEPER
5	USB INTERFACE

FIGURE 2-2
OPERATOR CONTROLS



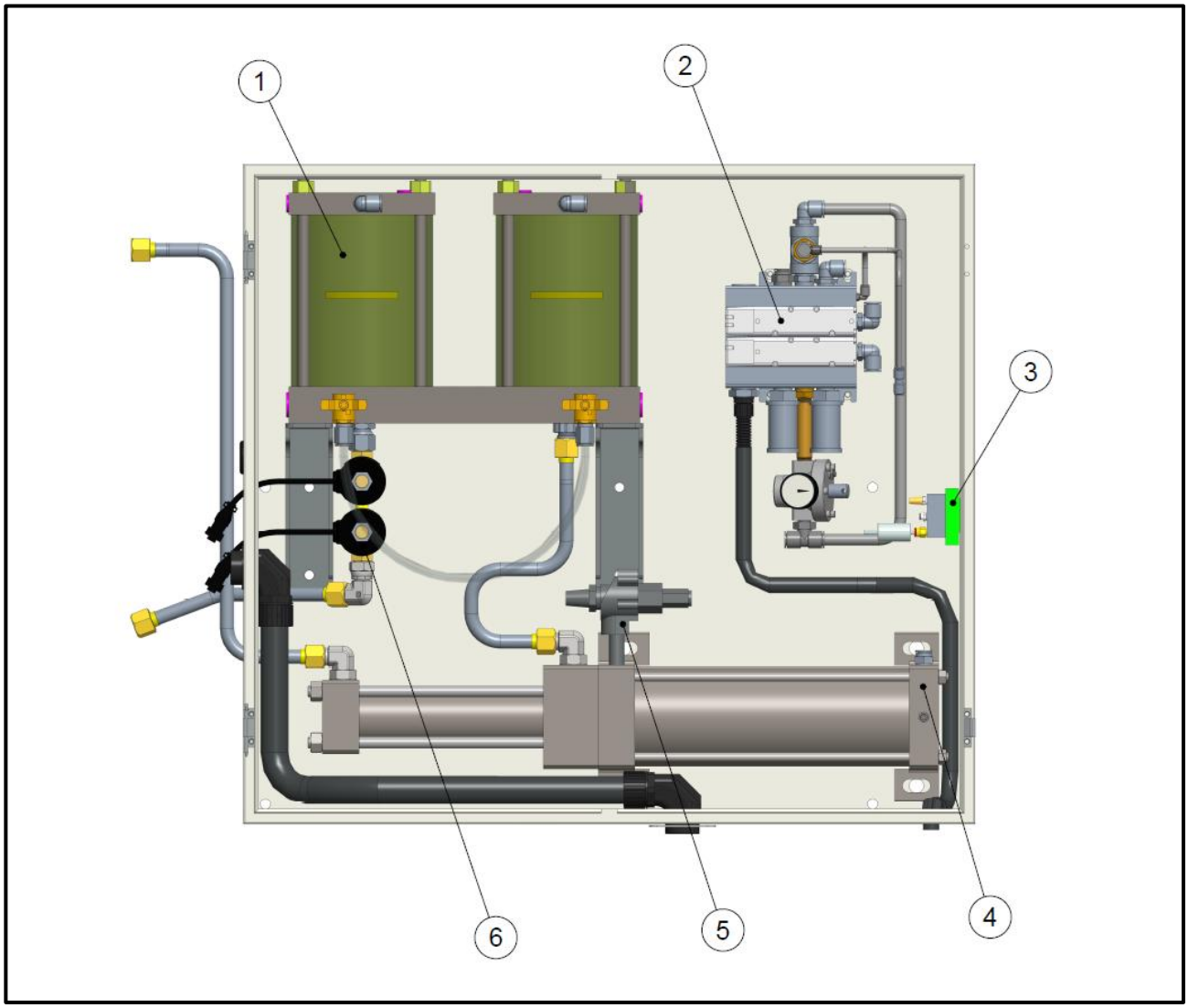
NO.	DESCRIPTION
1	LINEAR TRANSDUCER
2	MAIN CYLINDER
3	PRESSURE TRANSDUCER
4	DISTRIBUTION BOX
5	GUIDING SAFETY ASSEMBLY

FIGURE 2-3
MAIN CYLINDER ENCLOSURE



NO.	DESCRIPTION
1	LINEAR TRANSDUCER
2	MAIN CYLINDER

FIGURE 2-4
PUNCH AND ANVIL AREA DETAIL



NO.	DESCRIPTION
1	AIR/OIL TANK ASSEMBLY
2	RAN VALVE / PILOTED REGULATOR ASSEMBLY
3	ELECTRONIC PILOT REGULATOR
4	BOOSTER ASSEMBLY
5	KIT EXHAUST VALVE (BOOSTER)
6	SAFETY VALVE ASSEMBLY
FIGURE 2-5 HYDRAULIC / PNEUMATIC ENCLOSURE	

SECTION 3
SAFETY SYSTEM OPERATION

WARNINGS - To avoid injury:

1. Always shut off the electrical power, and remove the power cord, before servicing this machine.
2. Only authorized and trained personnel should maintain, repair, setup, or operate this equipment.
3. Always use eye protection when operating or maintaining the pull riveting machine.

SYSTEM SAFETY FEATURES

1. Shutting off the electrical power, with either the “OFF” push-button, the ON / OFF switch, or pushing the E-Stop button, will cause the electric quick exhaust/supply valve to exhaust all air pressure in the press. WITHOUT ANY CONTAINED PRESSURE, ALL PNEUMATIC MOTION STOPS.

2. The electrical cabinet door is key locked to discourage unauthorized access.

3. The patented safety system can distinguish between a work piece properly set-up between the ram and the anvil, and a foreign object placed between the ram and the anvil. The safety system operates as follows:

   - A sensor called a linear transducer is installed on the top of the main cylinder. The linear transducer senses the position of the main cylinder piston and transmits that information back to the PAC.

   - A device called the "safety assembly" is installed in the bottom of the ram. The assembly consists of a fixed section called the housing and a compressible spring-loaded section called the adapter. The adapter holds the punch tooling. When the ram extends and the adapter or punch tooling contacts an object, the safety assembly compresses.

   - Two redundant pairs of optical thru-beam sensors are located inside the front enclosure, under the main cylinder. Each pair of sensors maintains an individual optical beam path that is reflected through one of two holes in the ram by the "reflective collar". When the safety assembly is compressed, part of the safety assembly inside the ram, blocks both beam paths and the sensors are triggered.

   - When the sensors are triggered, because, either the safety assembly is compressed, the reflective collar is moved, or the beam path is blocked in some other way, the PAC immediately senses the change.

   - During a Setup Cycle, the PAC uses this system to "learn" where the fastener and workpiece location is by moving the ram down, compressing the safety assembly, sensing the contact and reading the Linear Transducer. The data of the contact location is saved and used for a comparison during each press/run cycle.

   - During Press Cycling, the PAC determines each time it senses that the safety assembly/punch has contacted something, whether it is "legitimate" or "not legitimate". A "safety window" is used to allow for minor variations with workpiece or operator precision.

- Only if BOTH redundant signals agree and the latest contact point is within the "safety window", does the PAC allow the safety assembly to fully compress and for the air-oil system to apply the predetermined high force needed for fastener installation**.**

4. Three levels of access security are available, each with a different four digit pass code

WARNING: Immediately upon receipt of your press, establish a "Maintenance Code" for your supervisor/maintenance personnel only, as it is possible, however difficult, to operate the press without the standard safeguards in place in the Maintenance Mode. Only trained personnel should use the Maintenance Mode the PennEngineering® is not responsible for improper maintenance mode procedures which result in a loss of operation of the press or operator safety.

5. If the Linear Transducer or either of the ram safety sensors should develop an open or a shortfault, the entire system, including the ram, will come to an immediate stop and not operate further, until repairs are made.

SECTION 4
INSTALLATION OF HARDWARE INSERTION MANCHINE

Transportation of thehardware insertion manchine

- When using a forklift or pallet jack be sure that the forks are properly located between the fork guide tabs under the base of the press. When hoisting from above (See Fig 4-1), be sure to balance the chain or strap between the two eyebolts to prevent swinging.

WARNING: Unbalanced loading of the hardware insertion machine or sudden stops may lead to toppling of the hardware insertion machine.

Locating the Hardware Insertion Machine

- Select a well-lit clean area with a (relatively) level floor. The floor must be able to support the weight of the Hardware Insertion machine.

Leveling the Rivet Installation Machine

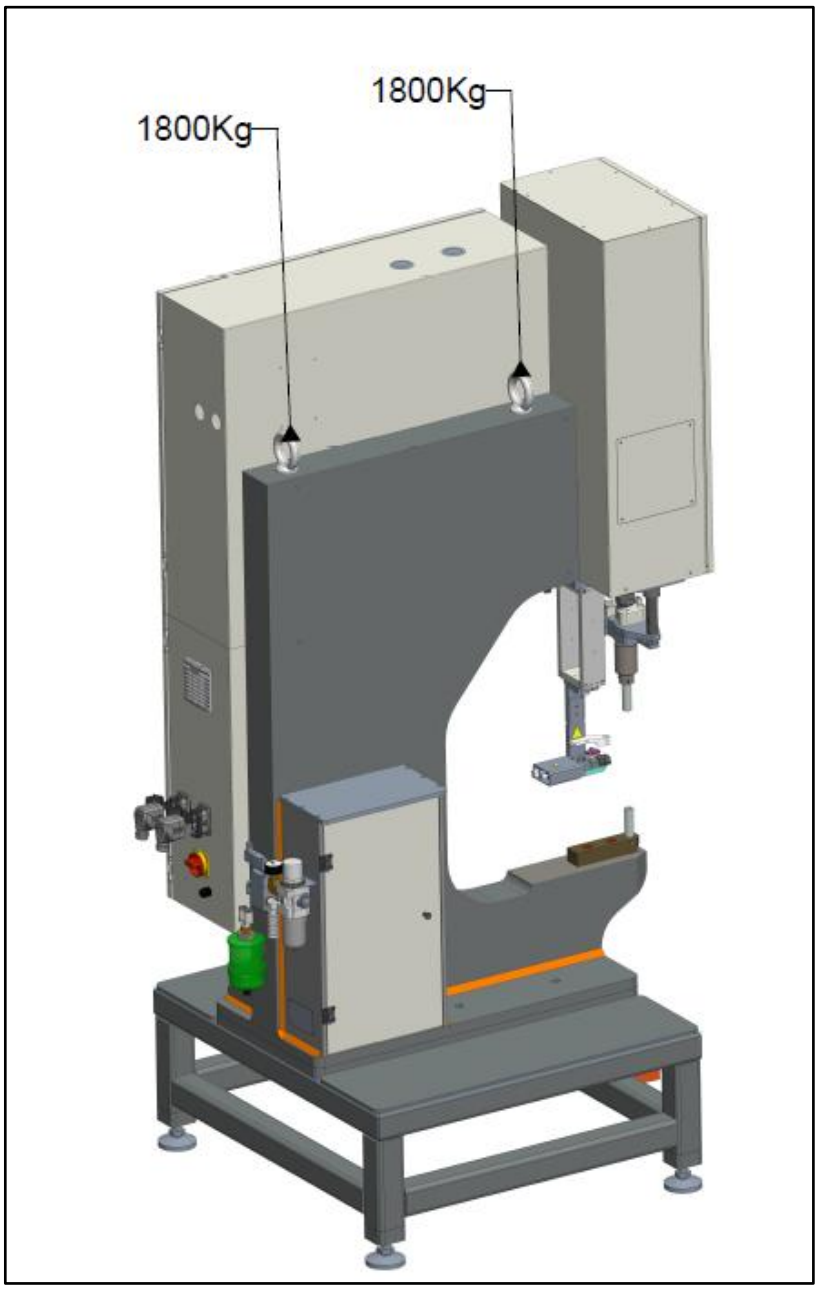
- The hardware insertion machine should be leveled and stabilized after it has been located. This is done by adjusting the height of each footpad then locking each footpad in position by tightening a jam nut. This task requires two 24mm wrenches (See Fig 4-2). An adjustable wrench may also be used. Adjust the foot pad while reading the level at the tooling nut gate adapter. The universal escapement adapter must sit level for proper functioning of the feed systems.

Open Space Requirements

- PennEngineering® has no specific requirements for providing open space around the perimeter of the hardware insertion machine. However, be sure to comply with any national or regional safety codes that may dictate otherwise. We do recommend that you at least leave enough space around the hardware insertion machine so the various storage and maintenance enclosures can be opened fully and so the largest workpieces can be accommodated.

Original Installation Requirements

- After the final installation of the hardware insertion machine verify the continuity of the protective bonding circuit (TN-System) in accordance with EN 60204-1 Clause 18.2.2 standards.



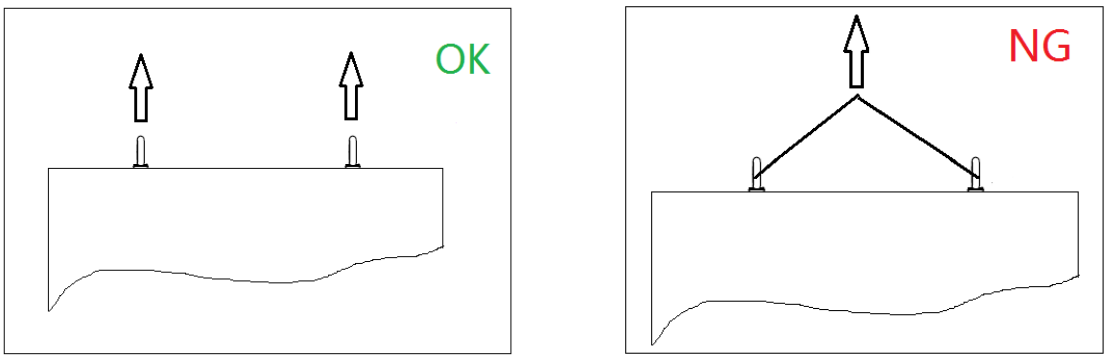


FIGURE 4-1
Cable Suspension Diagram

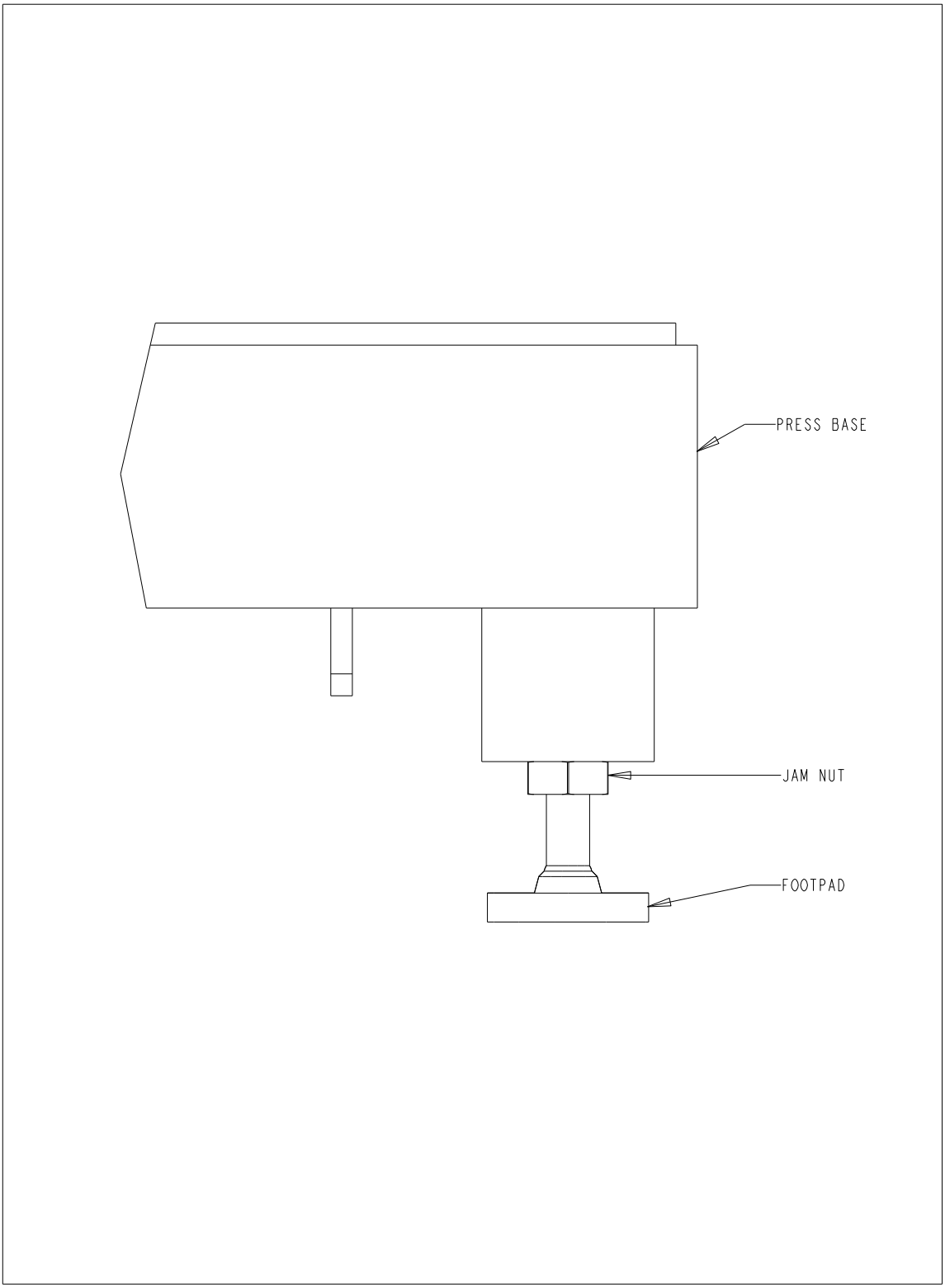


FIGURE 4-2
Adjustable Footpad

Recommended Air Supply Hook-Up Arrangement

Proper air supply is very important to the performance and maintenance of the hardware insertion machine. Following these simple guidelines will ensure good machine performance.

- **Air Quality** - The quality of the air supply is very important. The air must be clean and dry. Moisture and debris will contaminate the oil and valve systems and lead to machine performance and maintenance problems.
- **Air Supply Flow** - Use a minimum 12mm diameter line and fittings from the compressed air source to the rivet installation machine. Shop pressure ranging between 6 to 7 bar (90 psi to 100 psi) is acceptable. Inadequate air flow will affect machine performance.
- **Air Consumption -** Air consumption in automatic mode is about 2.5 liters of compressed air per cycle. Average air consumption running at 6 insertions per minute is about 0.3 liters/sec at 1 atm.
- **Piping Installation** – Proper piping hookup will help achieve the above requirements. See Figure 4-3 on the next page.
  - ♦ Connect to your supply line with a pipe pointing upwards that curves over and down. This - arrangement will help prevent water and compressor oil from entering the machine.
  - ♦ Connect to that drop with your supply fitting for a 12mm or larger hose.
  - ♦ Continue the end of the drop to a drain valve. This will help collect additional water and oil and allow the system to be purged.
  - ♦ If your factory air supply falls short of the above recommendations, an air reservoir tank of an appropriate size for your location can be used.
  - ♦ An auxiliary filter/separator installed immediately outside the machine is recommended.

Install An Appropriate Power Cord.

- The press is equipped with a Male IEC 320/CEE22 Universal Connector for power. Outside North America, unless special arrangements have been made, a customer supplied power cord must be installed. No other electrical system modifications are necessary. Connection should be in accordance with your local electrical code.

Install The Foot Switch

- Plug the foot switch into the receptacle located at the lower left corner of the front of the electrical enclosure.

Check The Hydraulic Fluid Level In Both Air-Oil Tanks

- Check to be sure the hydraulic fluid is level with, but not over, the fill lines on the air-oil tanks. If the fluid level is too high or too low correct the problem by following the procedures provided in section eleven of this manual.

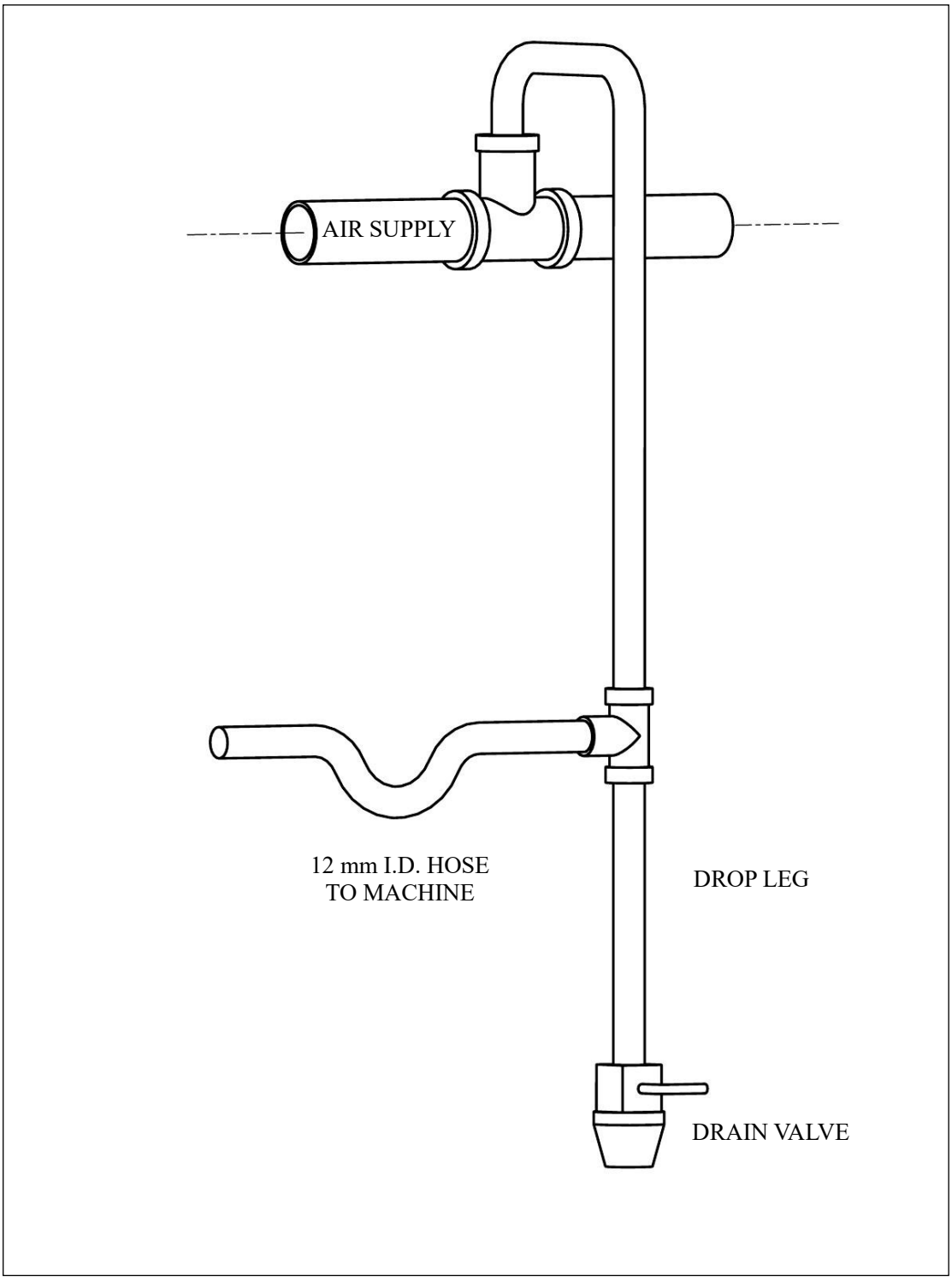


FIGURE 4-3
AIR SUPPLY

SECTION 5
GENERAL FUNCTION DESCRIPTIONS

System Function:

The function of a **PEMSERTER® SERIES 2000®-PAC FASTENER INSTALLATION PRESS** is to safely, quickly, and consistently install PEM® brand self-clinching fasteners in various types of sheet material. To do this the press uses:

- A patented point-of-operation safety system that controls the descent of the ram and does not allow the ram to descend if it contacts any object other than the intended fastener and workpiece.
- Automatic fastener feeding system that locates the fastener at the point of insertion, so that the operator is free to handle just the workpiece.
- Air-oil-booster system that provides quick ram travel with high installation forces at the point of insertion.
- Precise installation tools and computer controlled installation forces.

Self-clinching Fastener Installations:

PEM® self-clinching fasteners are installed into punched or drilled holes in ductile sheet material. To install a PEM® self-clinching fastener:

- The shank of the fastener is placed into the installation hole until the part of the fastener that is larger than the hole called the displacer (such as the knurls for nuts, or the head for standoffs) sits on the edge of the hole.
- A parallel squeezing force is applied to press the displacer (overhanging part) of the fastener into the sheet material.
- The force causes the sheet material to cold flow into the undercut of the fastener that is between the displacer and the shank. This traps the fastener within the sheet metal.

Setting up the Press:

The following section of the manual describes the setup process in general. For details on setting up and operating the press see the appropriate section in the manual.

Step 1 - Setup Tooling

Tooling setup consists of selecting appropriate tooling for the fastener being fed and the workpiece, installing the tooling on the press and adjusting the feed controls.

Different types of tooling that feed the same size fastener are selected for accessing different shapes and sizes of work pieces.

See the Tooling Section of this manual on selecting the right tooling.

Step 2 - Select the Setup for the Tooling and Fastener on the Touchscreen

Once the tooling is installed, the next step is to setup the press by using the touchscreen. The touchscreen setup is simple and can be done one of three ways.

- **New Tool Set-up** – Choose tooling mode, fastener size and workpiece material.
- **Recall A Job** – Select from a previously programmed Job stored in the press
- **Recall Last Job** – Run the same Job that was just run, the press remembers, even if it is turned off between jobs.

See the Touchscreen Controls section of this manual on choosing the right selections for setup.

When the selections are complete, the press automatically sets the values for operation and moves onto safety setup.

Step 3 - Safety Setup

The next step is very quick and simple but very important.

Safety Setup is the step where the press learns the position of installation called the Safety Set point. The operator positions the materials for an installation, but the press does not actually install the fastener. The ram extends and touches the fastener and workpiece. The touch point

teaches the press where the proper installation point should be. The Press is ready to install fasteners.

Fastener Automatic Feed Functions:

Automatic Fastener Feeding is done from the vibratory feeder bowl to the insertion point in the workpiece. The following steps are taken:

- The vibratory feeder bowl moves the fasteners around the bowl and past a tooling component called a nutgate for nut-type tooling or an escapement for stud-type tooling.
- The fasteners are oriented in the tooling and fed into a tooling shuttle. The shuttle takes the first fastener and separates it from the rest. That fastener is blown with compressed air out of the shuttle into a plastic tube that leads to the punch and anvil area.
- Depending on the type of tooling the fastener is either fed directly into a tooling module like a stud-injector module or bottom feed nut module or into a set of jaws on the top feed slide and gripper system.
- During a top-feed tooling installation, the fastener is picked up from the jaws either by a vacuum punch or pin punch and the jaws open and pull back.
- The workpiece is placed with the installation hole onto either a fastener or tooling guide pin. When the operator has located the workpiece, the foot pedal can be depressed to begin the installation process.

Installation Process:

- When the foot pedal is depressed, the ram extends down quickly bringing the punch to the workpiece.
- When the fastener contacts the workpiece the safety sensors are tripped. The Press Control System checks that the position called the insertion point, is at the same position as the learned position at setup, the safety set point. Only if the insertion point is within a certain range of the safety set point, does the installation proceed.
- If the insertion point is good then the high installation force is applied to install the fastener and the ram returns up.

Special Features and Conditions:

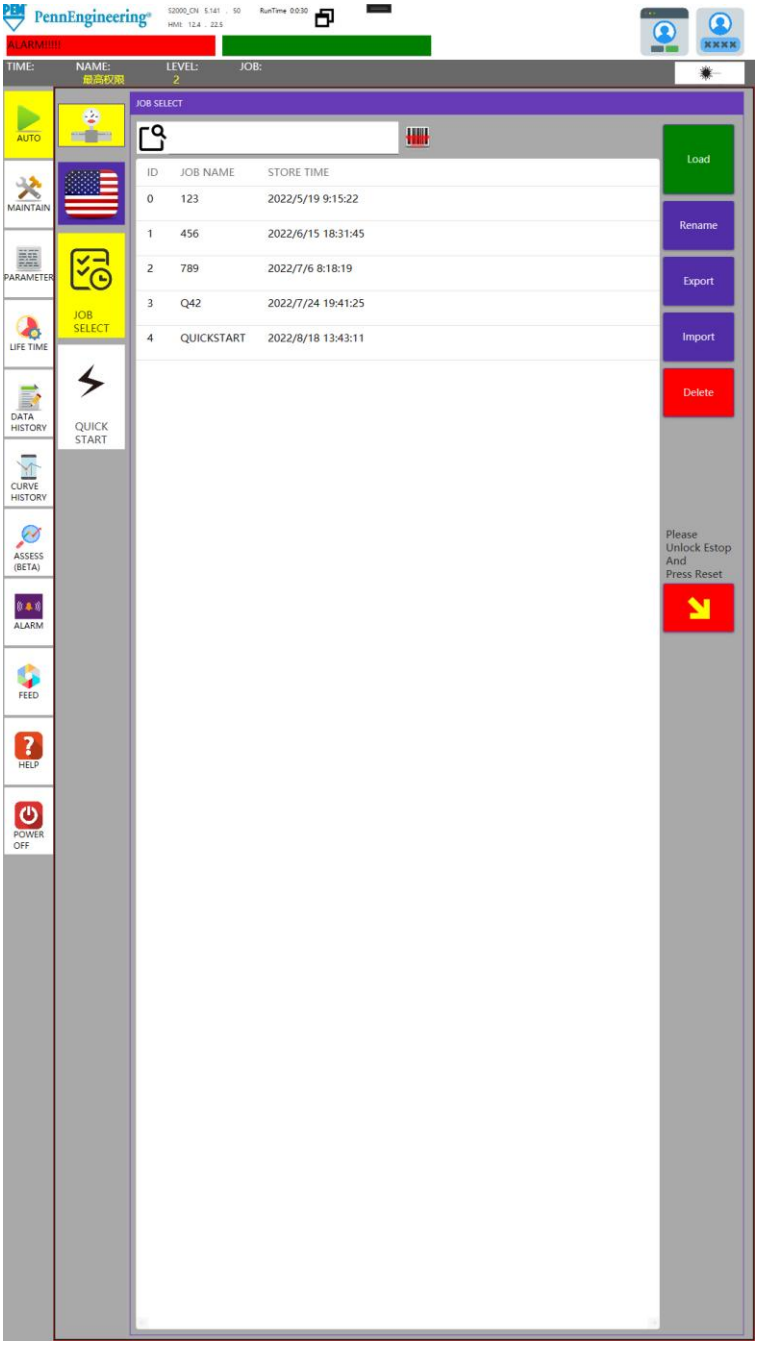
- **Dwell/Force Verification (Quality Assurance System)** – Dwell time is the period from when the press control system starts the high force cycle to when the high force cycle ends. The Dwell software system monitors pressure feedback signals throughout the cycle to assure a quality installation.
- **Soft Touch Mode** – When running in Soft Touch Mode the press will slow down just before contacting the workpiece and fastener. This mode is slightly slower but can insure against damage to soft and brittle work pieces.
- **Interrupted Mode** – When running in Interrupted Mode the press will slow down and stop upon contacting the workpiece and fastener. This mode is the ultimate in assurance just before installation that a workpiece or layers of work pieces are properly aligned.
- **Setpoint Tolerance** – Can be selected for Standard Tolerance or Narrow Tolerance. Narrow Set point Tolerance sets a smaller range for the allowed deviation of each installation from the Safety Set point. Narrow Tolerance is used for smaller fasteners and more precise operations to assure proper installation in the workpiece hole. This mode is less tolerant of work pieces not held level and poor hole quality or hole debris.
- **Start at Minimum Setup** – This mode changes the setup sequence. Instead of pre-selecting a force at setup, the press interrupts the dwell time of the first installation and allows the operator to adjust the force as the fastener is being installed. This function allows for the most precise installation force setup. Once the installation force is established, it can be saved within one of the Recall Job memory locations.
- **Fastener Length Monitoring (FLM)** – This mode requires optional tooling hardware to be installed. During the automatic fastener feeding process for long fasteners such as stud and long standoffs, the length of each fastener is checked to ensure that it is the correct length. If a fastener is too long or short, it is rejected and not installed. During shop operation, fasteners of different lengths can become mixed. Long fastener tooling is typically designed to accept various lengths of fasteners to increase the value of the tooling and decrease the costs of installing different size fasteners. FLM Hardware and Software can be setup to check for any length fastener.
- **Safety Fault Error** - If the difference between the insertion points and the safety set point is outside the range of the set point tolerance then a safety fault error condition occurs. When a safety fault occurs the redundant safety valves close, immediately stopping downward ram motion. The ram reverses direction and retracts the punch. The safety assembly on the end of the ram never fully compresses and the boost cycle is never initiated.

SECTION 6
TOUCH-SCREEN CONTROLS

A programmable Automation Controller (PAC) controls the functions of the Device. The operator sends commands to the PAC and reads data from the PAC through a system of menus and information displayed on its touch screen. An operator need only touch the buttons displayed on the touch screen to make a selection.

The touch screen controls allow the operator to setup the Hardware Insertion Machine for operation, operate special functions and maintain and troubleshoot the machine.

6.1 Main Screen



When system finish loading software ‘Main Screen’ will show.

[ ]: Login In and Login Out

→To→6.1.1 Login Page

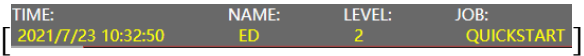
[Load]: First select a job in list and load current selected job
→To→6.1.2 Run Page

[Rename]: Select a job in list and rename current selected job

[Export]: Select a job in list and export a file that save in local.

[Import]: Choose a job file from local and import to system

[Delete]: Delete current selected job.

[

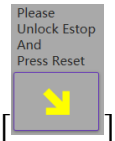
]: Load information show.

[]: Main air supply

[]: Language switch
→To→6.1.4 Language Switch Page

[JOB SELECT]: Load a job you have already saved in system.

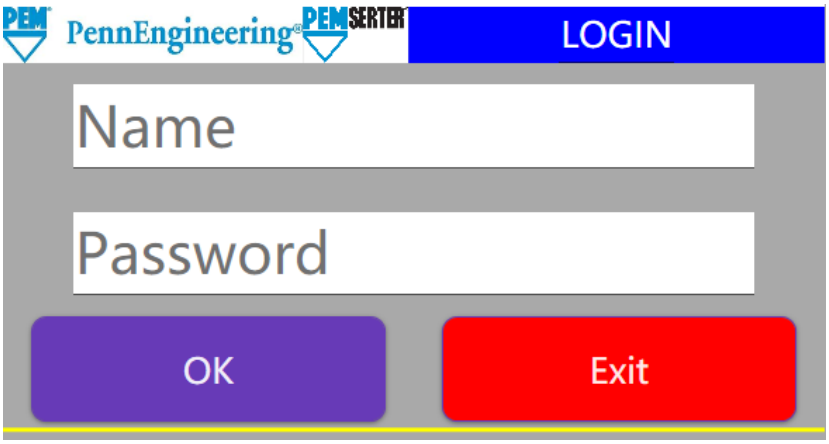
[QUICK START]: Start to work with a new create job.
→To→6.1.5 Quick Start Page

[

]: Remind you need to unlock estop and press ‘Reset’ button.

[QRcode ]: Type in the QRcode compare with job names. If compare ok. Press blue button will auto load current job.

6.1.1 Login Page



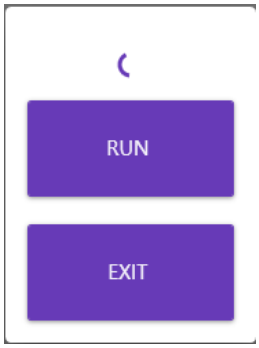
[Name]: Login name

[Password]: Login password

[OK]: Enter

[Exit]: Exit page

6.1.2 Run Page



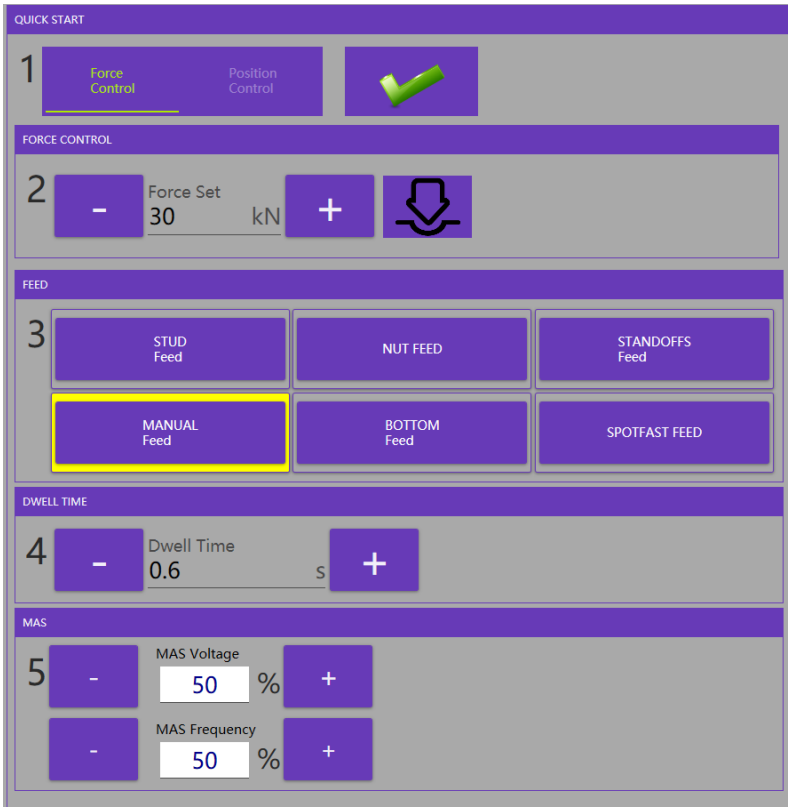
[Run]: Enter run mode

[Exit]: Load current job but not in run mode

6.1.4 Language Switch

Select the language you need.

6.1.5 Quick Start

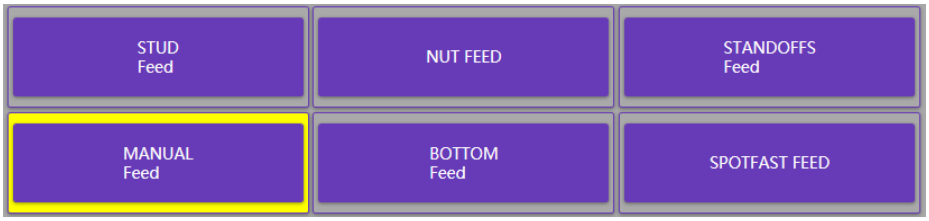


[1]: Choose a work mode between force control and position control.
[Force Control]: Control force first

[2]: 

Choose force control

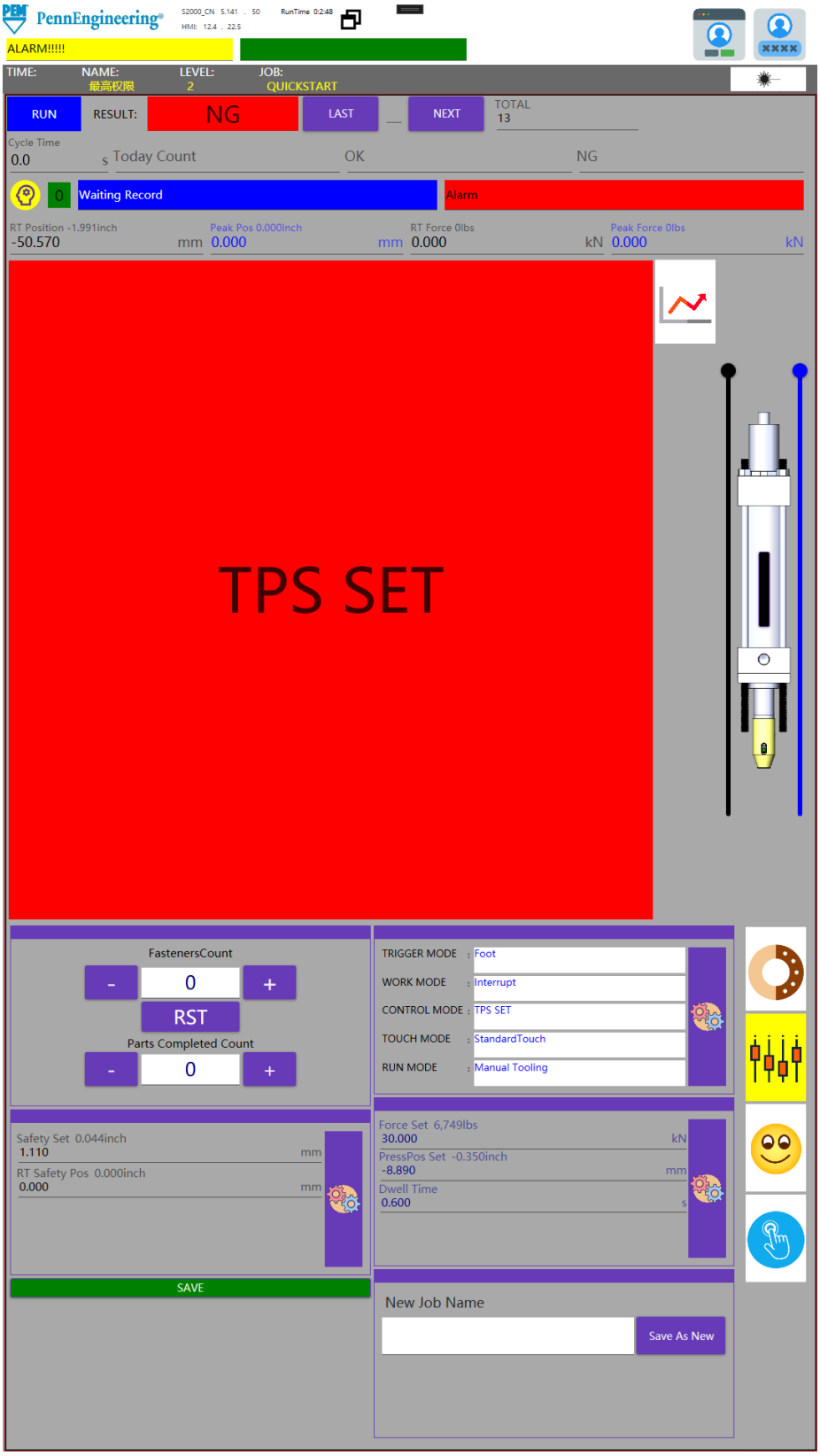
[]: Suggestion menu
→To→6.3.1.1 Suggestion Page

[3]: Choose feed mode 

if you use “Suggestion Menu” select “AUTO FEED” this mode will auto adjust

[]: Confirm and Loading job

6.1.6: RUN SCREEN



[RESULT: NG]: The result of press

[LAST 1 NEXT]: Search last 20 curves

[TOTAL]: Total count

[Temp]: Oil temperature

[Today Count]: One day production

[OK/NG]: One day OK NG count

[RT Position]: Real time position

[RT Force]: Real time force

[Peak Pos]: Peak position

[Peak Force]: Peak force

[

]: Running status

[]: Curve page
→To→6.1.6.1 Curve Page

[]: Picture page(Only when you use “Insert Graphic” this icon will show
→To→6.1.6.3 Picture Page

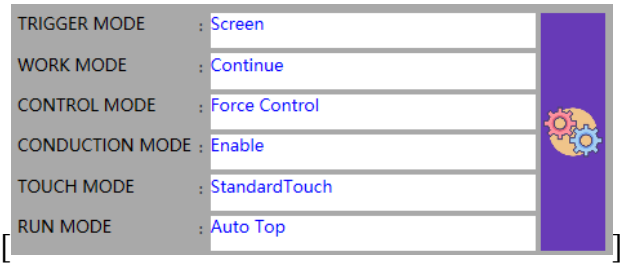
[FastenerCount]: Current fastener count decreasing numbers

[Pars Completed]: Current workpiece count increasing numbers

[]: Increase and decrease count

[

]:Reset the “Fasteners Count”

[

]: Setting

[TRIGGER MODE]:
→[Foot]: Using a foot panel control the press
→[Signals]: Using IO or communication to control the press
→[Screen]: Using figer touch the screen to control the press

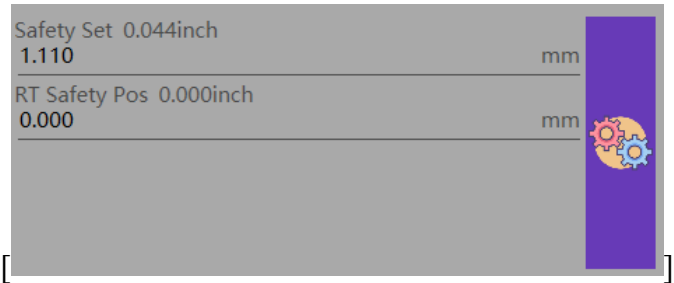
[WORK MODE]:
→[Continue]: Only give a trigger will finish the press cycle
→[Interrupt]: First trigger will contact fully. Second trigger will booste

[CONTROL MODE]:
→[Force Control]: Force first to control press. Just monitor the force
→[Position Control]: Position first to control press. Just monitor the position

[TOUCH MODE]:
→[StandardTouch]: Ram going down with normal Speed.
→[SoftTouch]: Ram going down before touch the surface will slow up.

[RUN MODE]:
→[Manual Tooling]: Single press mode without any feed.
→[Auto Top]: Auto press with top feed mode
→[Auto Bottom]: Auto press with bottom feed mode

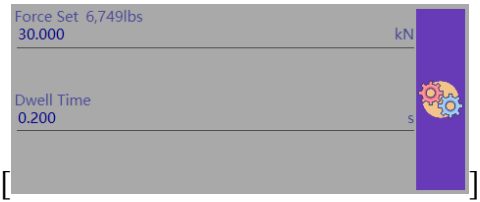
→[]→ 6.1.6.4 Run Mode Page

[

]:
[Safety Set]: The position trigger the safety sensors

[RT Safety Pos]: Real time safety position

→[]→ 6.1.6.5 Safety Page

→[

]→[]→ 6.1.6.6 Quick Set Page

[Force Set]: Under force first control mode only set force

[Position Set]: Under position first control only set press position

[Dwell Time]: Keep booste time

[

]: Save current job as a new job

[]: Feed information

PS:  under selecting and press again this will switch to customert mode  (Enable only under customer mode)

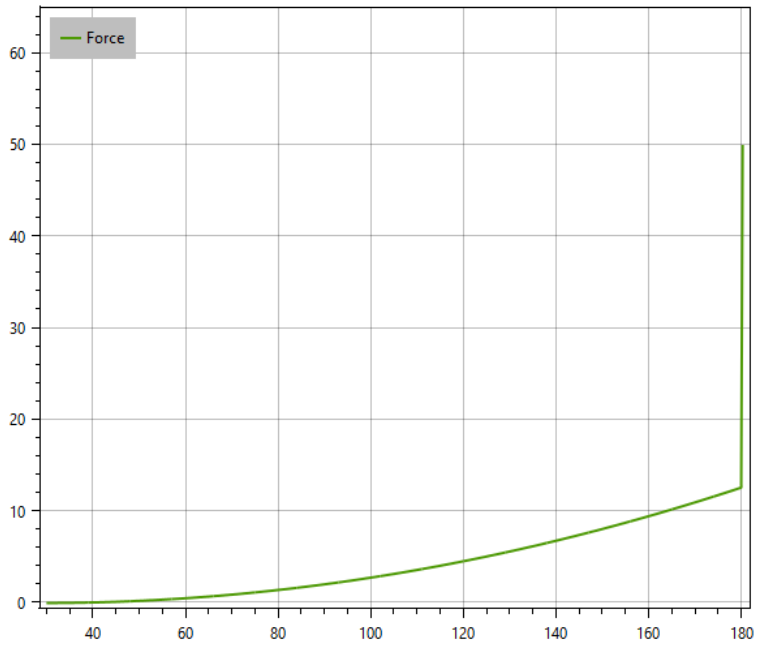
[]: Parameters

[]: Result the page will show OK or NG

[]: Screen trigger
→to→ 6.1.6.7 Screen Page

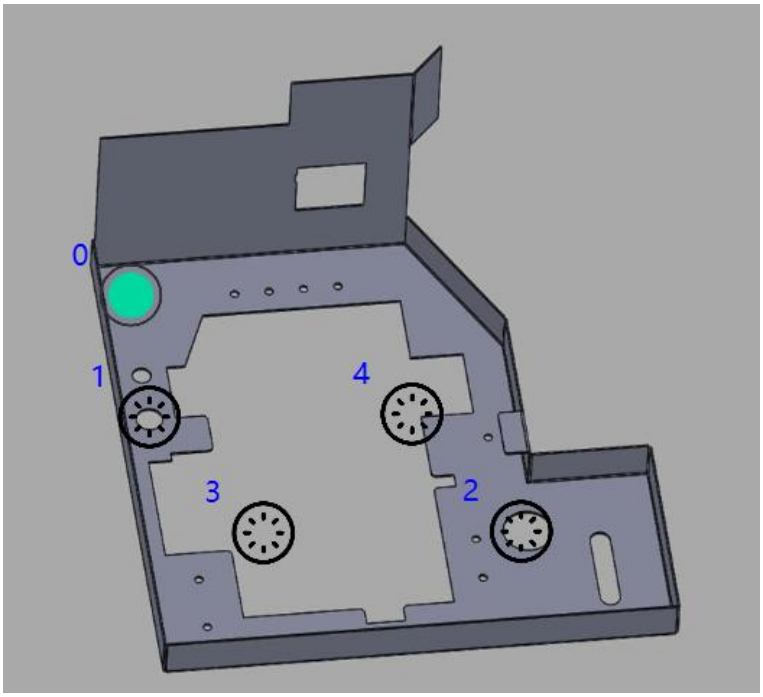
[]: Exit current job

6.1.6.1 CURVE PAGE



Curve page

6.1.6.3 INSERT GRAPHIC



→[

]: Waiting for press

→[

]: Current working point

→[

]: Finished press

6.1.6.4 RUN MODE

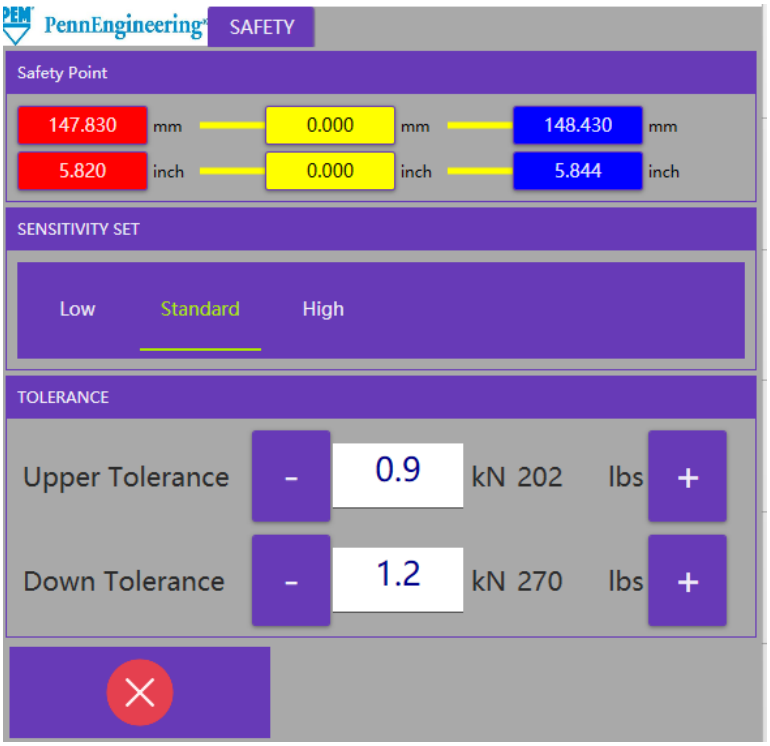
[TRIGGER MODE]: The way to control press

[PRESS MODE]: The way to control one or two trigger

[CONDUCTION]: Control the length detect(Only Enable for SS)

[TOUCH MODE]: Before touch the surface whether slow down.

6.1.6.5 SAFETY



[0.000]: Yellow means current values

[7.200]: Blue is normal tolerance

[5.100]: Red is alarm current values above or below tolerance

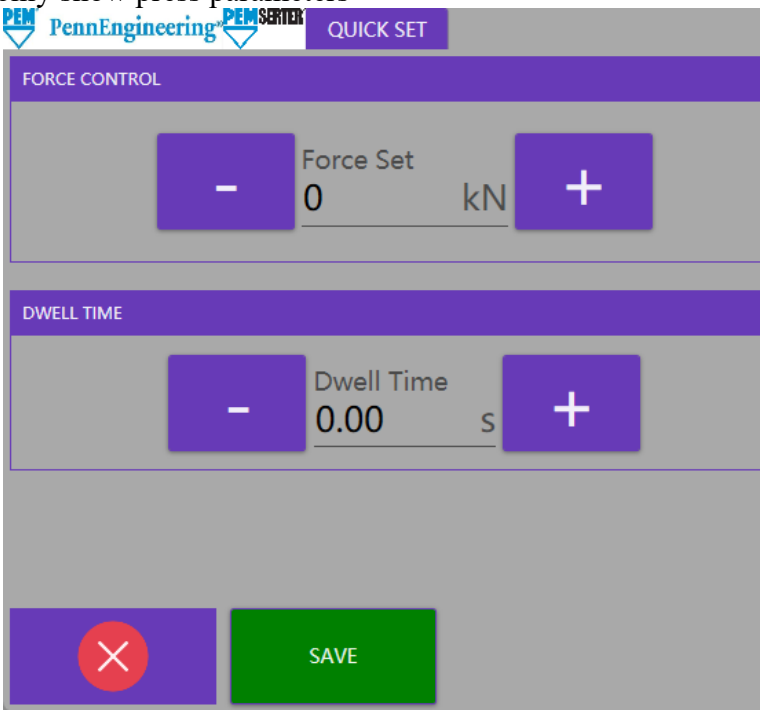
[SENSITIVITY SET]:
→[Low]: Safety tolerance will increase
→[Standard]: Safety tolerance standard
→[High]: Safety tolerance will decrease

[Upper Tolerance]: The force judge OK must below (Peak Force + Upper Tolerance)

[Down Tolerance]: The force judge OK must above (Peak Force - Down Tolerance)

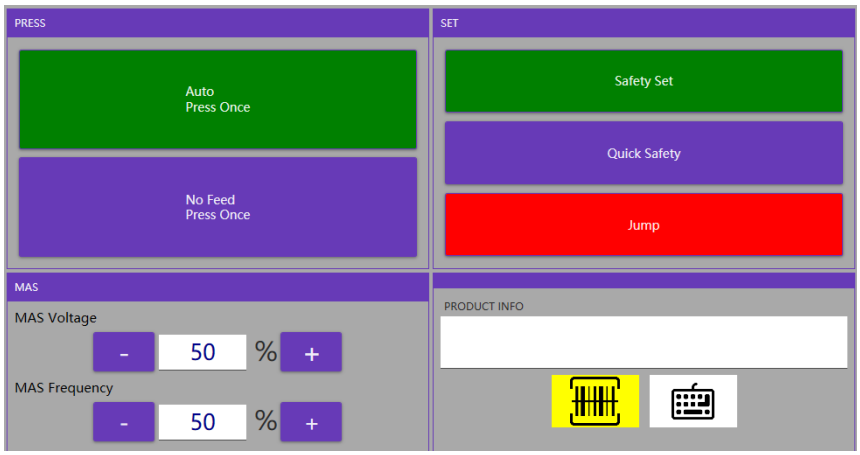
6.1.6.6 QUICK SET

Press mode set will only show press parameters



Set Parameters but not save in job. Only temporarily modify parameters

6.1.6.7 SCREEN PAGE



[Auto Press Once]: Feed and press by auto control

[Safety Set]: After ‘TPS just keep press the foot panel

[Quick Safety]: This will use current values to set values

[No Feed Press Once]: Press without feed

[Jump]: This will give a simulation for robot

[_____]: Enter the product info or code

[ ]: QR code type in

[ ]: This will show keyboard for customet to type in

[MAS Voltage]: If you use “Auto Feed” you can adjust MAS Voltage

[MAS Frequency]: If you use “Auto Feed” you can adjust MAS Frequency

6.2 MAINTAIN

[IO]
→To→6.2.1 IO Page

[SIGNALS]
→To→6.2.3 SIGNAL Page

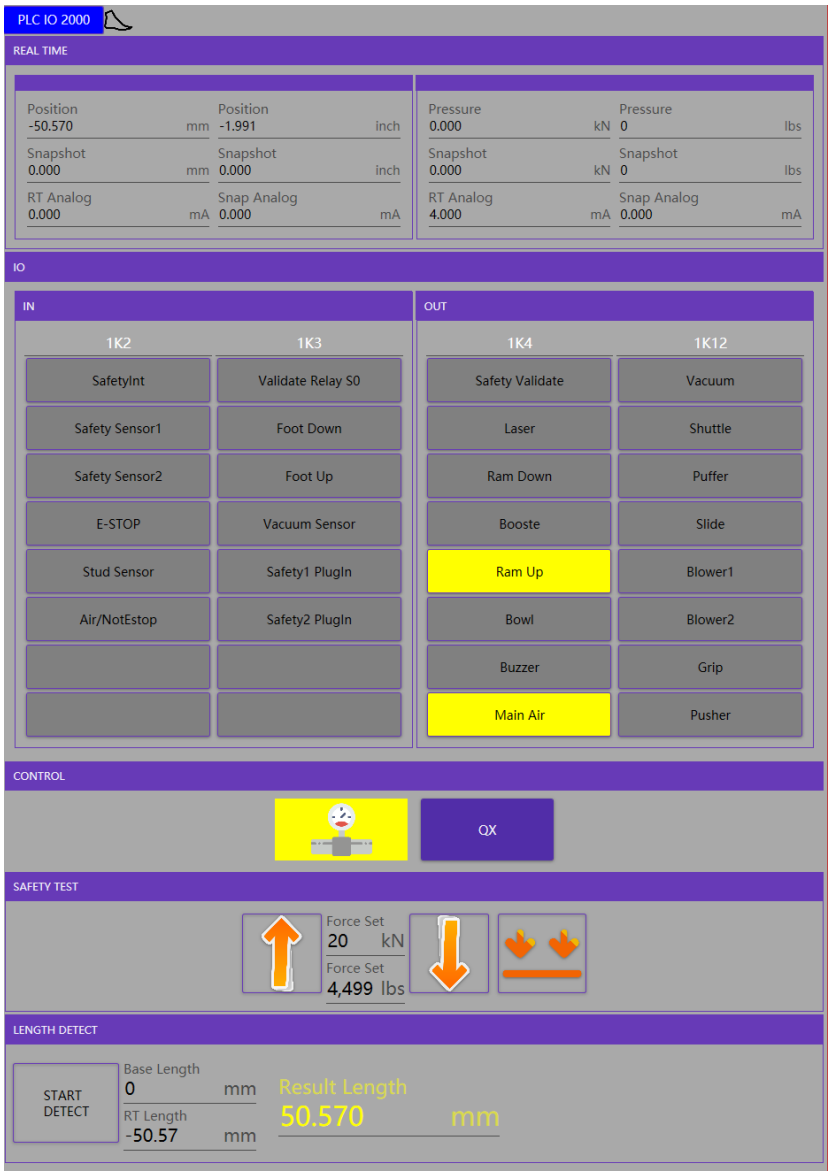
[LEVEL]
→To→6.2.4 LEVEL Page

[CALIBRATE]
→To→6.2.5 CALIBRATE Page

[CLEAN]
→To→6.2.6 CLEAN Page

[FACTORY]
→To→6.2.7 FACTORY Page

6.2.1 IO



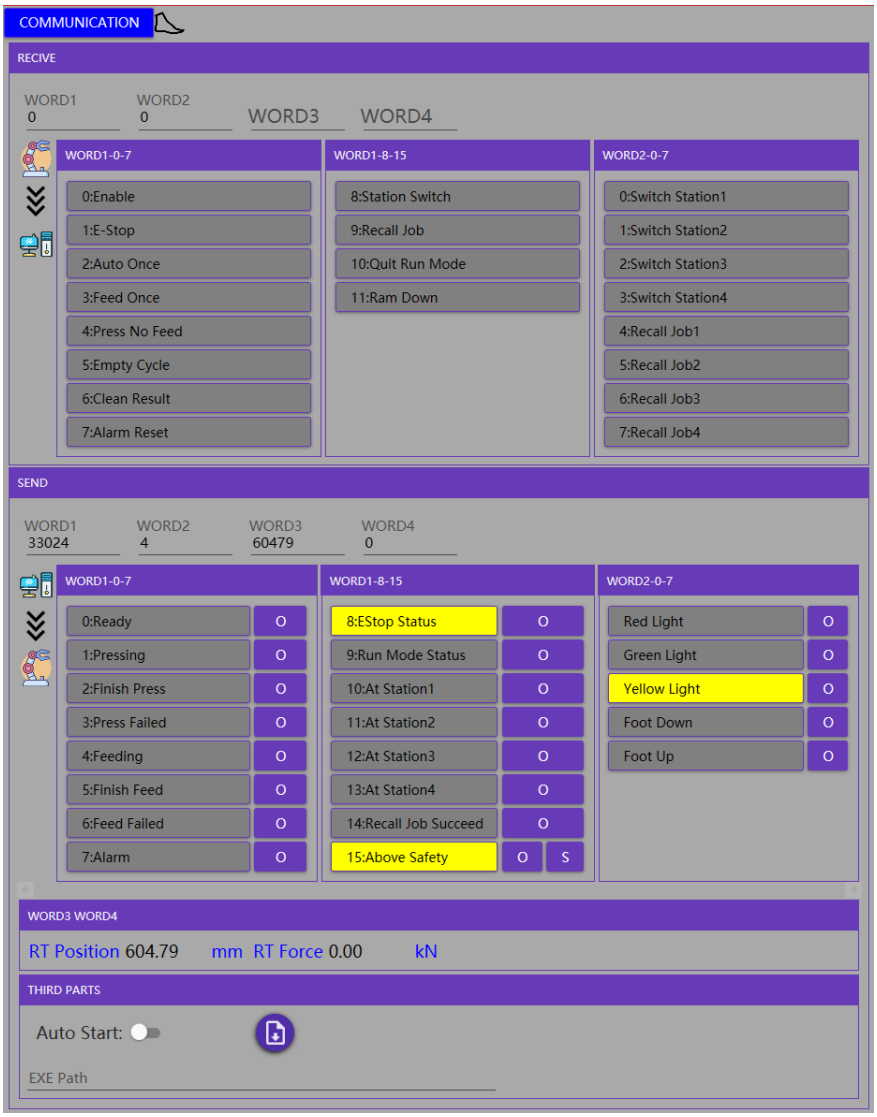
[REAL TIME]: Show all the sensors in ServeHydralic System

[IO]: Show Input and output in PAC modules

[SAFETY TEST]: Press ‘Conduction’ or ‘Safety Sensor’ then trigger the conduction or sensors.

PS: Under this page foot panel is enable for both ram up and ram down.

6.2.3 SIGNALS



[Recive]

Bit	WORD1	
0	Enable	ON Enable outer signals
1	E-Stop	ON Estop triggered,OFF release Estop
2	Auto Once	OFF-ON,Rising signal trigger once(Auto control feed or not)
3	Feed Once	OFF-ON,Rising signal trigger feed once
4	Press No Feed	OFF-ON,Rising signal trigger press without feed
5	Empty Cycle	ON,Feed will stop working and safety detect will stop checking
6	Clean Result	OFF-ON,Rising signal trigger will clean the last press result
7	Alarm Reset	OFF-ON,Rising signal trigger will reset the alarm
8	Station Switch	OFF-ON,Rising signal trigger station switch(only muti stations)
9	Recall Job	OFF-ON,Rising signal trigger will recall the job
10	Quit Run Mode	OFF-ON,Rising signal trigger will quit the run screen
11		
12		
13		
14		
15		

Bit	WORD2	
0	Switch Station1	Switch1,When ON is working
1	Switch Station2	Switch2,When ON is working
2	Switch Station3	Switch3,When ON is working
3	Switch Station4	Switch4,When ON is working
4	Recall Job1	Recall Job1,When ON is working
5	Recall Job2	Recall Job2,When ON is working
6	Recall Job3	Recall Job3,When ON is working
7	Recall Job4	Recall Job4,When ON is working
8		
9		
10		
11		
12		
13		
14		
15		

[Send]

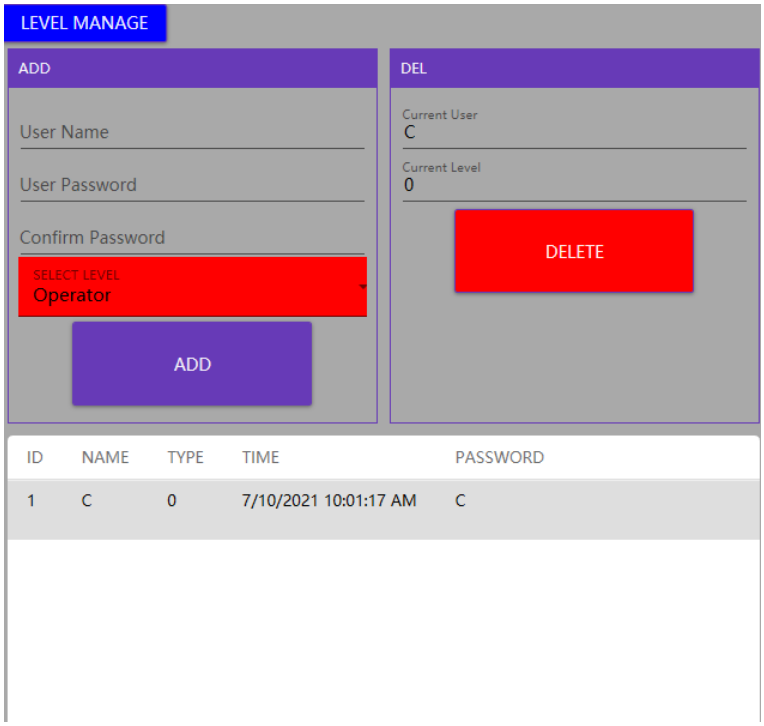
Bit	WORD1	
0	Ready	ON,No alarm and ram at home under run screen mode
1	Pressing	ON,Ram is under going down or booste
2	Finish Press	ON,Press finished until next loop or manual reset status
3	Press Failed	ON,Press failed until next loop or manual reset status
4	Feeding	ON,Under feeding
5	Finish Feed	ON,Finish feed until ram move or next feed loop
6	Feed Failed	ON,Failed feed until ram move or next feed loop
7	Alarm	ON,Alarm until everything ok
8	Estop Status	ON,Estop status
9	Run Mode Status	ON,Only under run screen
10	At Station1	ON,At station1
11	At Station2	ON,At station2
12	At Station3	ON,At station3
13	At Station4	ON,At station4
14	Recall Job Succeed	ON,Succeed recall job and signal will keep for 2s
15	Above Safety	ON,Ram above safety position(That can set by customer)

Bit	WORD2	
0	RedLight	RedLight
1	GreenLight	GreenLight
2	YellowLight	YellowLight
3	FootDown	ON,Foot press down
4	FootUp	ON,Foot press up
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Bit	WORD3	
	RT Position	Data/100=mm

Bit	WORD4	
	RT Force	Data/100=kN

6.2.4 LEVEL MANAGE



[User Name]: Operator name

[User Password]: Operator password

[Confirm Password]: Operator password confirm

[SELECT LEVEL]:

→[SELECT LEVEL Top Level]:The top level allows modified everything

→[SELECT LEVEL Administrator]: Admin allow change parameters and set. But not allow modified the key parameters

→[SELECT LEVEL Operator]:Only allow recall a job and quick start

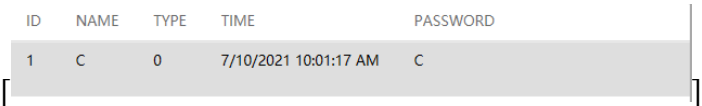
[ADD]: Add the operator

PS:The system time format can't change because of the database time must match the system time format.

[Current User]: Current select user name

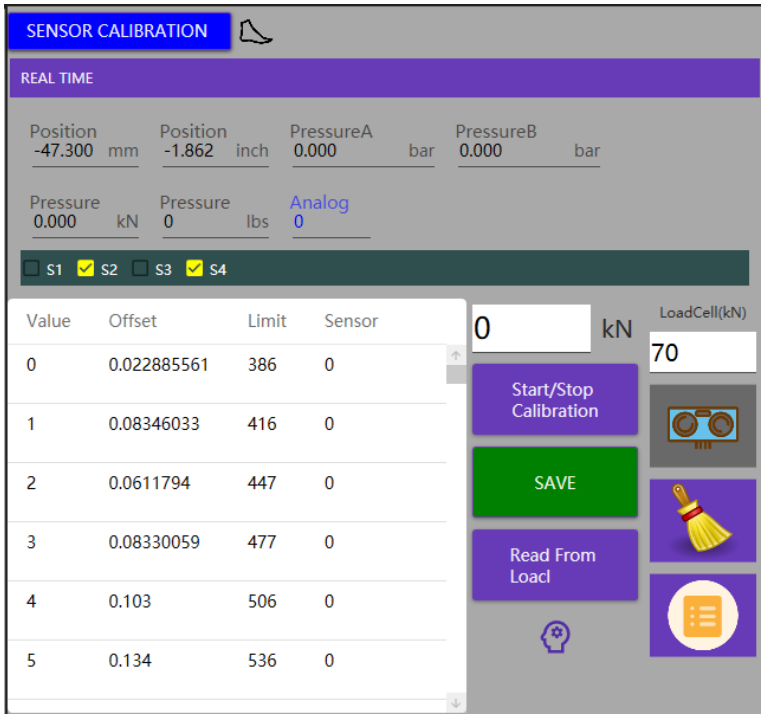
[Current Level]: Current select level

[DELETE]: Delete current selected operator

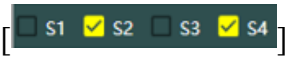
[

]: Users datagrid

6.2.5 CALIBRATE



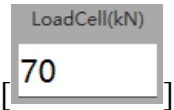
[REAL TIME]: Real time values of servo hydraulic

[

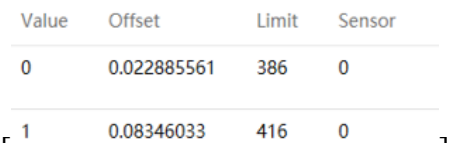
]: The valves status of hydraulic system

[

]: Set the start calibrate force

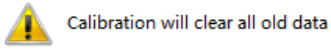


[]: Set the loadcell range
Use 4-20ma analog control(The range force scale the 4-20ma)



]: Calibration list
→[Value]: The calibrate force
→[Offset]: The force offset value
→[Limit]: The force limit torque(Only Enable For SS)
→[Sensor]: The offset between sensor and loadcell

[
]: Sensor calibration

Press this will 

clear all the old data

[Start/Stop Calibration]: Control start and stop calibrate from the set start force

[
]: Under this status the force sensor will be calibrated

[]: Not select this button the set value and feedback value will be calibrated
PS: The calibration will start from the set force and minus 1kN every cycle. When the force below 1kN this calibration will auto stop working

[Save]: Save the calibrate result to local and controller

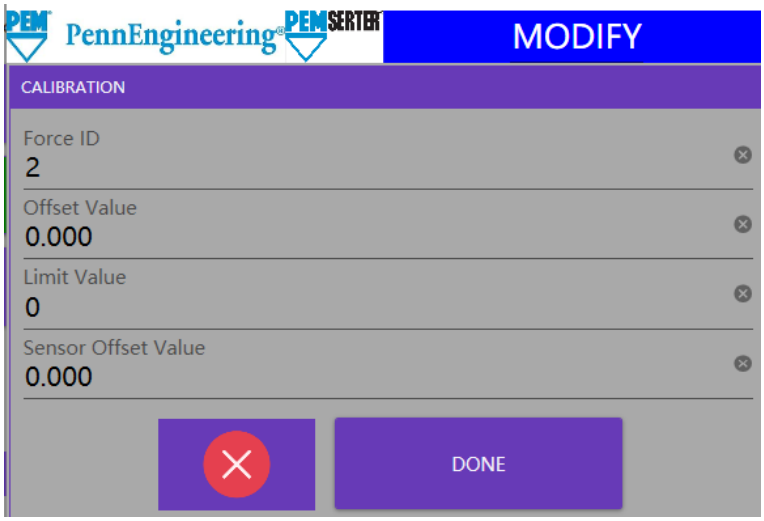
[Read from local]: Read the calibrate file from local to controller

[]: Smart mode the force will auto adjust during the press

[]: Clean the calibrate result

[]: Adjust calibrate value by manual
→[]→ 6.2.5.1 Modify page

6.2.5.1 MODIFY PAGE



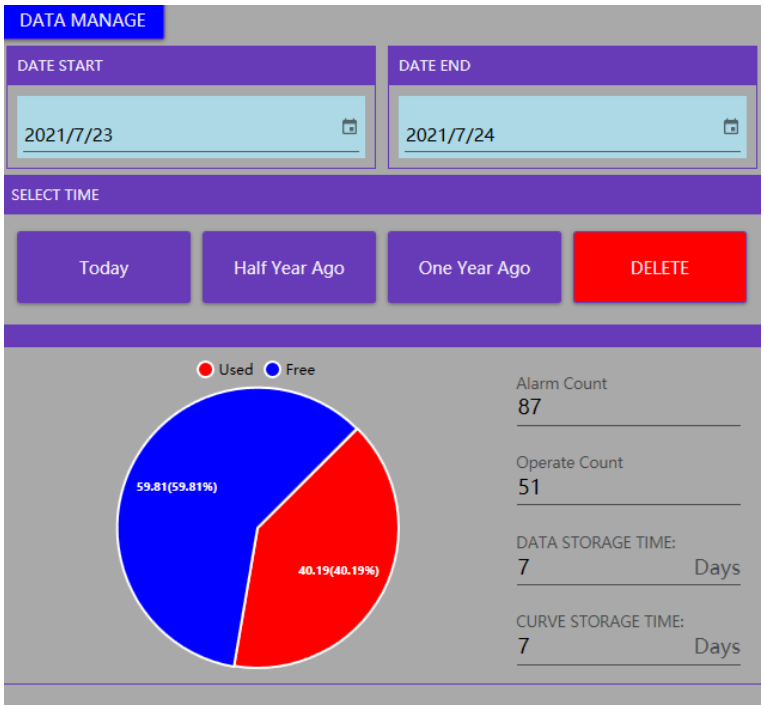
[Force ID]: Current selected (2 means 2-3 force range)

[Offset Value]: The force offset value

[Limit Value]: The force limit torque (Under any situation press won't above limit torque)

[Sensor Offset Value]: The offset between sensor and loadcell

6.2.6:DATA MANAGE

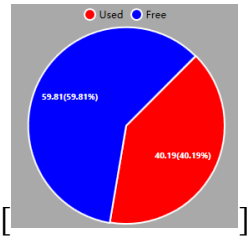


[DATE START]: Select clean start time

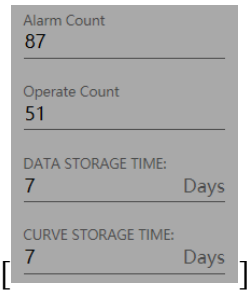
[DATE END]: Select clean end time

[SELECT TIME]: You can quickly select the period time

[DELETE]: Delete data between start time and end time

[

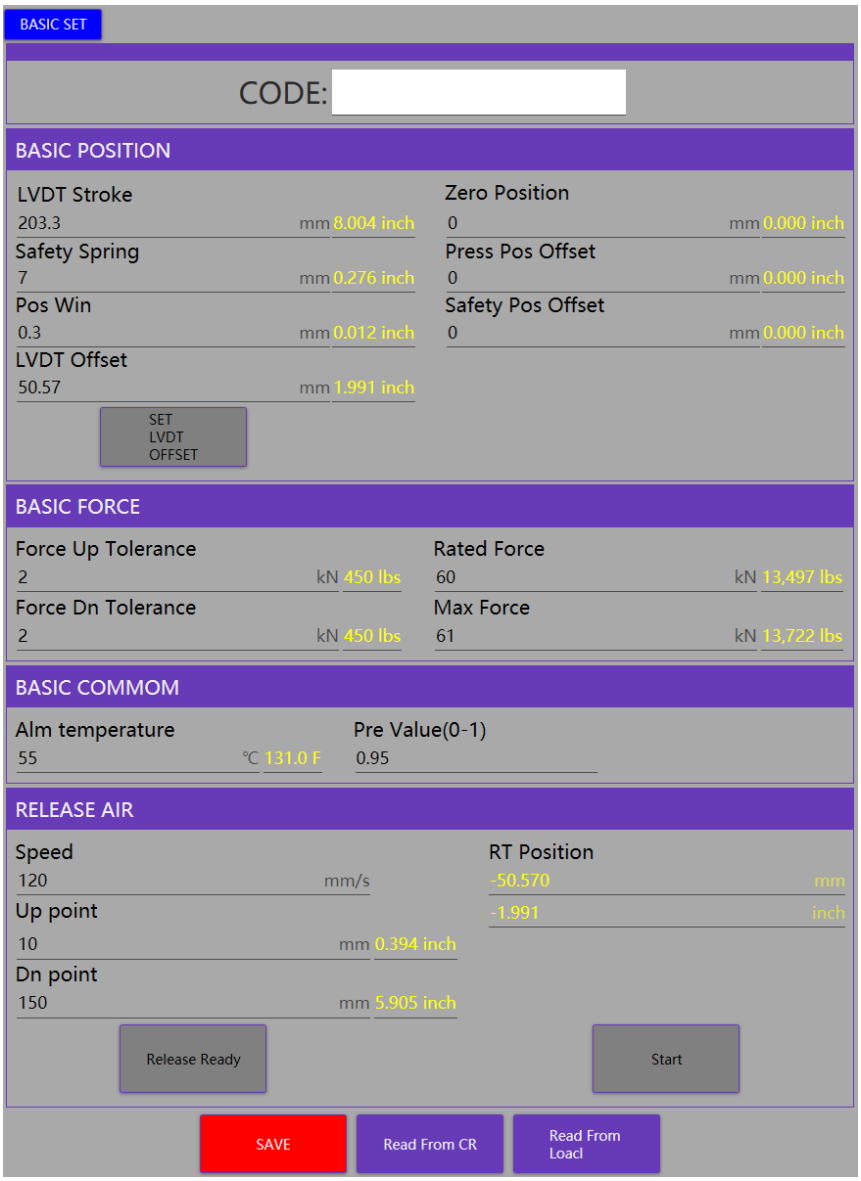
]: C Disk space show

[

]: Store information

PS: When space used above 80%. curve record will stop recording
When space used above 90% all the data will stop recording

6.2.7 FACTORY



[CODE:]: Factory Set Use

[LVDT Stroke]: Standard is 8Inch = 203.3mm

[Safety Spring]: Default is 7mm

[Pos Win]: Default is 0.3mm,When cylinder arrive in the region between +-0.03mm. The arrive signal will trigger.

[LVDT Offset]: When the cylinder return home the original value is offset. Default is 47.3mm

[Zero Position]: If you don’t load a job zero position will be the default home position

[Press Pos Offset]: When under position mode press position offset will adjust the final press position

[Safety Pos Offset]: When trigger safety position if the safety position is not accuracy we can use offset to adjust this values

[Force Up Tolerance]: Press force judge must between set force - tolerance default is 1kN

[Force Dn Tolerance]: Press force judge must between set force + tolerance default is 1kN

[Rated Force]: 618SH Default is 54kN

[Max Force]: Under any situation the realtime force above 60kN cylinder will protect itself will immediately going up.

[Alm temperature]: The oil temperature is 55

[Pre Value]: Default is 0.95

[RELEASE AIR] (Only Enable For SS)
[Speed]: Cylinder move up and down speed

[Up point]: Cylinder move up position

[Dn point]: Cylinder move down position

[Release Ready]: Moto mode switch to speed mode

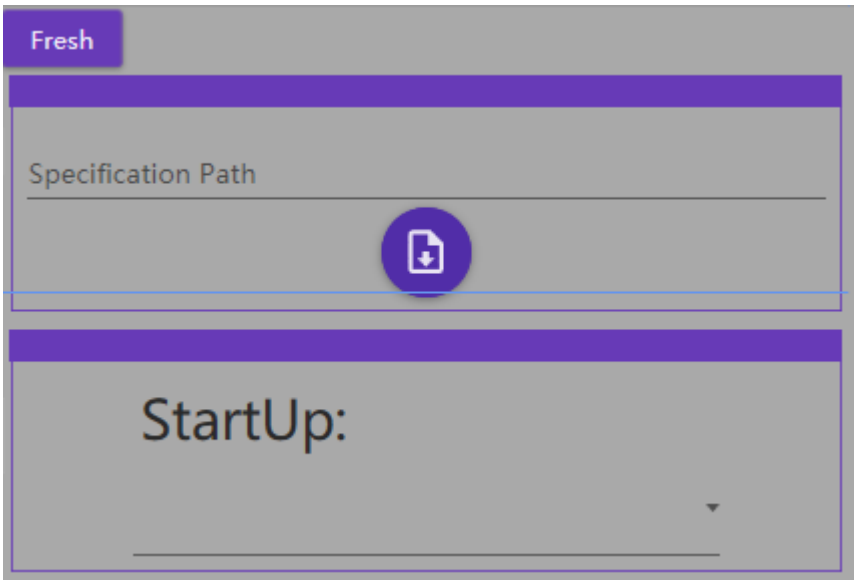
[Start]: Start to move up and down.

[SAVE]: Save parameters to controller and local

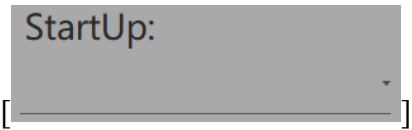
[Read From CR]: Read parameters from controller

[Read From Local]: Read parameters from local

6.2.8 FACTORY PG2



[]: Set specification PATH

[

]: Choose a startup auto login level

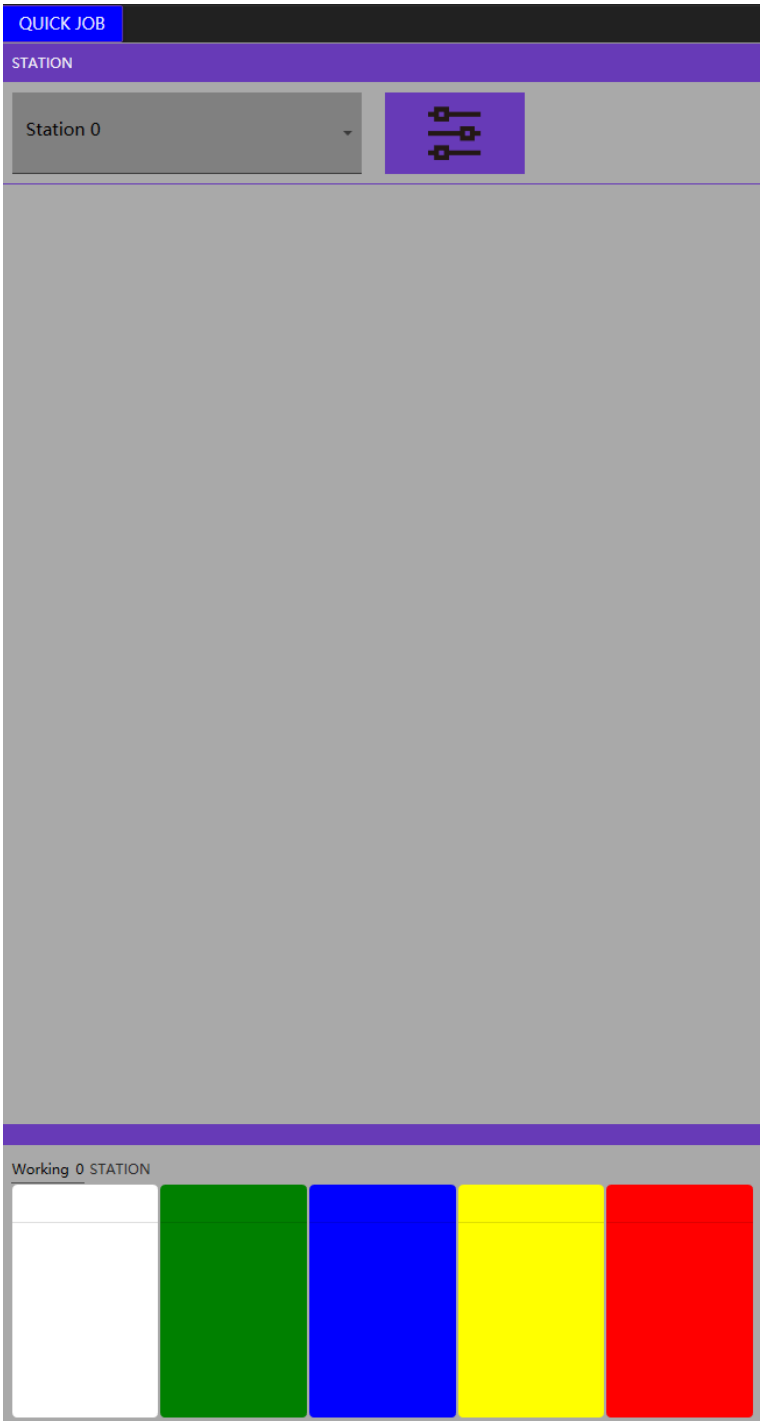
→[Operator]: Operator only allow to load job and history seek
→[Administrator]: Almost can operate everything but factory set
→[Top Level]: Control everything

6.3 PARAMETER

[CREAT JOB]
→To→6.3.1 CREAT JOB Page

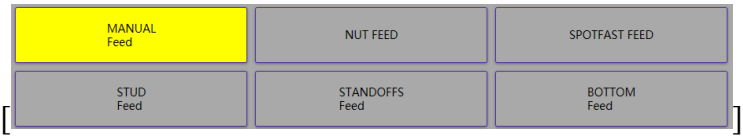
[PARAS SET]
→To→6.3.2 PARAS SET Page

6.3.1 CREAT JOB

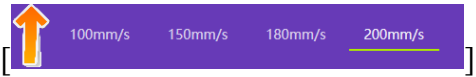


[ ]: Select station from 0 – 4
Station0 means manual mode press without feed
Station1 means standard press with one bowl feed
Station2 means standard muti press with at most two bowls feed (Rotate from 1-2)
Station3 means standard muti press with at most three bowls feed (Rotate from 1-3)
Station4 means standard muti press with at most four bowls feed (Rotate from 1-4)

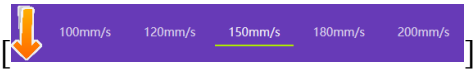
[ ]: Config the station

[

]: Select type of feed mode

[

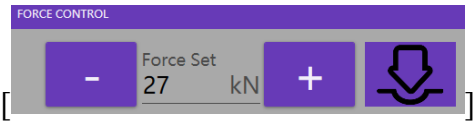
]: Select up speed default is 200mm/s (Only Enable For SS)

[

]: Select down speed default is 180mm/s (Only Enable For SS)

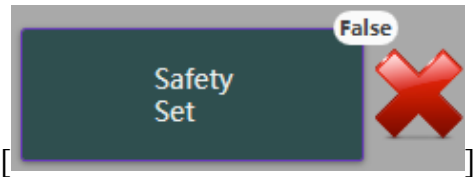
[Force Control]: Force first control

[Position Control]: Position first control (Only Enable For SS)

[

]: Force control set

[
]: Suggestion menu
→To→6.3.1.1 Suggestion Page

[

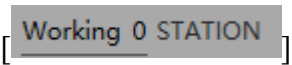
]: Safety set (Only Enable For SS)
→To→6.1.5.1 SafetySet Page

[

]: Press position(P4) set (Only Enable For SS)
→To→6.1.5.2 Press Position Set Page

[

]: Set the count(Default 1 is unlimit) and press ‘RECORD’

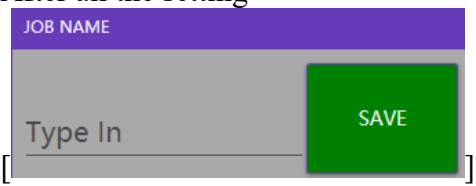
[

]: You can see how many stations are working

[

]: Every station information will show in grid

After all the setting

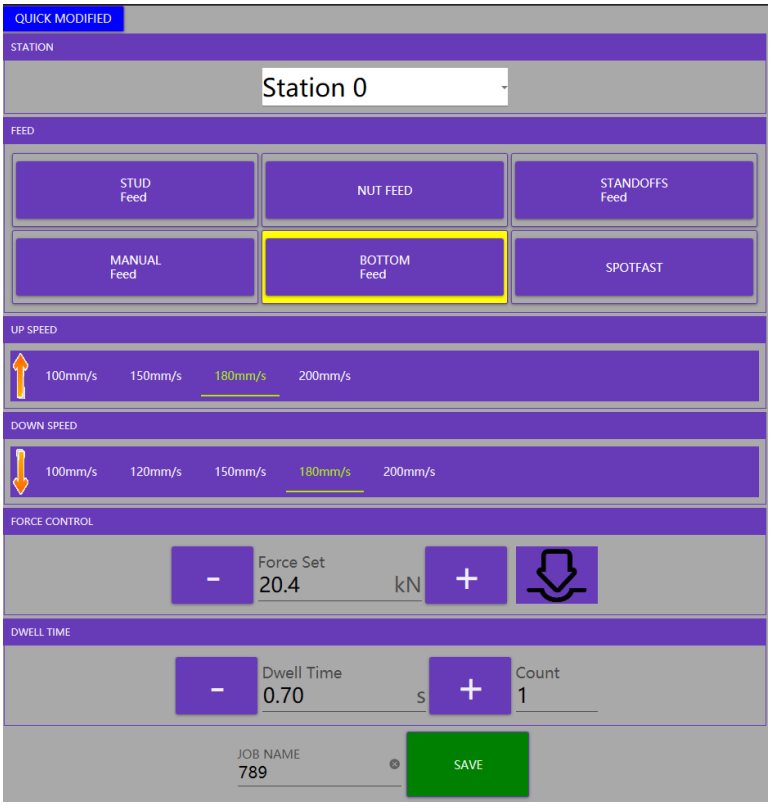


[ ]: Set a name of job and save

You will see in ‘JOB SELECT’

→To→6.1 Main Screen Page

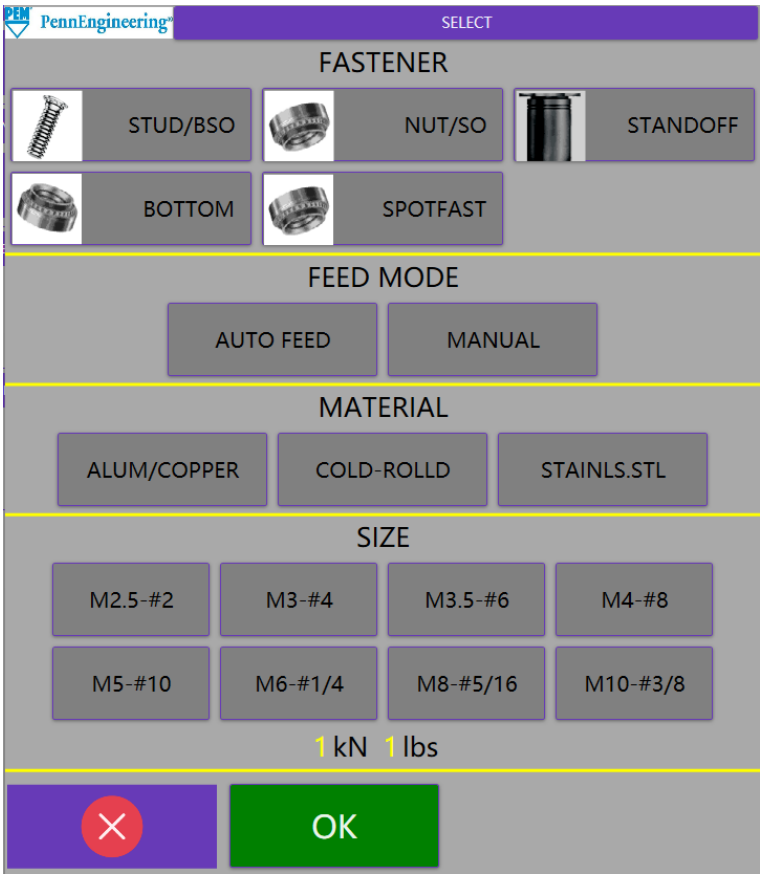
6.3.2 QUICK MODIFIED



You can see the parameters as like in ‘CREAT JOB’

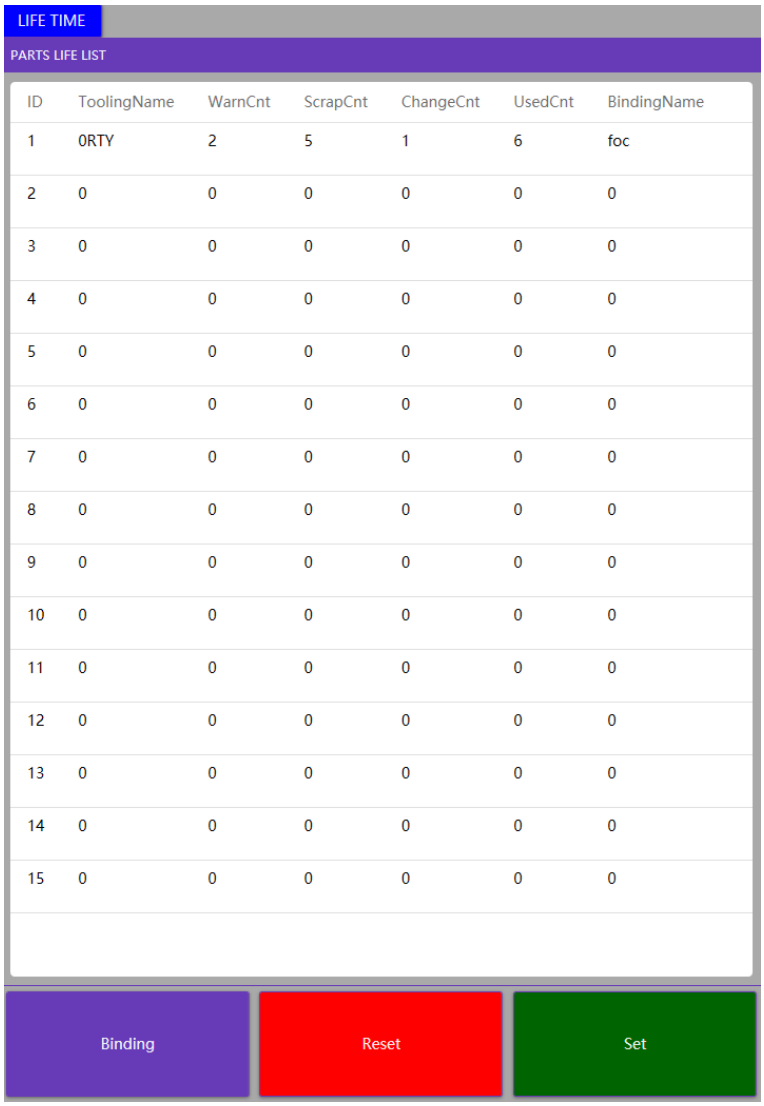
[Dwell Time]: When force arrive the target force will continue boost for dwell time

6.3.1.1 SUGGESTION PAGE



After you select PEM fastener. System will show the suggestion force

6.4 LIFE TIME



[ToolingName]: Set any name of current ID

[WarnCnt]: Warnning count

[ScrapCnt]: Scrap count

[ChangeCnt]: Reset used count to 0 and ‘ChangeCnt’ add 1

[UsedCnt]: Used count

[BindingName]: Binding a job

[Binding]: Binding a job
→To→6.4.1 Binding Page

[Reset]: Reset used count
‘UsedCnt’ will clean to 0 and ‘ChangeCnt’ will add 1

[Set]: Set tooling information
→To→6.4.2 Binding Page

6.4.1 BINDING PAGE

ID	ToolingName	WarnCnt	ScrapCnt	ChangeCnt	UsedCnt	BindingName
1	0RTY	2	5	1	6	foc
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0

[ ]: Parts life list select a ID

[Binding]: Open a binding life

ID	JOB NAME	TIME
0	TT	2021/7/23 10:32:41

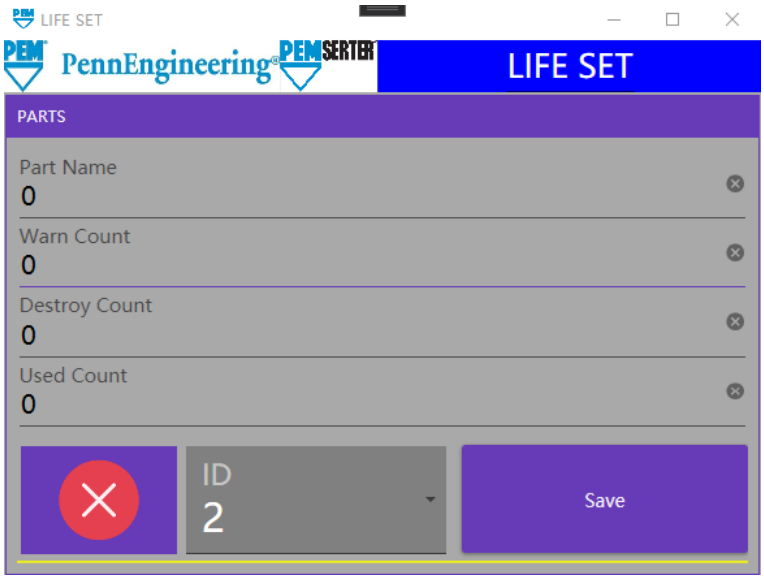
[ ]: Select job

[OK]: Finish set
→To→ 6.4 [Binding Name]

[Cancel]: Exit 'Binding Life Set Page'

[Remove Binding]: Remove ID you selected
→To→ 6.4 [Binding Name]

6.4.2 LIFE SET



[Part Name]: Type in tooling name
→To→ 6.4 [ToolingName]

[Warn Count]: Set current part warning count
→To→ 6.4 [WarnCnt]

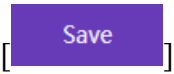
[Destory Count]: Set current part scrap count
→To→ 6.4 [ScrapCnt]

[Used Count]: Set current part used count
→To→ 6.4 [UsedCnt]

[]Exit page

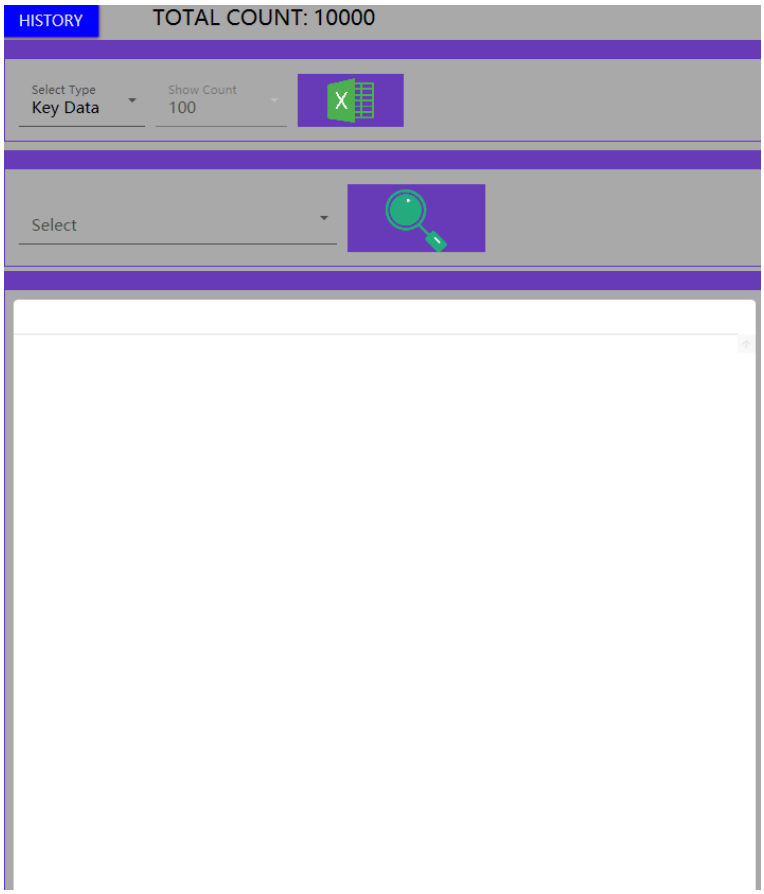
[

]: Select ID you need to save

[

]: Save the setting

6.5 DATA HISTORY



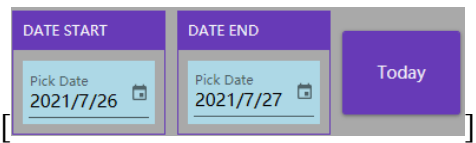
[Select Type]:
[KeyDate]: Store press key values
[Alarm]: Alarm information will be recoreded
[Operate]: Operate action will be recorded
[DayData]: Allow check every day and every hour count of production

[Show Count]: Grid show count(Except ‘KeyData’)

[]: Current datagrid export to excel

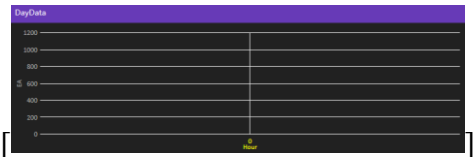
[Select]: ‘KeyData’ Select search data

[]: ‘Key Data’ search

[

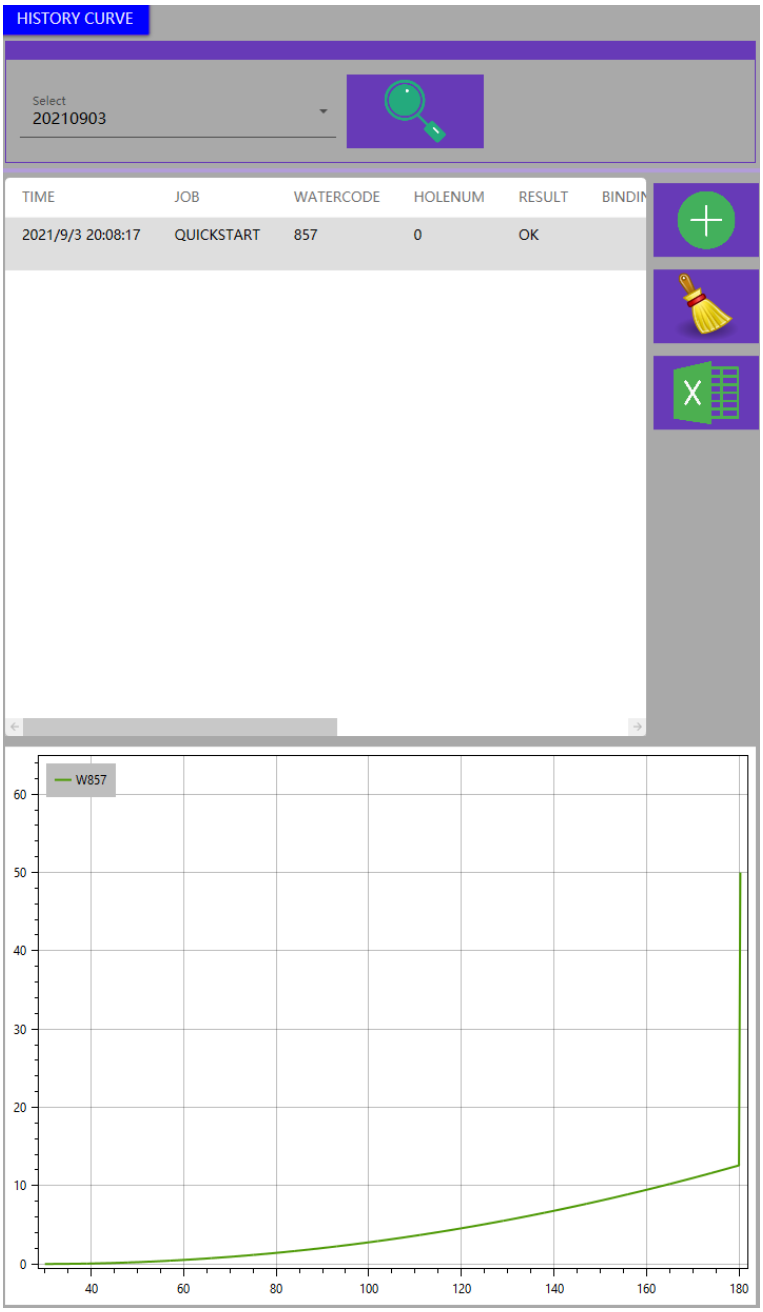
]: Select search date

[]: The datagrid will add next show count details

[

]: The ‘DayData’ Histogram

6.6 HISTORY CURVE

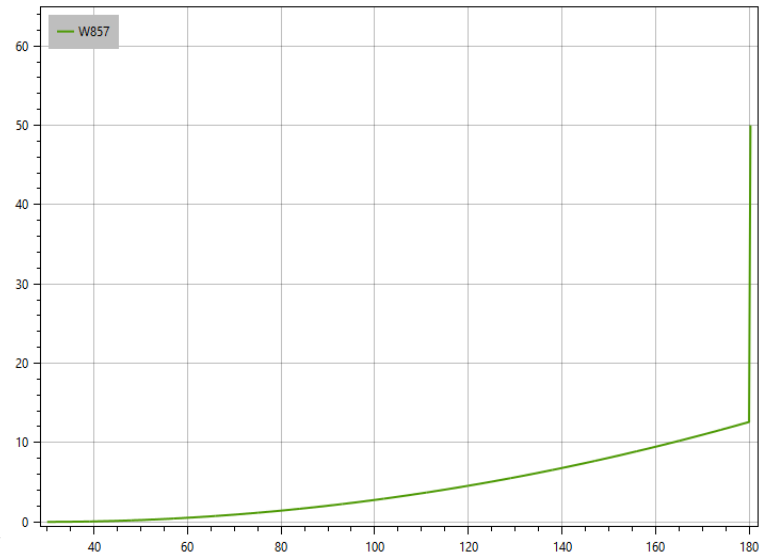


[Select]: Select date

[]: search

[]: Select a record and show curve

[]: Clean the curve show

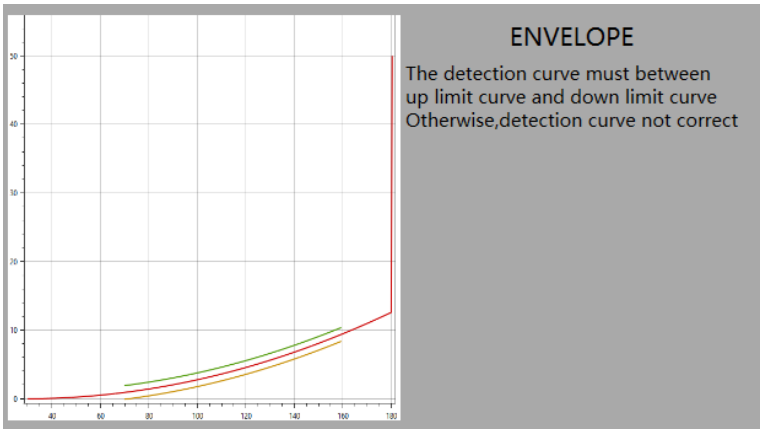
[

] On curve show you can select a position to check data

[ ]: Export to excel point data

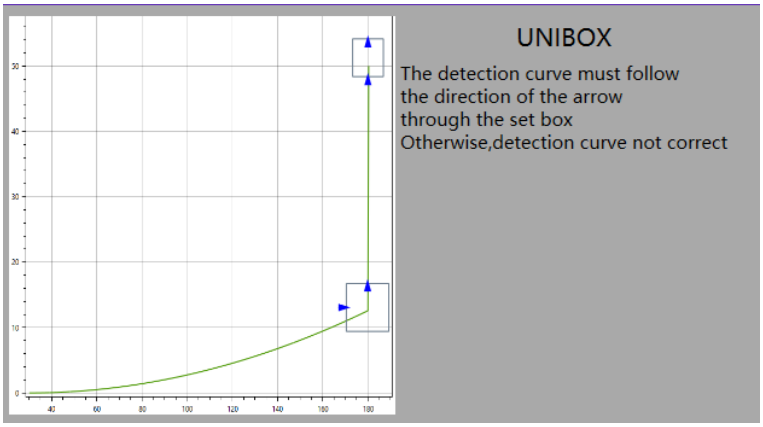
6.7 ASSESS

[ENVELOPE SET]:



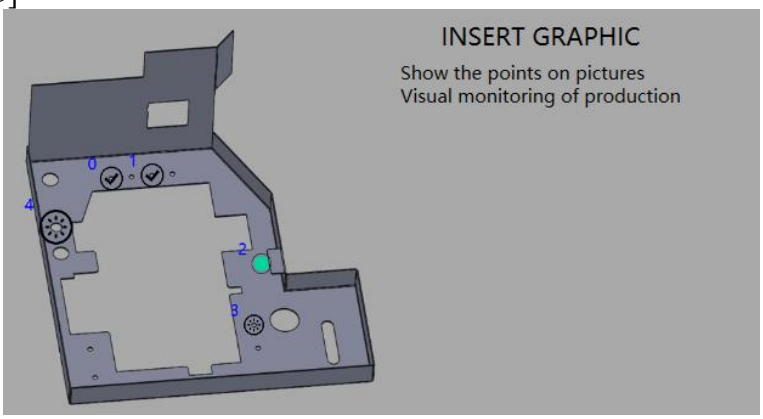
→To→ 6.7.1 ENVELOPE PAGE

[UNIBOX SET]:



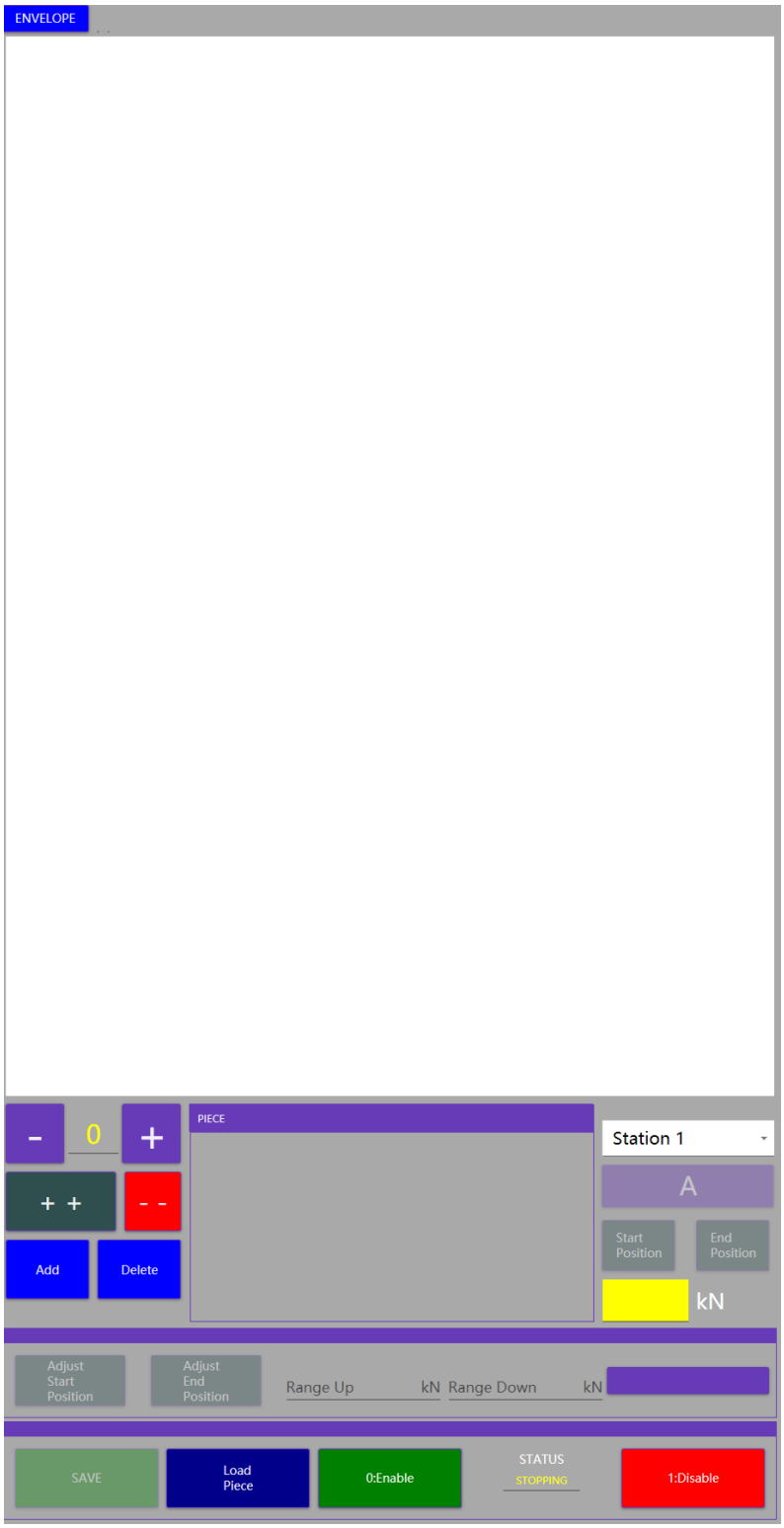
→To→ 6.7.2 UNIBOX PAGE

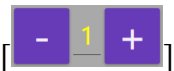
[INSERT GRAPHIC]



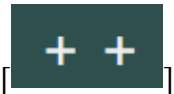
→To→ 6.7.3 INSERT GRAPHIC

6.7.1 ENVELOPE



[

]: Select curve

[

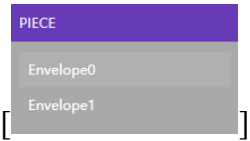
]: Add current curve to evaluate

[

]: Clean all the selections

[

]: Add and delete PIECE

[

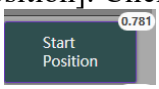
]: You need to select a piece to set

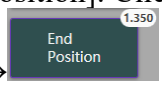
[

]: Select station
→To→ 6.3.1 CREAT JOB

[

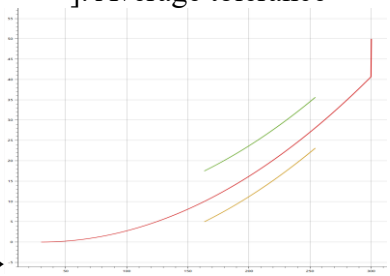
]: Auto suggestion set

[Start Position]: Click on the curve you will see a red line then press ‘Start Position’
→To→ 

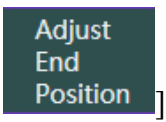
[End Position]: Click on the curve you will see a red line then press ‘End Position’
→To→ 

[

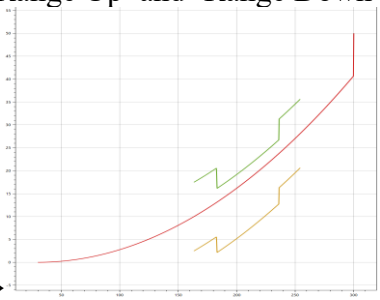
]: Average tolerance


→To→

[



]: Between start and end position. You can choose another period distance to set ‘Range Up’ and ‘Range Down’


→To→

[

]: Save current set

[

]: Load current job envelope set

[

]: Evaluate enable

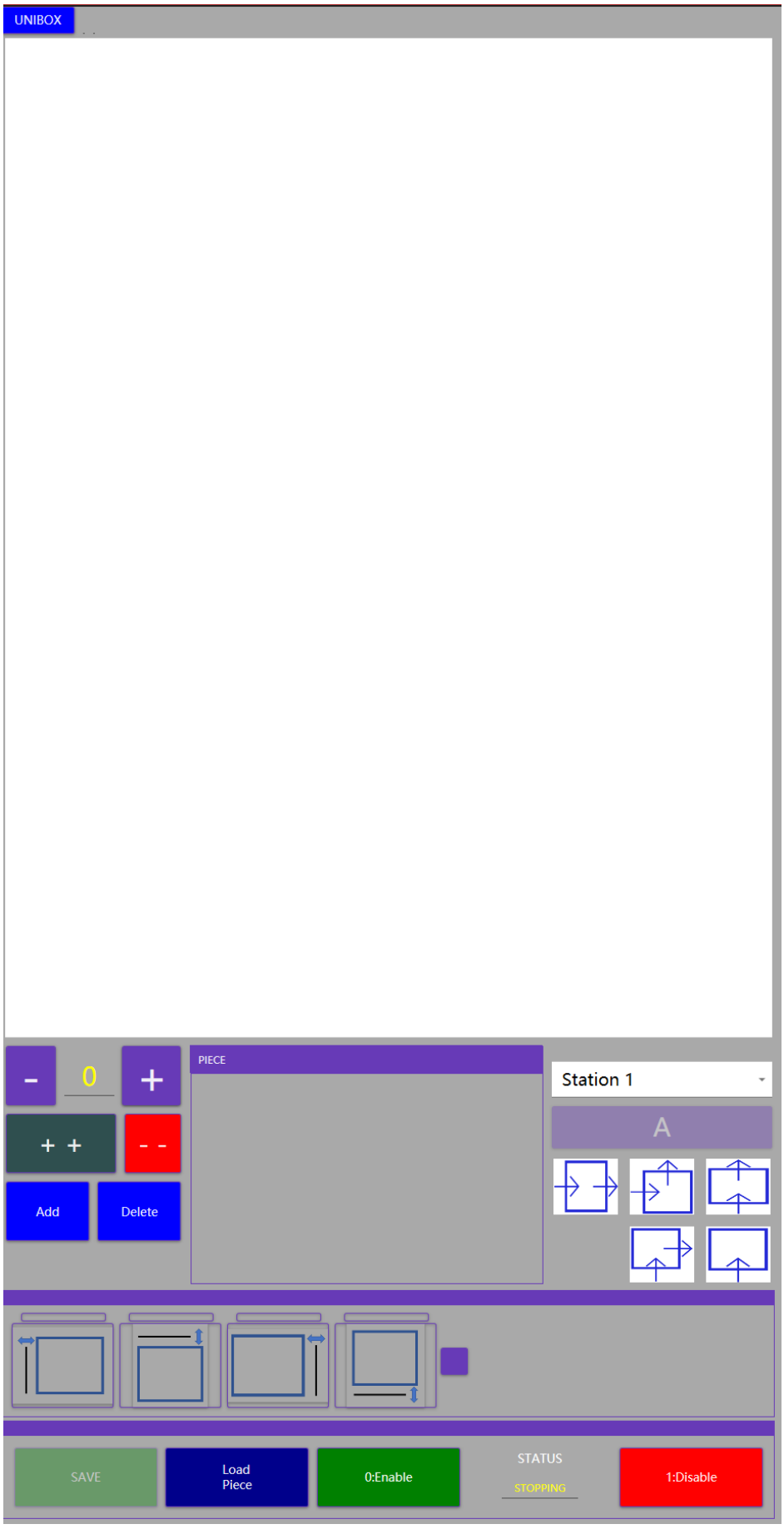
[

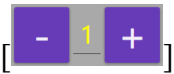
]: Evaluate status

[

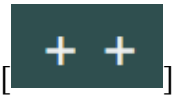
]: Evaluate disable

6.7.2 UNIBOX


UNIBOX
-
0
+
+ +
- -
Add
Delete
PIECE
Station 1
A
SAVE
Load
Piece
0:Enable
STATUS
STOPPING
1:Disable

[

]: Select curve

[

]: Add current curve to evaluate

[

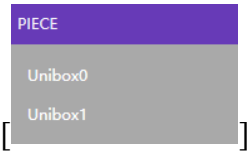
]: Clean all the selections

[

]: Add and delete PIECE

[

]: Auto suggestion set

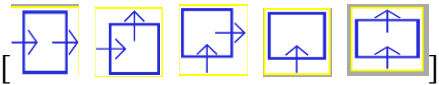
[

]: You need to select a piece to set

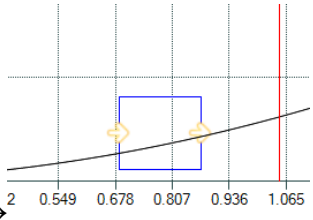
[

]: Select station

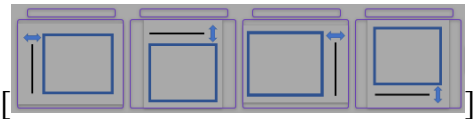
→To→ 6.3.1 CREAT JOB

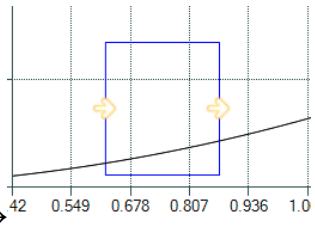
[
]: Press set type then you can draw on curve.

PS: Curve must follow the direction then will judge ok



→To→

[
]: Adjust the curve outline border after choose an adjust side then set on curve

→To→  →To→ 

[

]: Save current set

[

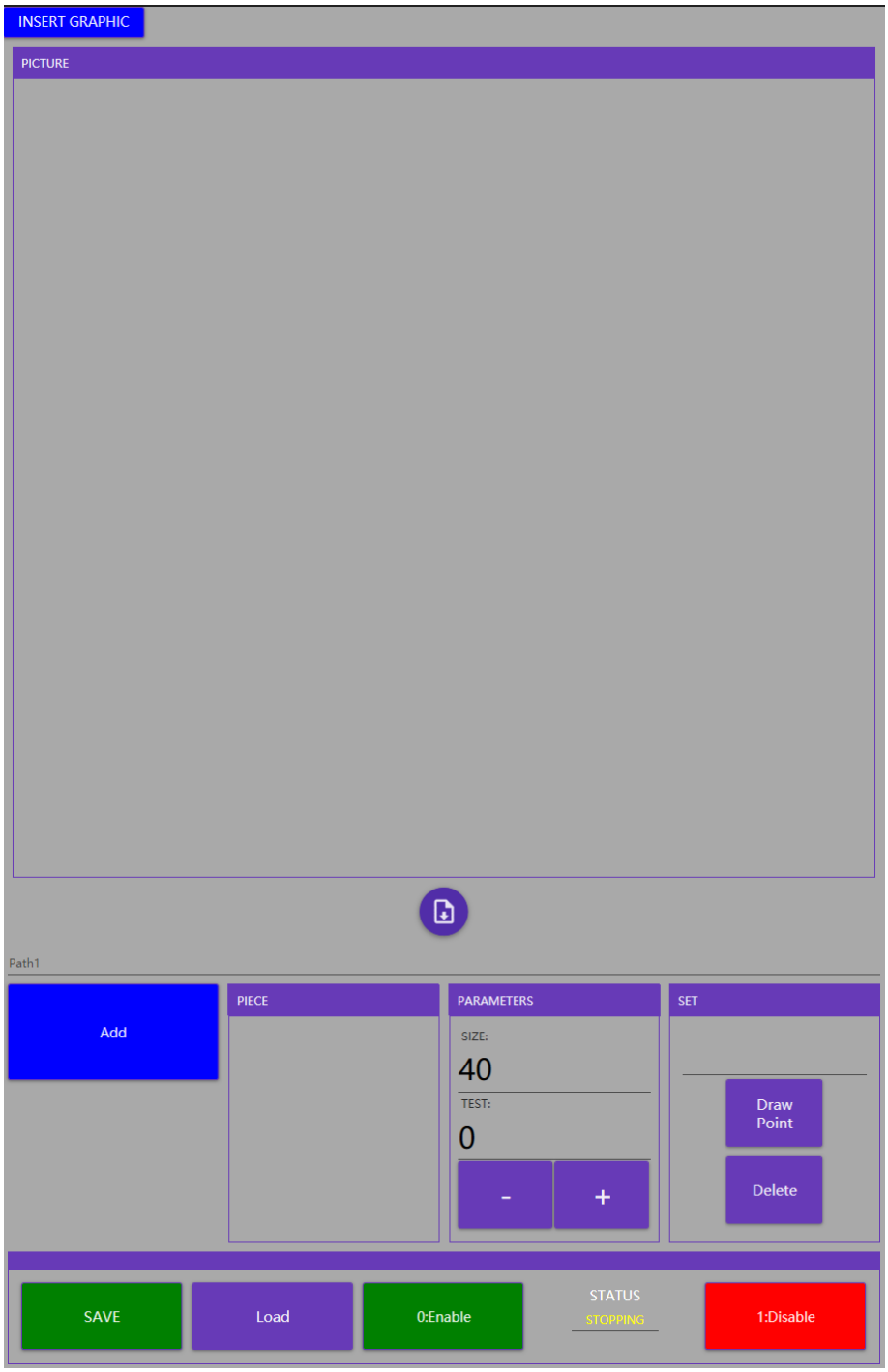
]: Load current job envelope set

]: Evaluate enable

]: Evaluate status

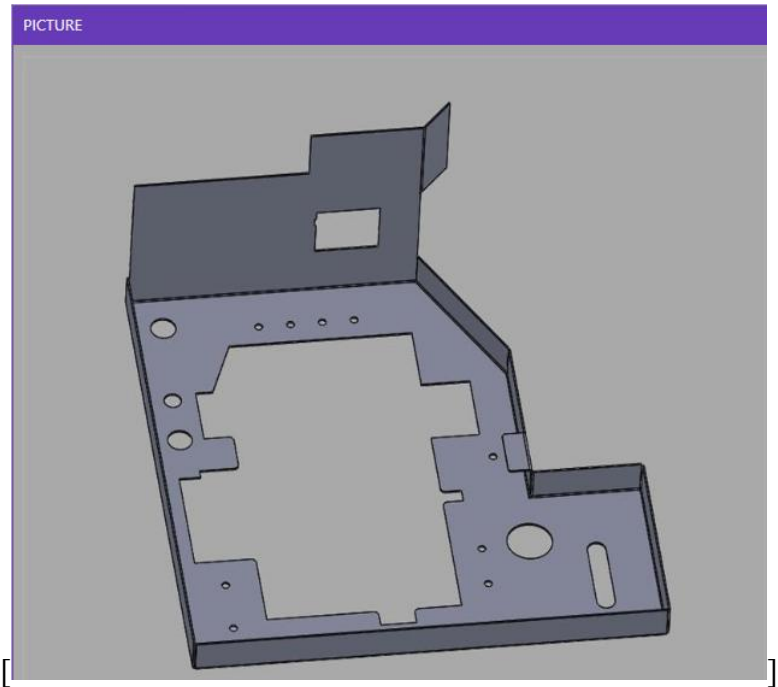
]: Evaluate disable

6.7.3 INSERT GRAPHIC



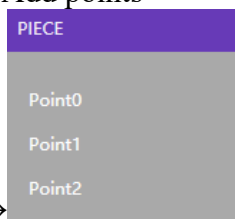
[

]: Picture path

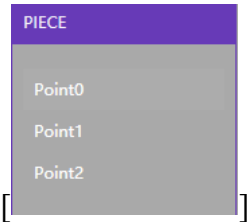
[

]: Picture show

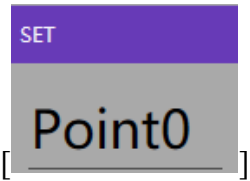
[Add]: Add points

→To→ 

[SIZE]: Point size default is 40

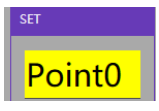
[

]: After added points please select a point

[

]: Current selected point

[

]: After press 

is waiting for draw on picture

→[

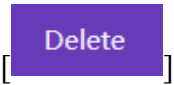
]: Waiting for press

→[

]: Current working point

→[

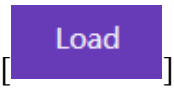
]: Finished press

[

]: Delete the points

[

]: Save current set

[

]: Load current points

[

]: Evaluate enable

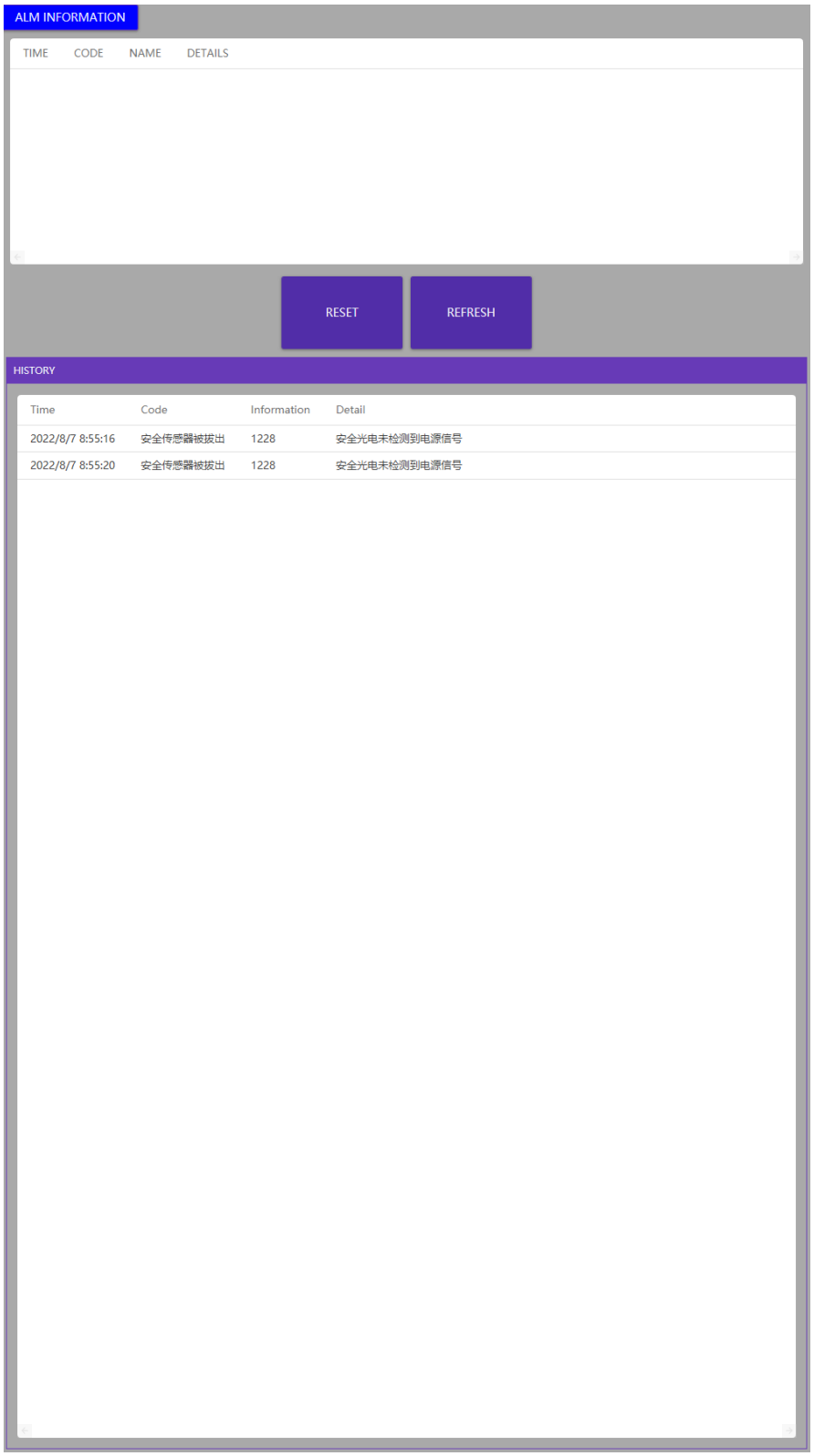
[

]: Evaluate status

[

]: Evaluate disable

6.8 ALARM



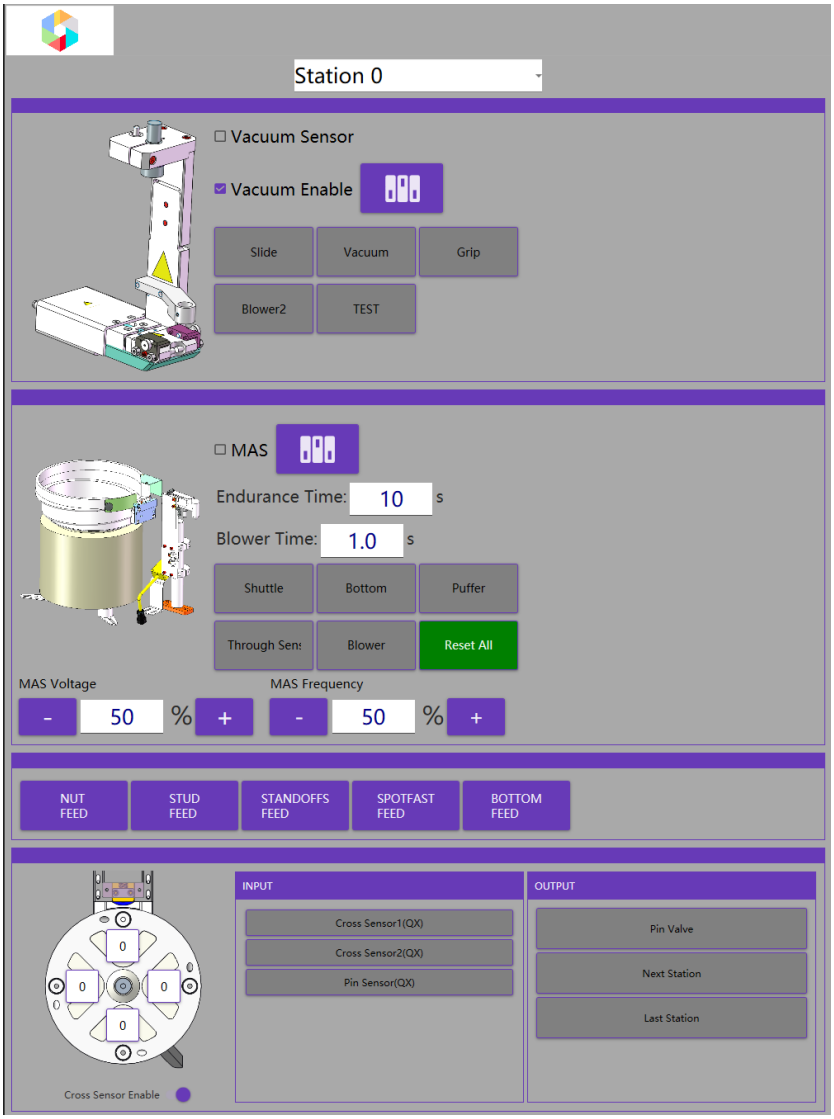
[RESET]: Reset alarm if allow to reset

[REFRESH]: Refresh the alarm information

[HISTORY]: Alarm history

6.9 Feed System

[FEED]:Feed page



[Slide Cylinder]: Slide move out

[Grip]: Grip cylinder control

[Vacuum Valve]: Tooling vacuum on and off

[Vibration Disk]: Feed bowl control

[Shuttle Cylinder]: Shuttle cylinder control

[Blower Valve]: Blower to tooling

[Reset All Valves]: Reset all valves

[Vacuum Switch]: Vacuum enable switch

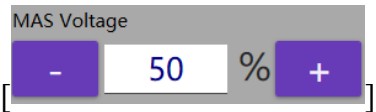
[Cross Detect Enable]: Cross work with sensor

[Vacuum sensor]: Vacuum sensor

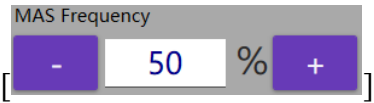
[Top Feed]: Top feed to tooling

[Bottom Feed]: Bottom feed to tooling

[Reset All]: Reset all the cylinders

[

]: MAS Voltage adjust

[

]: MAS Frequency adjust

6.10 HELP

[

]: Help

[Instruction]: You can check the specification.

6.11 POWER OFF

[

]: Power off the system

[Exit]: Exit the program

[RESTART]: The HMI PC will restart

[POWER OFF]: The PC will power off

[SOFTWARE UPDATE]: This will start a update software

ALARM

Number	Alarm Information	Code	Reason	Solve
1	RT Safety position above set	1181	Current safety trigger above set position	Reset and try again
2	RT Safety position below set	1182	Current safety trigger below set position	Reset and try again
3	Over maximum force	1183	Current force above the system maximun force set	Reset and check the hardware or force sensor
4	Home search error	1184	After power on or home search triggered, Cylinder won't arrvie the target position in a period time	Reset and try again, Or check the pump system and servo
5	Safety position set error	1185	During TPS set no contact the anvil or fastener vacuum lost	Reset and try again
6	Safety sensor error	1187	Not at run mode and position < 50mm, Two sensors signals not synchronization or keep triggering	Check the safety sensors Check Input Module Check SSR relays
7	EMERGENCY STOP! ! !	1188	E-Stop Button on	Check safety button status Check safety module E-stop input
8	Move error	1189	After trigger move command and can't arrive target position within 10 seconds	Reset and try again Check servo status Check valves status
9	Job done	1190	The workpiece counter > set workpiece	Reset
10	No vacuum checked	1193	Vacuum lost or no fastener on tooling	Reset and try again Check vacuum valve display Check air supply
11	No ram contact	1195	The tooling move down but not contact anvil within a period time	Reset and try again
12	Safety sensor 1 lost	1196	Sensor 1 not work ok	Check safety structure Check sensors
13	Safety sensor 2 lost	1197	Sensor 2 not work ok	Check safety structure Check sensors
14	Press sensor error	1199	If pressure A > 380bar or pressure B >380bar	Check pressure sensor
15	Servo error	1200	Servo error	Servo power off then power on Restart the press
16	Oil temperature high	1201	Oil temperature above set temperature	Cooling down the oil
17	Vacuum Err Please check and clean	1208	During cylinder return home the vacuum sensor triggered	Check vacuum tube
18	Safety trigger when return	1211	Trigger the safety sensor when cylinder return home	Reset
19	Current force above set force	1212	Peak force above set force	Reset
20	Current force below set force	1213	Peak force below set force	Reset
21	Position Sensor Error	1214	After home position check ok and the LVDT out of range	Check LVDT
22	Press NG	1215	Position or force not arrive the target set	Reset and try again
23	LVDT Error	1216	LVDT out of range for 0.5 second	Reset and check LVDT
24	Press Pos Above Set	1217	Under force mode the position above set(not necessary)	Reset
25	Press Pos Below Set	1218	Under force mode the position below set(not necessary)	Reset
26	Cylinder move unnormal	1219	The Cylinder moved without any move command	Reset and check LVDT
27	Conduction Failed	1221	Safety triggered but no conductive	Reset check SSR relay or conduction voltage
28	Fastener Length Err	1222	The conduction position out of safety set range	Reset and try again
29	TPS Error	1223	Conduction position error	Reset
30	Safety Light curtain Triggered	1224	Please remove from light curtain	Reset
31	Rotating Failed	1225	Can't move to target station	Check the rotating moto and sensors
32	Safety Circle Error(2000PAC)	1226	Check the safety circle follow the drawings	Hardware problems
33	Safety Validate No Response(2000PAC)	1227	Safety Relay on but no safety relay signal	Hardware problems
34	Safety Sensors Pull Out	1228	Safety Sensors Without Power	Hardware problems

SECTION 7
PNEUMATIC-HYDRAULIC SYSTEM

A. THE PNEUMATIC SYSTEM

Initial Air Entry

- Your factory air supply should be clean, dry and, ideally, have a high flow capability. Airline feeds smaller than 12mm (1/2") will increase cycle time.
- Factory compressed air, set between 6 and 7 BAR (90 to 100 psi), enters the system through a manually adjusted filter/regulator which is mounted on the back of the machine.
- After passing through the filter/ regulator, the air is distributed into three areas.
- 1) The 1/4" (6mm) line which leaves the manifold is used for various machine functions, which manipulate, transport, and position fasteners. It supplies an 8-valve manifold located under the Feeder Bowl. See section nine for additional information.

- 2) The 1/2" (12mm) line which leaves the manifold first supplies a pilotted pressure regulator. With this regulator the operator or setup person can adjust the fastener insertion force from the touch screen.
- From the regulator, the air is routed to the right valve of the "Ram Valve" assembly, a two position, four way valve, which switches it to move the Booster cylinder. It is sometimes referred to as the "high pressure" valve because the pneumatic energy is converted into mechanical energy which is used to create the ram's high pressure squeezing force.

- 3) The 1/2" (12mm) line then supplies the left valve of the Ram Valve assembly. This 3-position, 4-way valve switches the air to both Air-Oil tanks. The *upper* coil, when energized (note indicator light), supplies the left tank, causing the ram to retract (up). The *lower* coil supplies the right tank, causing the ram to extend (down). When neither coil is energized, the valve exhausts both tanks, relieving the oil system of residual pressure.

Air Exit

- Air exiting the air-oil tanks is routed to an air/oil separator, which is located at the bottom rear of the press.
- The purpose of the separator is to collect any oil vapor suspended in the air stream. Oil collects in the reservoir, which is emptied as necessary.

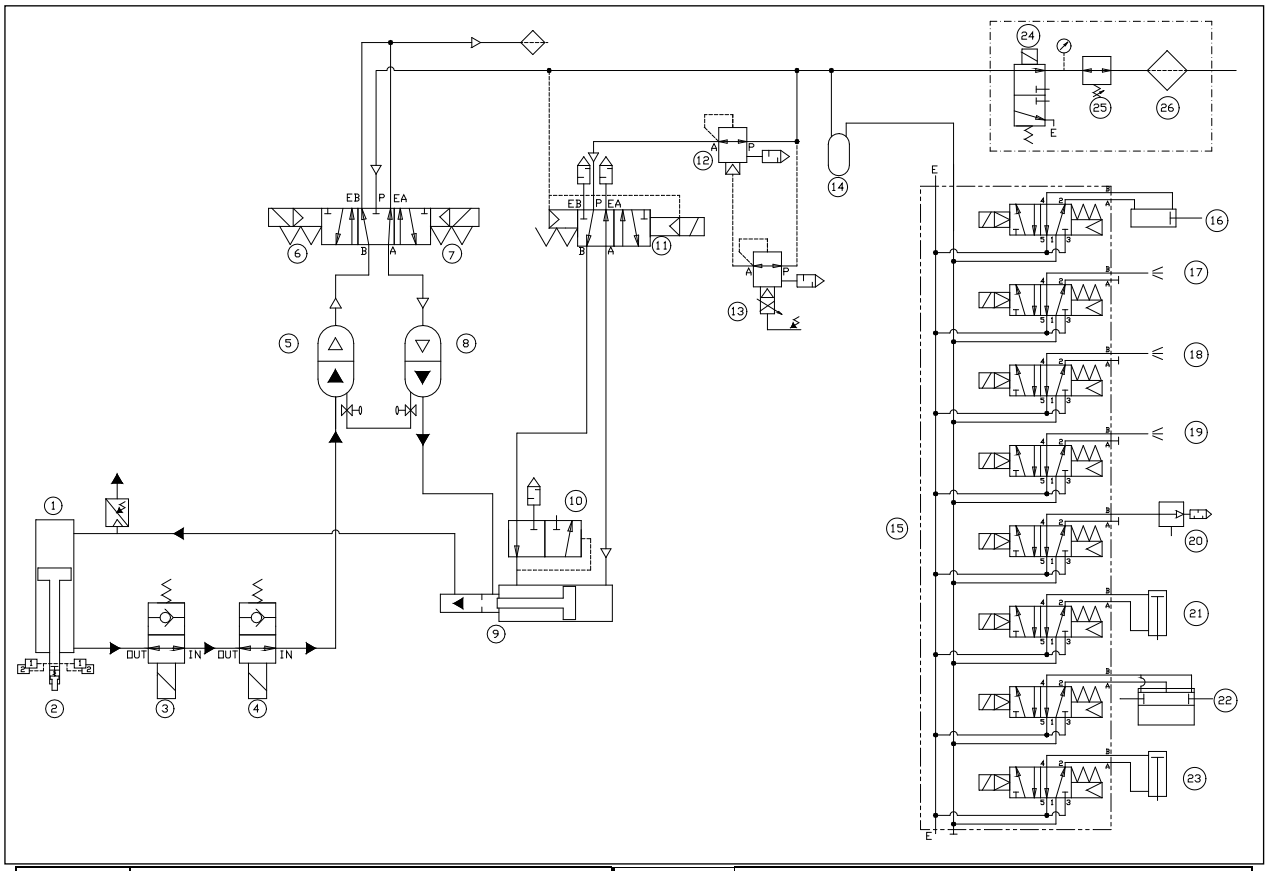
B. THE HYDRAULIC SYSTEM

Pushing The Ram Down

- As pressurized air flows into the right (extend) tank, it causes hydraulic fluid, at air pressure, to flow into the top of the ram cylinder, forcing the ram down.
- As the ram comes down it forces the unpressurized hydraulic fluid below the ram back into the left (retract) tank.
- With the ram *safely* in the down position, the hydraulic pressure, which forced the piston (ram) down, is increased by the air-powered booster to provide the insertion force.

Pushing The Ram Up

- Booster (air) pressure is removed by the right hand Ram valve assembly (high pressure booster valve), and the booster retracts.
- As pressurized air flows from the left Ram valve, into the left (retract) tank, it causes hydraulic fluid, at air pressure, to flow into the bottom of the ram cylinder, forcing the ram up.
- The left valve on the Ram valve assembly also exhausts the air pressure from the extend tank, thereby allowing the hydraulic fluid on top of the ram to become unpressurized. As the ram comes up, this unpressurized fluid is pushed back into the tank.



ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	RAM	**14**	ACCUMULATION TANK
2	SAFETY SENSOR	**15**	TOOLING VALVE MANIFOLD
3	SAFETY VALVE A	**16**	SHUTTLE CYLINDER
4	SAFETY VALVE B	**17**	PUFFER
5	AIR-OIL TANK UP	**18**	BLOWER 1
6	RAM UP	**19**	BLOWER 2
7	RAM DOWN	**20**	VACUUM ASPIRATOR
8	AIR-OIL TANK DOWN	**21**	SLIDE CYLINDER
9	BOOSTER	**22**	GRIPPER CYLINDER
10	QUICK EXHAUST	**23**	PUSHER CYLINDER
11	BOOST	**24**	“DUMP” VALVE
12	PILOTED REGULATOR	**25**	REGULATOR
13	ELECTRONIC REGULATOR	**26**	FILTER

FIGURE 7-1
HYDRAULIC / PNEUMATIC DIAGRAM

SECTION 8
ELECTRICAL SYSTEM

WARNING: Device uses high voltage electrical power. Only trained and authorized personnel may attempt to maintain, service, or repair its electrically powered subsystems, components, or parts.

The electrical panel enclosure requires a special key to open. The purpose of this feature is to protect the machine from unauthorized persons tampering with the system and to help prevent unauthorized and untrained personnel from receiving an electrical shock. We suggest the key be kept by a manager/supervisor who will properly control its use.

Please refer to the drawing description for details.

AC Power Distribution:
The device is protected by a four-pole main circuit breaker. The orange line means there is still power after the power is off.

The inline AC power entering the device is routed to the following 2 areas:
- AC power supply
- Maintenance electricity.

DC Power Distribution:
- DC power supply from the main power supply for the programmable controller. Through different sub-circuits, it also supplies power to sensors and other input signals, touch screens, and programmable controllers that are used to control output drive cards for different load (output) switches.
- Programmable Automation Controller (PAC) is the electronic control system of the Hardware Insertion Machine. Programmable automation controllers receive input from sensors located throughout the machine, which reflect the operating state of the machine at any moment. The programmable automation controller controls the pneumatic valves, which in turn control the movement of most of the machine's mechanisms, including the tools for transporting and positioning the rivets.
- There are three electronic circuit breakers protecting (1) the touch screen, (2) the sensor, and (3) the air pressure regulator.

SECTION 9
TOOLING SET-UP

Tooling

The PEMSERTER® Series 2000®-PAC Fastener Installation Press can be equipped with interchangeable tooling in order to properly install numerous types of PEM® fasteners. Series 2000™ Tooling refers to components that are installed onto the press that are specific to automatically feed and install different types of fasteners in different ways.

Manual versus Automatic Tooling

Manual tooling refers typically to the punch and anvil set that is used to install the fasteners. Placement of each fastener into the workpiece hole is done by the operator. Only moving the ram down and the installation stroke is controlled by the press. Automatic tooling refers to the set of specific components that orient the fasteners feeding from the vibratory bowl to the automatic punch and anvil that allow the operator to locate the workpiece properly and carry the fastener into the workpiece hole. The press handles the entire sequence. In Automatic Feed Mode the operator only handles the workpiece.

Manual Tooling

The two tooling components that exert the installation squeezing force are called the Punch and Anvil. Typically the punch is the moving element, installed in the end of the safety adapter at the end of the ram. The anvil is the stationary element installed in the anvil holder at the bottom of the press throat. In a typical installation, the punch pushes the displacer into the workpiece and the anvil supports the other side of the workpiece and provides the reaction force.

Different Punches and Anvils are selected for different types, sizes and materials of fasteners. The shape of the punch and anvil differ to account for the different shapes in fasteners. However, for many fastener applications a flat surface punch is used. Anvils are more varied. For instance, for studs, an anvil with a hole in the middle is used to accept the long body of the stud. An anvil with a different diameter hole is needed for each different size of the stud in order to support the material properly.

Specific tooling is sometimes required to accommodate different sizes and shapes of workpieces. There are different length punches and anvils to reach or accommodate workpieces . There are different diameter or special featured punches and anvils to accommodate different workpiece material and thickness.

Automatic Tooling Set Selection

There are different types of automatic feed tooling to feed different types, sizes and materials of fasteners. There are even different types of automatic feed tooling to feed the same fasteners.

PEMSERTER® Series 2000®-PAC Automatic Tooling consists of a number of basic types.

- Top Feed Tooling - feeds the fastener to the Slide/Gripper Assembly at the top of the throat. The workpiece is located and the hole centered on an automatic feed anvil. When the press is actuated the fastener is put on the end of an automatic feed punch and carried down to the waiting workpiece for insertion. This type of tooling is available for various nuts, studs and standoffs, as well as special fasteners.

- Double Stroke Bottom Feed Nut Tooling - is for nut-type similar to Top Feed Tooling except that the workpiece is not placed on the anvil before the press is actuated. During this mode the fastener is fed to the Slide/Gripper Assembly. When the foot pedal is pressed the first time the nut is carried down to the anvil and deposited on the anvil, shank up. Then the workpiece is placed onto the fastener shank. When the foot pedal is pressed the second time the installation process is started. This type of tooling is used when the installation side of the workpiece is not accessible by the punch and the anvil length and shape is required to accommodate the workpiece.

- Injector/Bottom Feed Module Tooling - does not feed the fastener to the Slide/Gripper Assembly. Instead the fastener is fed directly into a punch or anvil module. For stud-type fasteners this is called an Injector Module and it is installed in the safety adapter. The stud is fed out to the injector module, the workpiece is located on a top-feed type anvil and the stud is carried down by the injector module and inserted. For nut-type fasteners a Bottom Feed Nut Module is installed on the anvil holder. The nut is fed out to the Bottom Feed Nut Module, the module is actuated by the Bottom Feed Cylinder and the fastener is pushed out into place. The workpiece is located on the shank of the fastener like Double Stroke Bottom Feed Nut Tooling. The punch comes down and does the insertion. These types of tooling are used for applications where the shape or size of the workpiece can be accommodated by the type of module tooling.

Tooling Mode Selection on the Touch Screen

During the setup selection process of the press, the tooling mode must be selected on the touch screen. The tooling modes available are:

[MANUAL NUT]
[MANUAL STUD]
[TOP FEED NUTS/SO]
[BOTTOM FEED DOUBLE STROKE]
[BOTTOM FEED NUTS]
[STUDS/BSO]
[STUDS INJECTOR]
[LONG STANDOFFS]
[PF]
[TOP MOUNT ANVIL - NUT]
[TOP MOUNT ANVIL – STUD]
[CUSTOM]

NOTE: For Standoff Fasteners different tooling modes are selected based on size and type. Choose:
[LONG STANDOFFS] - if the standoff length is long like a stud and the tooling components have a stud-type shuttle with round tubing and a pin punch
[TOP FEED NUT/SO] - if the standoff length is short and looks like a nut and the tooling components have a nut-type shuttle with rectangular tubing
[STUDS/BSO] - if the standoff is long or blind (no thru hole) and the tooling components have a stud-type shuttle with round tubing and vacuum punch Top Feed Nut Tooling

Tooling Component Installation

<u>Stud Escapement and Nut Gate</u>

- The purpose of an escapement is to properly align the fasteners so that other tooling can deliver and position them at the ram/anvil area, properly positioned for insertion. Escapements are installed on the outside/top part of the vibratory bowl.
- The escapements used with nuts have two parts: (1) the first part of the escapement is called the nut gate adapter. The nut gate adapter is placed upon the escapement adapter with two positioning pins. (2) The second piece is called the nut gate. The nut gate provides a "fastener-specific" machined channel which will funnel only properly aligned nuts to the shuttle. The nut gate is positioned on top of the nut gate adapter with the same two positioning pins and is secured in place with one thumb screw.

- The escapements used with studs are “stud specific”. The escapement is mounted onto the “escapement adapter” with the nut gate adapter removed.
- After mounting an escapement, push the “puffer” air hose into the escapement air intake connector. The puffer has two functions: (1) to blow excess and misaligned fasteners off the top part of the bowl’s ramp, back into the bowl; (2) to create a slight vacuum (only when inserting nuts) which helps pull the nuts into the escapement channel.
- Adjust the puffer air pressure by turning the puffer’s flow-control knob. Excess/Misaligned nuts and studs should be blown back into the bowl, while correctly oriented nuts should be gently drawn into the channel This knob is located below the escapement mounting area.

Shuttle And Tube

- The purpose of a shuttle is to move the fasteners, one at a time, from the escapement to the mouth of its mated plastic tube which will then transport the fasteners to the punch/anvil area.
- To prevent fasteners from becoming misaligned, each shuttle and each tube is designed to be part specific. For this reason the shuttles are typically left attached to their mated tubes and handled as one assembly.
- When installing a shuttle: (1) attach it to the shuttle air cylinder. This air cylinder is mounted on the same bracket that will support the shuttle after it is installed. The function of this air cylinder is to push and pull the shuttle’s slide back and forth. To attach the air cylinder to the shuttle, slide the shuttle’s clevis over the tip on the end of the cylinder rod; (2) position the shuttle over the two positioning pins then secure it in place with its one tee handle. Be sure to maintain a gap of about 1mm (.040”) between the shuttle and the escapement.

Tube Extension, Jaws, Punch

- Slide the punch into the bottom of the safety housing and secure it by tightening the two setscrews.
- Slide the anvil into the anvil holder and tighten its mounting screw to hold it in position.
- Install the set of jaws on the gripper assembly. Locate each jaw using the two positioning pins provided, then secure it by tightening its thumbscrew.
- For nut insertion, twist the tubing 180 degrees (so the nut will be positioned shank-side down) and slide the end of the tube over the fitting on the left jaw
- For studs, slide the tube extension onto the end of the fastener delivery tube then insert the tube extension into the tube hanger, (the tube hanger is part of the tool support assembly). Be sure stud tubing *always* runs through the Stud-in-Tube sensor.

Injector Module

- Slide the top of the injector assembly into the bottom of the safety housing. Tighten the two setscrews to secure it.
- Slide the anvil into the anvil holder then tighten the setscrew to hold it securely.
- Install the fastener delivery tube by sliding it over the injector intake.

Bottom Feed Nut Module

- Attach the bottom feed tooling module to the top of the anvil holder. This is done in three steps: (1) place the hole in the bottom feed tooling module's slide, over the pin on the end of the cylinder rod; (2) place the hole in the bottom of the tooling module over the positioning pin on the anvil holder; and (3) tighten the two setscrews on the sides of the bottom tooling module to hold it in position.
- Only if you encounter fast/slow module performance adjust the air flow going to the cylinder assembly (located on the back end of the anvil holder), by turning the air flow control knob. The knob is on the end of the cylinder assembly.
- Slide the end of the fastener delivery tube over the intake at the rear of the bottom tooling module.

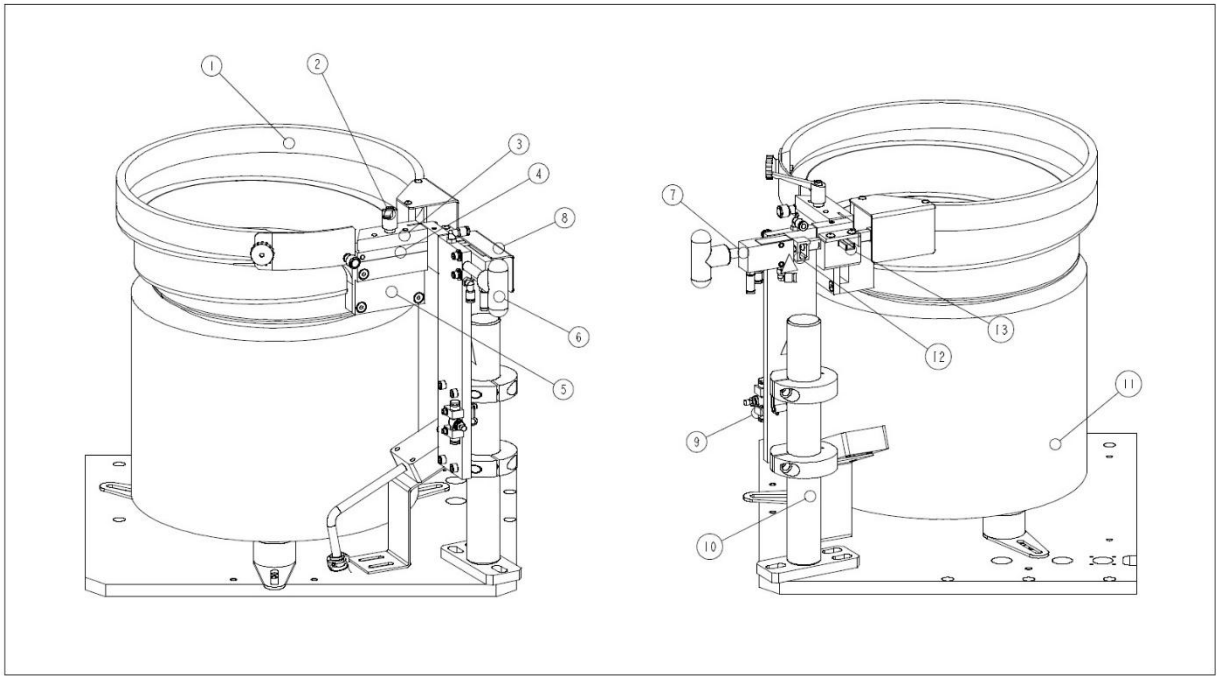
Top Mount Anvil Holder (OPTION)

- The top mount anvil module is for manual applications requiring 9000 lbs. (4082.4 kg.) or less. The geometry of this anvil permits installation of parts into workpieces which need clearance underneath the anvil to be positioned properly.
- Remove standard punch and anvil.
- Remove the gripper hanger assembly from the frame by unscrewing the four (4) socket head cap screws with a 3/16" Allen wrench.
- Remove the wall mount pipe clamp closest to the hanger assembly by unscrewing one (1) socket head cap screw with a 9/64" Allen wrench.
- Use four (4) 1/4-20 bolts to secure the top and bottom portions of the mounting block (P/N 8004280 and 8004281 respectively) to the frame using a 3/16" Allen wrench. Do not tighten.
- Reinforce top and bottom mounting blocks by screwing 1/2"-20 bolts into the frame. Do not tighten.
- Unscrew the rosette style lock knob found on the left side of the mounting block assembly so the pin provides clearance for insertion of the anvil holder. **Insert the anvil holder until it stops.** Hand tighten the rosette knob to secure the anvil holder in place.
- Install 1/4" anvil (P/N 975200722025) and 1 1/2" punch (P/N 8004414). The punch length should not exceed 2." In the Maintenance Mode, accessed from the 2000 touchscreen, jog the punch on top of anvil and physically line up, then tighten. Jog ram down to confirm alignment between punch and anvil. Jog ram to home position.

- Once aligned torque all bolts to 150 foot-pounds (203.4 N/m). Jog ram down to ensure alignment after tightening.
- The mounting block of the top mount anvil holder is designed to mount the gripper hanger assembly for automatic feeding, thus eliminating the need to remove the mounting block.
- The anvil must be removed to install the hanger assembly. Unscrew the rosette style knob to disengage the pin from the anvil allowing it to slide.
- Remove the anvil.
- Mount the hanger assembly to the mounting block and secure it with one (1) SHCS with a 3/16" Allen wrench.
- Follow the alignment procedure for the hanger assembly outlined in Document P/N 8006092, Pemserter® Series 2000® Alignment Procedure for Gripper/Slide Hanger Assembly (P/N 8010944) and Anvil Holder.

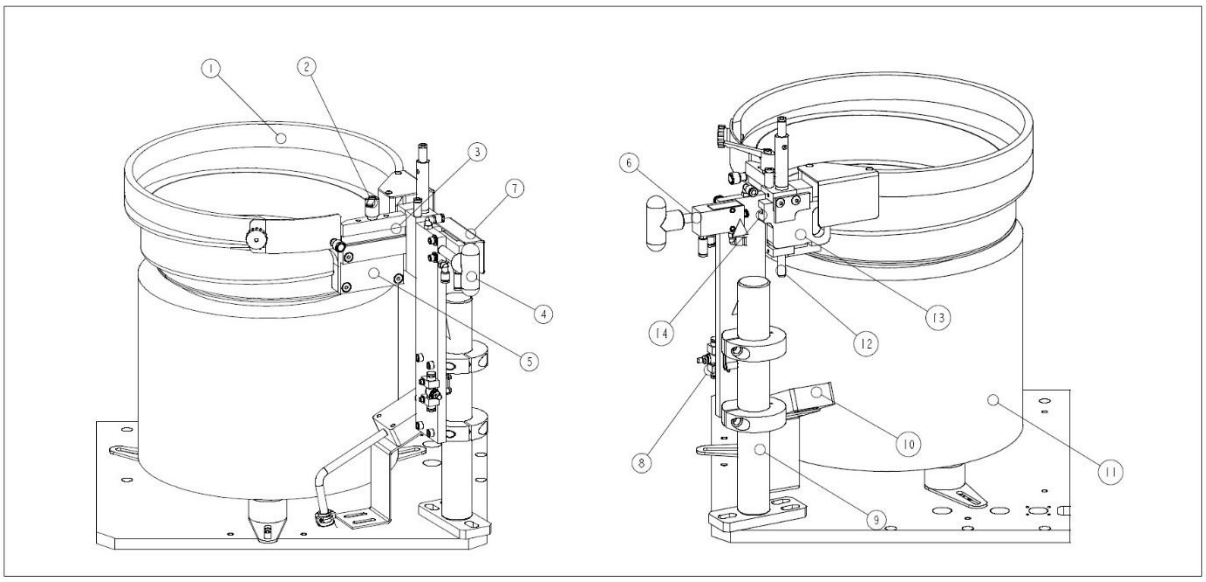
Fastener Length Monitoring System (OPTION)

- The Fastener Length Monitoring (FLM) System is a system that checks the length of stud-type fasteners such as studs and long standoffs and only installs fasteners that passes the check. The system attaches to stud-type shuttles and plugs in the port on the vibratory bowl plate in place of where the Stud-In-Tube sensor plugs in.
- The FLM system consists of a sensing unit that uses two sets of optical sensors that look at the end of the fastener when it is staged in the shuttle for feeding out to the installation area of the press. If the sensors do not receive the correct combination of signals for a correct fastener then the press control system, feeds the fastener out to the top feed slide and gripper system and drops the part instead of installing it. The press control system then attempts to seek a new correct fastener.
- The FLM hardware can be set-up to any standard length fastener.



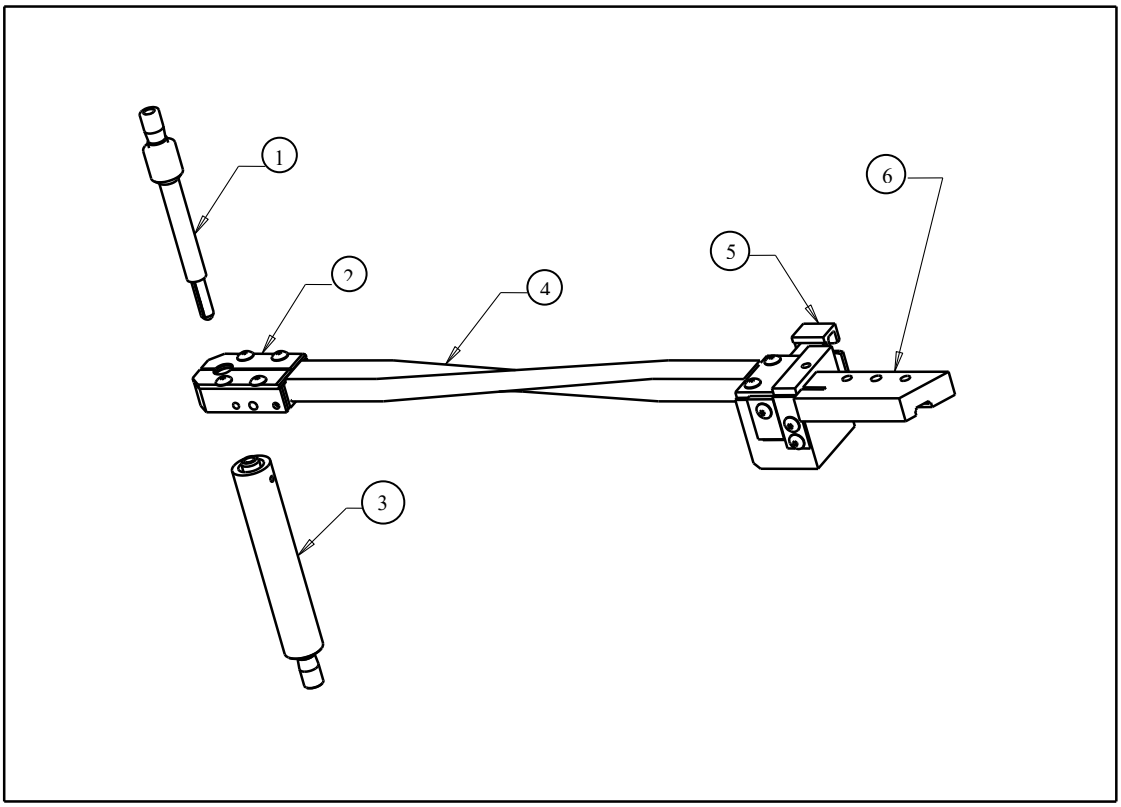
ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	FEEDER BOWL	8	TRANSPARENT SHUTTLE GUARD
2	RETAINING HANDLE	9	"PUFFER" FLOW CONTROL VALVE
3	NUT GATE	10	SHUTTLE SUPPORT ASSEMBLY
4	NUT GATE ADAPTER	11	FEEDER BASE
5	ESCAPEMENT ADAPTER	12	CLEVIS
6	HANDLE	13	TUBING ADAPTER
7	SHUTTLE AIR CYLINDER		

FIGURE 9-1
FEEDER BOWL SYSTEM WITH NUT TOOLING



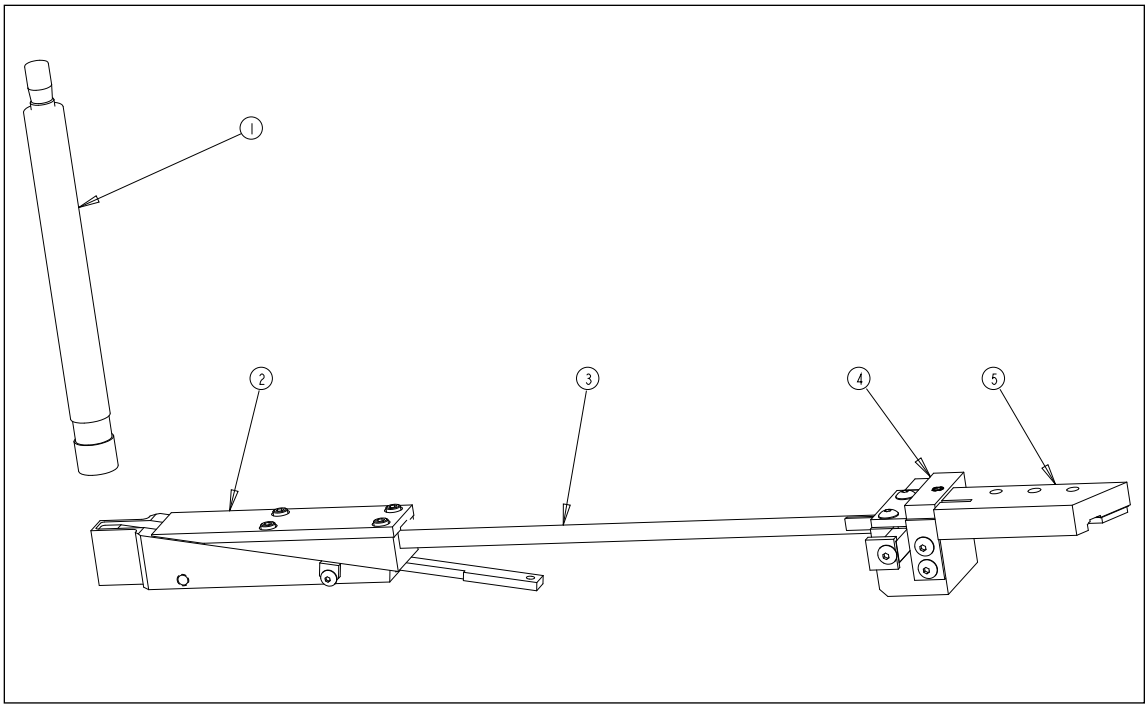
ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	FEEDER BOWL	8	"PUFFER" FLOW CONTROL VALVE
2	RETAINING HANDLE	9	SHUTTLE SUPPORT ASSEMBLY
3	STUD ESCAPEMENT	10	RING SENSOR
4	HANDLE	11	FEEDER BOWL BASE
5	ESCAPEMENT ADAPTER	12	TUBING ADAPTER
6	SHUTTLE AIR CYLINDER	13	STUD SHUTTLE ASSEMBLY
7	TRANSPARENT SHUTTLE GUARD	14	CLEVIS

FIGURE 9-2
FEEDER BOWL SYSTEM WITH STUD TOOLING



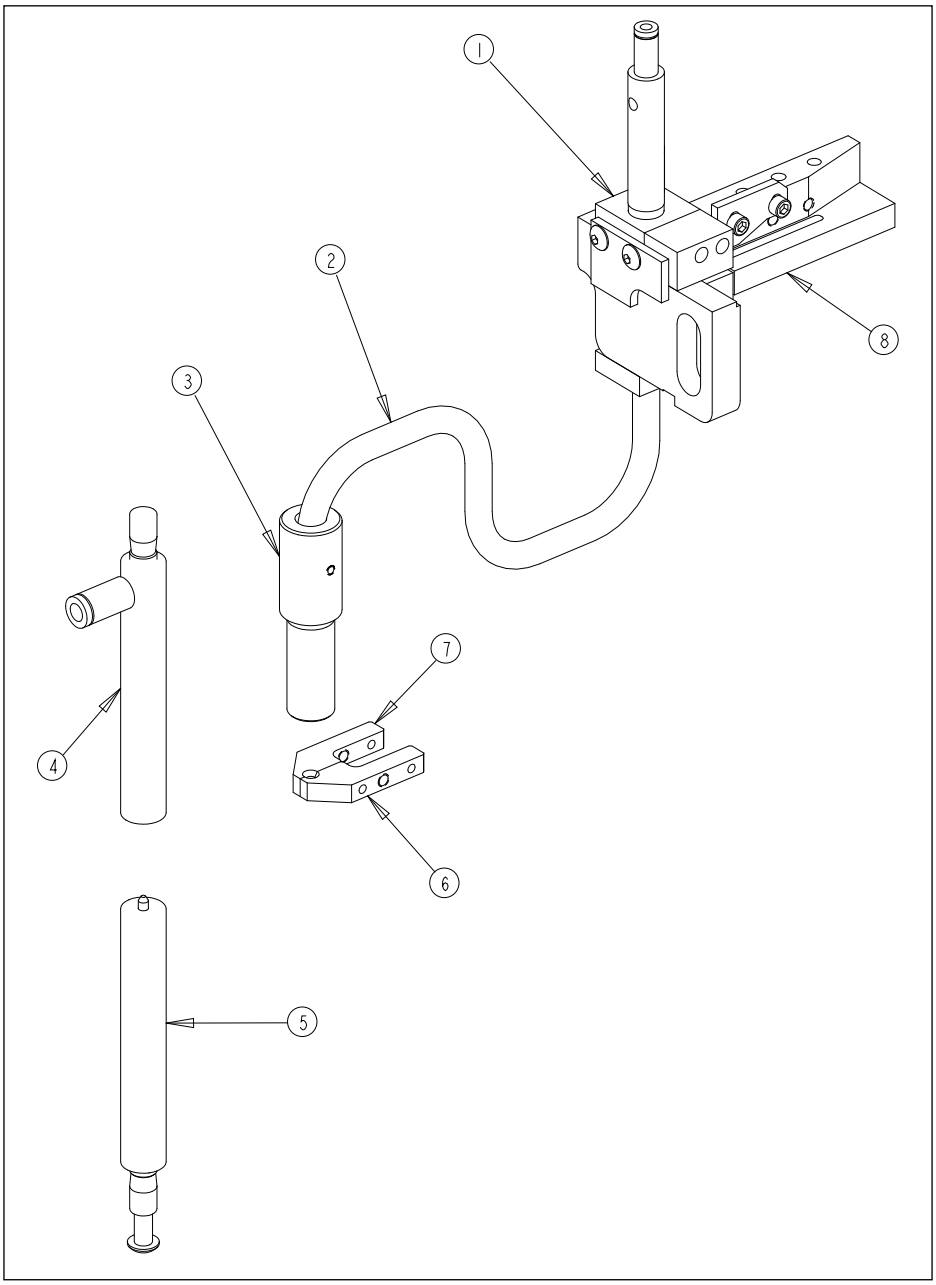
ITEM	DESCRIPTION
1	PUNCH ASSEMBLY
2	JAW ASSEMBLY
3	ANVIL ASSEMBLY
4	TUBING
5	SHUTTLE ASSEMBLY
6	NUT GATE

FIGURE 9-3
TOP FEED NUT TOOLING PACKAGE



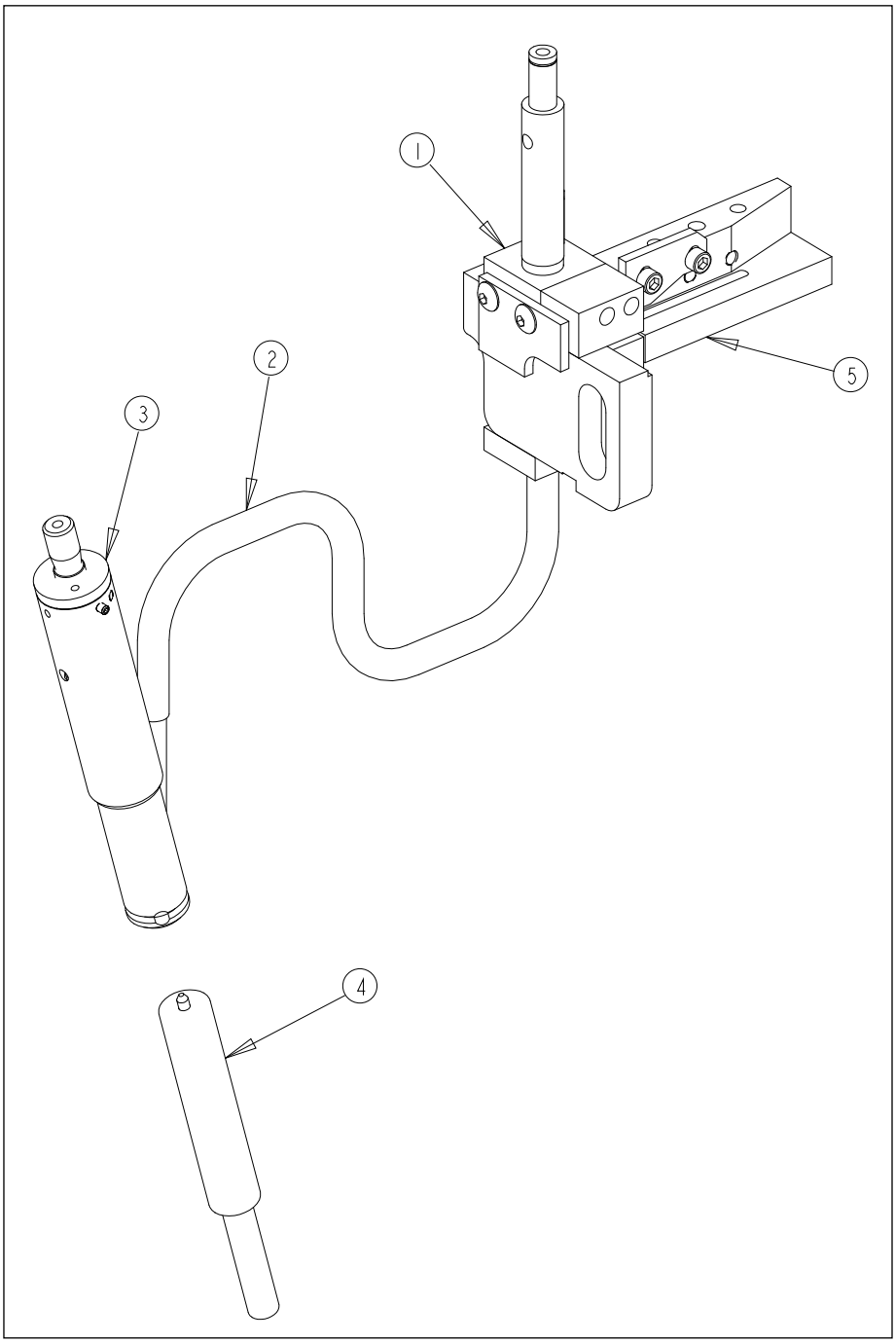
ITEM	DESCRIPTION
1	PUNCH ASSEMBLY
2	MODULE ASSEMBLY
3	TUBING
4	SHUTTLE ASSEMBLY
5	NUT GATE

FIGURE 9-4
BOTTOM FEED NUT TOOLING PACKAGE



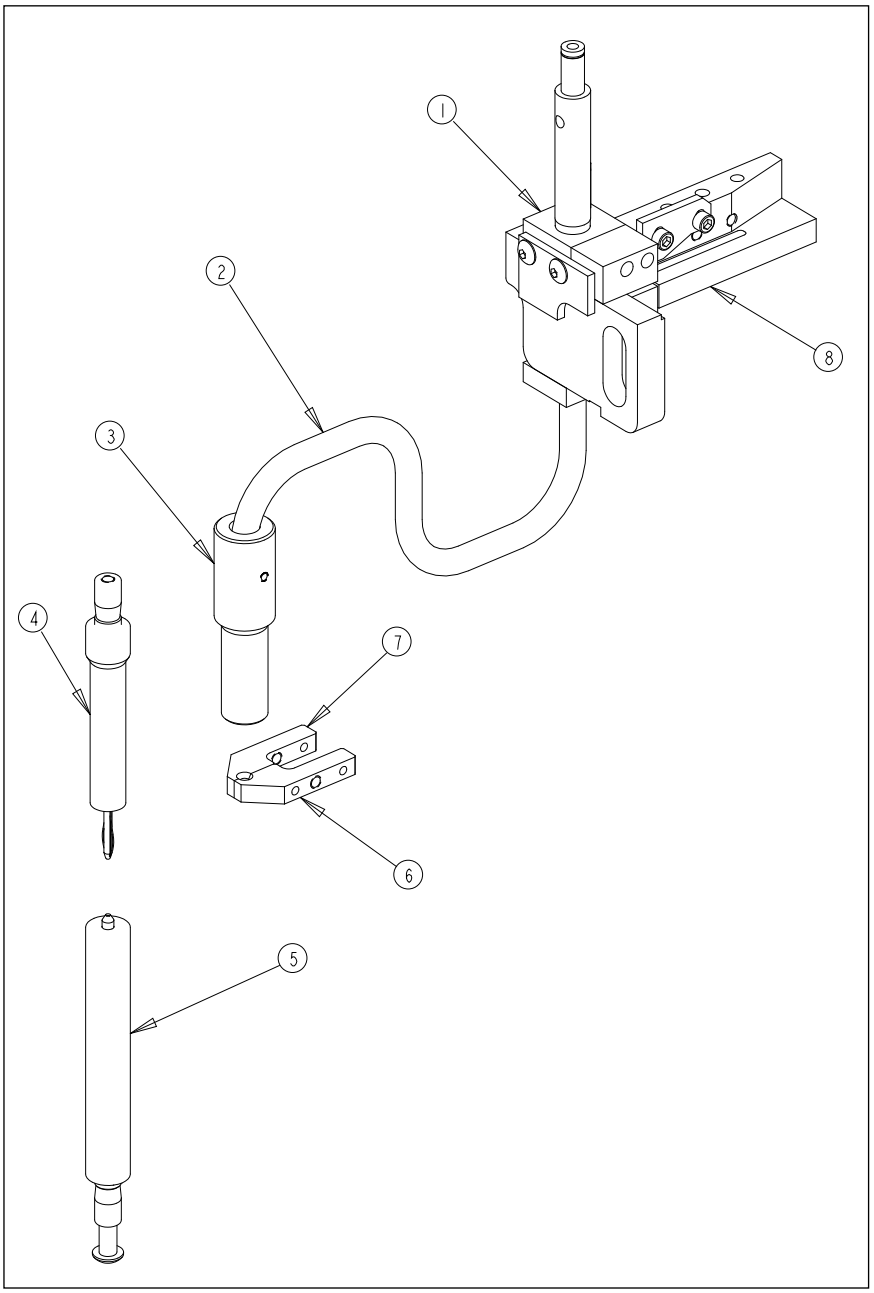
ITEM	DESCRIPTION
1	SHUTTLE ASSEMBLY
2	TUBING
3	TUBE EXTENSION
4	PUNCH ASSEMBLY
5	ANVIL ASSEMBLY
6	RIGHT HAND JAW
7	LEFT HAND JAW
8	STUD ESCAPEMENT

FIGURE 9-5
TOP FEED STUD/STANDOFF TOOLING PACKAGE



ITEM	DESCRIPTION
1	SHUTTLE ASSEMBLY
2	TUBING
3	INJECTOR TOOLING MODULE
4	ANVIL ASSEMBLY
5	STUD ESCAPEMENT

FIGURE 9-6
INJECTOR STYLE TOOLING PACKAGE



ITEM	DESCRIPTION
1	SHUTTLE ASSEMBLY
2	TUBING
3	TUBE EXTENSION
4	PUNCH ASSEMBLY
5	ANVIL ASSEMBLY
6	RIGHT HAND JAW
7	LEFT HAND JAW
8	STUD ESCAPEMENT

FIGURE 9-7
TOP FEED STANDOFF PIN TYPE TOOLING PACKAGE

SECTION 10
PRESS-OPERATION

Before running the press:

- **Install the tooling** (See Tooling Section 9).
- **Check air supply** – be sure it is connected and that the pressure is between 6 and 7 bar (90 to 100 psi)
- **Check electrical power supply** – be sure the ON/OFF switch in the back is in the ON position. (indicated by red illuminated "off" button on the front of the press)
- **Always wear eye protection when operating the press**.
- **Always keep all body parts as far away from moving parts as possible.**
- **Test the safety system every day**

Testing the Safety System:

- **Install Tooling** - any punch and anvil set can be used. Standard flat punch and anvil for a Series 2000 are 16mm (.625") in diameter and 102mm (4.0") long.
- **Turn On the Press** – be sure the ON/OFF switch in the back is in the ON position.
- **Access the Setup** – press **[QUICK START]** on the touchscreen.
- **Select Setup Type** – press **[FORCE CONTROL]**
- **Select Tooling Type** – select a **[Manual]** tooling mode
- **Perform Safety Setup** – With NO fastener or workpiece between the punch and the anvil. Step on the foot pedal, the ram will extend and the punch and anvil will touch and "learn" the safety setup position. The ram will return up and the run screen will appear.
- **Test Safety System** - Test that the safety system is functioning properly. Use the following test:

a) After completing the safety setup step with nothing between the punch and the anvil. Place a wooden lead pencil on the anvil.
b) Wear eye protection, keep body parts away from moving parts, as far as possible.
c) Step on the footpedal.
d) The ram will extend, the punch will contact the pencil and the press will indicate a safety fault.
e) If the wood of the pencil is broken, the press has failed the safety test.
   Turn the press off.
   Remove and Lock out the power and air supply.
   Contact your service representative.

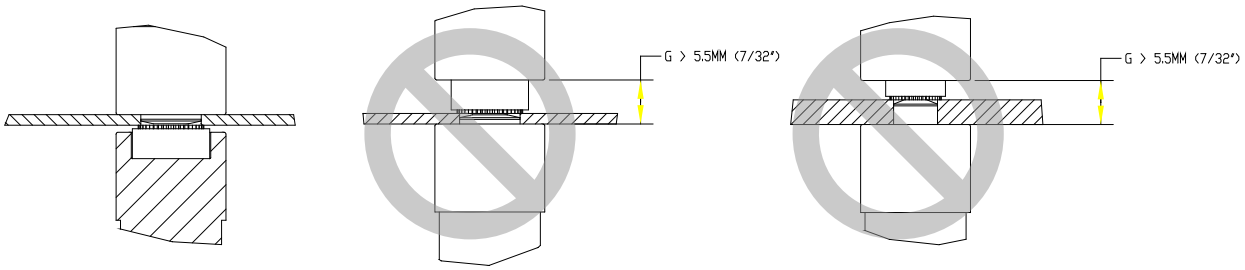
Wood Lead Pencil - 6.3mm-7.6mm (.250-.300") flat-to-flat hexagon (6-sided) cross section.

Running the press:

(The instructions given are for a standard new job setup. For the different options see Section 6 Touchscreen Controls.)

- **Turn On the Press** – Turn on the power switch, and be sure the ON/OFF switch in the back is in the ON position.
- **Access the Setup** – press [QUICK START] on the touchscreen.
- **Select Setup Type** – press [FORCE CONTROL] or [POSITION CONTROL].
- **Select Tooling Type** – press selection  button on the touchscreen.
- **Select Fastener Size and Workpiece Material** – press selections
- **Select Force –** adjust force or accept default then press [CONTINUE]
- **Perform Safety Setup** - Follow the instructions on the screen. If in automatic feed mode a fastener will be fed. Position the workpiece properly, flat on the anvil or fastener. Step on the foot pedal, the ram will extend and touch the fastener and workpiece and "learn" the safety setup position. The fastener will not be installed.

IMPORTANT: The ram must contact the fastener fully in the workpiece (but not installed) and both the fastener and workpiece must be flat to the punch and anvil. The gap between the punch and the anvil must not exceed 5.5mm (7/32”) to conform to internationally recognized safety standards. This means that the stacked height of the fastener and the workpiece before installation must not exceed 5.5mm (7/32”).

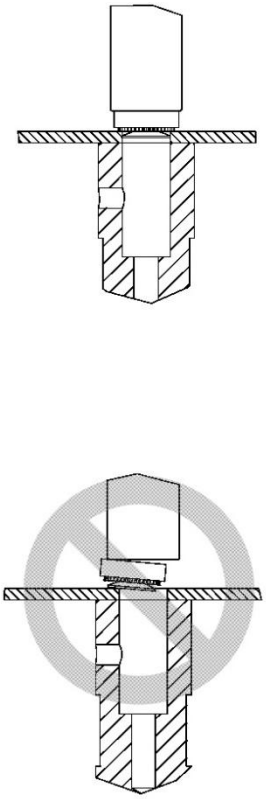


See drawings on next page for examples of proper and improper setup.

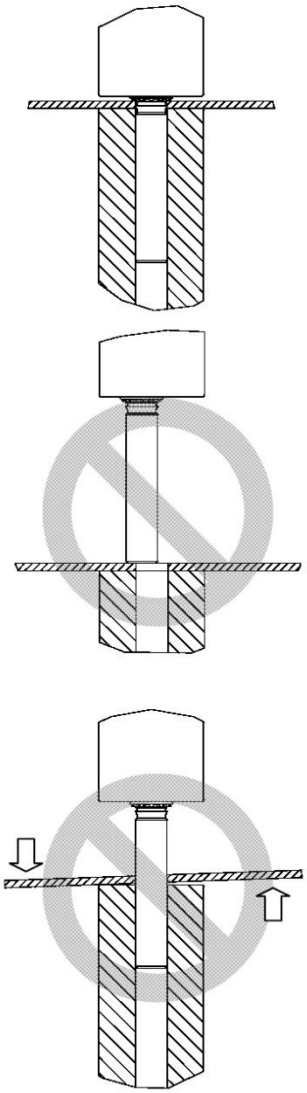
- **Install Fastener** – Position the workpiece properly, flat on the anvil or fastener. Step on the foot pedal. The ram will extend and install the fastener. The press will then get ready to install the next fastener.

EXAMPLES:

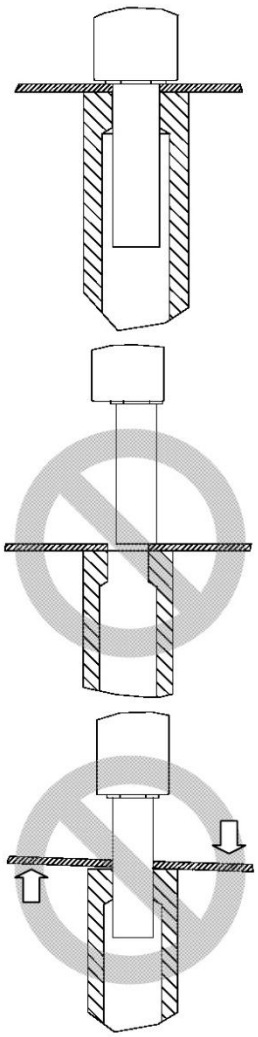
Nut Setup



Stud Setup



Standoff Setup



SECTION 11
MAINTENANCE

The most important element of maintaining your PEMSERTER® rivet installation machine is to ensure that the compressed air supply is clean and dry. Do not use lubricated air. It is necessary to ensure the cleanness of the liquid drawing oil, do not open the filling port, and check the fastness of each pipe joint regularly.

Following the maintenance schedule below will also help maintain your hardware insertion machine in good running order.

IMPORTANT: Only qualified individuals should perform maintenance pocedures. Unless otherwise specified, perform all maintenance with the hardware insertion machine disconnected from air and power. Follow safe practices and obey all local safety regulations.

Maintenance Schedule – PEMSERTER® 2000-PAC

Daily Inspection

• Check oil condition and level in air/oil tanks.	• If the oil is foamy or pink in color, there is excessive air or water contamination. Follow air bleed procedures and recheck. If the oil continues to foam or stays pink, it is contaminated and must be changed. The source of the contamination must be eliminated to avoid reoccurrence of the problem. • If the oil level is off the marks, the oil must be leveled. Follow air bleed procedures and recheck. If the oil is still out of level, balance tanks and add oil as necessary.
• Check tooling	• DO NOT USE tooling that is cracked, chipped, or otherwise damaged. • Check that all retracting pins move freely.
• Check footpedal cord	• Repair or replaced any broken, frayed or otherwise damaged cord.
• Check Safety Stop Distance	• Perform Safety Stop Distance Check Procedure (“Pencil Test”)

Weekly Inspection

• Check all filters and mufflers
  • Reclassifier/muffler
  • Electronic regulator filter
  • Booster valve mufflers
	• Some oil at the reclassifier/muffler in back is normal, empty or change filter as oil collects. If reclassifier/muffler is excessively wet, there may be oil problems. Recheck oil and observe tanks while the press is running. Look for foaming. If oil rises to the top of the tank, it may be blowing out through the valves. Follow air bleed procedures, recheck and change oil if required.
	• Change electronic regulator filter as needed. If filter becomes dirty quickly, it may indicate contaminants in the air that need to be eliminated, because it may lead to other problems.
	• If mufflers become dirty quickly, it may indicate contaminants in the air that need to be eliminated, because it may lead to other problems.
	• If mufflers show red oil, it may indicate a leak in the booster system. Call PennEngineering® Service.

• Check Lightstream Collar	• If plastic lens is dirty, clean with optical cleaning solution and soft cloth.
• Clean Press	• Wipe clean any build up of possible grime, oil mist or other material from room air. This will assist in detecting actual problems with the press systems.

Monthly Inspection and Maintenance

• Check Tooling Alignment	• Check Punch and Anvil alignment • Check Jaw to Punch alignment • Check Bowl to Shuttle alignment
• Check Lightstream operation	• Remove any punch and anvil tooling and in Maintenance Mode on the Touchscreen, jog the ram all the way down to the end of its stroke. Check to make sure that the Safety Sensor LED's do not change or flicker along the entire stroke.
• Check Safety Assembly Operation	• Push on the Punch Adapter of the Safety Assembly by hand and make sure that it moves freely and smoothly along the entire spring-loaded stroke.
• Check Actuator Movement	• Check Shuttle Cylinder moves freely • Check Slide moves freely • Check Gripper moves freely • Check Bottom Feed Cylinder moves freely.
• Check Vibratory Bowl	• Check for dirt, powder, or any other material in bowl, clean as needed. • Check the inside surfaces of the bowl, the surfaces should have an even sand blasted finish. If parts of the bowl become polished and shiny, the bowl surface should be sand blasted.
• Check Tooling Adapter	• Check the surface of the tooling nutgate adapter plate. The top surface should have an even sand blasted finish. If areas of the plate become polished and shiny, the plate should be sand blasted.

Annual Maintenance

• Clean Air Valves (optional)	• If contaminant build up occurs, clean the pneumatic valves annually.
• Change Oil (optional)	• If contaminants enter the oil system, flush and change the oil annually.
• Clean Vacuum Generator (optional)	• If contaminant build up occurs, clean the vacuum generator annually.
• Check Vibratory Bowl Magnet Gaps	• Gap between magnetic coils and striker plate should be 0.9 to 1.0 mm (.035”-.040”) and parallel. Adjust with screws as needed. Be sure to keep coils and plates parallel.
• Check Air Accumulation Tank	• Be sure air and power is disconnected. Pull the tubing from the air accumulation tank and check for water or other contaminants. If Tank is installed with fittings at the top, remove and reinstall with fitting on the bottom. Longer replacement tubing may be required.

3 Year Maintenance

• Rebuild Cylinder and Booster (optional)	• Contact PennEngineering® Service Department.
• Check PAC status and clean the PAC. • Replace the button battery of touch screen PC.	• Checking the PAC and replacing the button battery of touch screen PC can avoid an accidental loss of the program. When clean the PAC and replace the button battery of touch screen PC, the machine should be powered off.

SECTION 12
TROUBLESHOOTING

Note: If an internal PAC problem should develop, call a PennEngineering® service technician, please call +86 (512) 5726-9310.		
SYMPTOMS	**DIAGNOSTICS & PROBABLE CAUSE(S)**	**PROBABLE SOLUTION(S)**
A. Whole System Malfunctions		
1. The press will not start. (OFF light not lit)	a. Electrical disconnect turned off. b. No power to the press. c. DC Power Supply failure.	a. Turn on. b. Check main fuses. c. Check DC Power supply, replace if faulty.
The press will not start (ON light is lit)	a. OFF button is "open". b. ON button is not closing. c. MCR(Main Control Relay) system failure.	a. Check button, replace if faulty. b. Check button, replace if faulty. c. Check the wiring continuity, replace if faulty.
2. The press will not cycle.	a. Safety sensor inputs 1 & 2 are on. b. Footpedal is not making the proper PAC input.	a. The reflector is not in proper position for "lightstream" process. b. Check the footpedal & wiring. Replace if faulty.
3. SAFETY FAULTS: Sensors tripping above/ below the safety window.	a. Misalignment of punch/ gripper/ anvil. b. Slide/gripper require maintenance/cleaning. c. Safety housing spring damaged.	a. Check alignment. b. Clean/lube shafts as necessary. c. Check spring/replace if faulty.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
B. Electrical/Electronic Malfunctions		
1. The touch screen will not work but the power button is lit.	a. Fuse F2 is open.	a. Analyze and repair the touch screen related circuitry then replace the fuse. b. Replace the touch screen if faulty.
2. None of the PAC lights come on.	a. Check to see if the PAC power supply is receiving 24 volts. b. Check the fuse in the PAC power supply. c. Check to see if the PAC power supply has failed.	a. If not receiving power check fuse F2 b. Replace the fuse in the power supply. c. Replace the power supply.
3. The sensors are not functioning.	a. Check to see if fuse F3 is open. b. Check all sensors to see if one has a "short." c. Check the DC input module.	a. If open, investigate the circuitry and replace fuse three. b. Repair the "short" problem and/or replace the sensor. c. If faulty, replace the DC input module.
4. The pilot regulator is not functioning. (Power is on, but no pressure is on the gauge at the ram valves.)	a. Check to see if fuse F4 is open. b. Check pilot pressure at the regulator.	a. If open, investigate the electrical regulator and relevant circuitry, then replace the fuse. b. If there is pilot pressure replace the regulator. If not replace electronic regulator.
5. The DC power supply is not functioning.	a. Check the main power fuses. b. Check for line voltage at the supply terminals.	a. Replace if blown. b. Check the wiring between the power inlet module and the supply. c. Replace the power supply.
6. The press will not power-up.	a. Check to see if there is in-coming power. b. Check to see if the main disconnect is shut off. c. Check MCR's wiring.	a. Provide the power. b. Turn to the ON position.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
7. The press will not power-down.	a. Check to see if the OFF button is faulty. b. check MCR's /wiring.	a. Replace if faulty.
8. No voltage at a particular solenoid.	a. Check for a shorted coil. b. Check the related PAC output voltage.	a. Repair or replace. b. Replace the output card if faulty.
C. Ram Malfunctions		
1. The ram does not move up and down smoothly.	a. Check the main cylinder assembly. b. A Safety valve is dirty/sticking/damaged	a. Replace the main cylinder assembly if faulty. b. Clean, rebuild, or replace if faulty.
2. Oil is leaking out of the main cylinder.	a. The main cylinder assembly is faulty..	a. Replace the main cylinder assembly.
3. The ram will not go down.	a. Check to see if either safety valve is stuck in the closed position. b. Check to see if output lights one and two are on. c. Check to see if either safety sensor has opened. d. Check to see if the Linear Transducer has failed.	a. Clean, rebuild, or replace if faulty. b. The PAC has determined that the Linear Transducer /Safety states are not right. Fix conditions. c. Replace if faulty. d. Replace if faulty.
4. The ram will not go up.	a. Check to see if output light 1&2 have gone off and if output light 4 is on. b. Check to see if output light 3 is off, then see if the booster has retracted.	a. The PAC has determined that the conditions are not right. Fix conditions. b. Repair or replace the booster if faulty.
5. The ram will not stop quickly.	a. Air trapped in the bottom of the main cylinder b. Check both safety valves.	a. Remove the punch and anvil from the ram, and cycle the ram full stroke, down and up, waiting for air to rise out of the oil, between strokes. b. Clean, rebuild, or replace if faulty.
6. The safety assembly tip is wobbly.	a. Check the set screws holding the punch.	a. Tighten the set screws.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
7. There is insufficient insertion force.	a. Check to see if the force level was set too low. b. Check the electric regulator for air pressure level. c. Check to see if the booster is stuck in the retracted position.	a. Reset the force level via the touch screens. b. Reset the electric regulator. c. Repair or replace the booster.
D. Pneumatic/Hydraulic System Malfunctions		
1. White foam and/or sludge has collected in the air-oil tanks.	a. Water has gotten into the system because of "dirty" air entering the press.	a. If a small amount of foam and/or sludge is in the tanks, clean out the tanks. If a large amount of foam and/or sludge is in the tanks, dismantle and thoroughly clean every pneumatic/hydraulic components, then replace the hydraulic fluid (oil).
2. Hydraulic fluid (oil) does not come up to the fill lines on the tanks.	a. Check for fluid leaks.	a. Repair any leaks then see Section 11 for system refilling and balancing instructions.
3. No vacuum at the punch.	a. Check that PAC output light number 8 is lit and the module is putting out 24V. b. Check the vacuum aspirator solenoid.	a. If not putting out 24V replace the output module. If putting out 24V and the solenoid is not working replace the solenoid. b. Replace if faulty
4. No air is entering the press.	a. Check to see if the manually operated regulator is closed. b. Check the quick exhaust/supply valve.	a. Open the regulator. Replace if faulty. b. Replace if faulty.
5. No compressed air "dumping" noise is heard when the press is shut down.	a. Check the quick exhaust/ supply valve for incoming pressure.	a. Replace if faulty.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
E. Tooling Malfunctions		
1. If : • The puffer is not working properly. • Blower 1 is not working properly. • Blower 2 is not working properly. • The shuttle is not sliding back and forth. • The upper front tooling slide does not extend. • The bottom feed nuts are not being pushed out to the anvil. • The gripper assembly is not functioning.	a. Check the output module to see if the respective LED is lit and that the module is putting out 24V to the solenoid.	a. Replace the output module if it is not putting out 24V or, if it is putting out 24V, replace the solenoid.
2. The injector has failed.	a. Check for a stuck stud or standoff. b. Check for broken spring	a. Remove the stuck fastener. b. Replace the spring
3. The shuttle is jammed.	a. A fastener is jammed.	a. Clear the fastener.
4. Nuts or studs are not being drawn through the escapement properly.	a. The escapement is out of alignment.	a. Realign the escapement.
5. The long lengths of studs are jamming in the tube.	a. Bends in tube are too tight	a. Redress tube to bend toward the frame and then through the tube clips on the frame.
6. Shuttle vibrates with the bowl.	a. Shuttle is too close to the escapement.	a. Maintain a gap of about .040” (1mm) between the shuttle and the escapement.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
F. Vibratory Bowl Malfunction		
1. The bowl does not vibrate.	a. Check the bowl driver controller fuse. b. Check to see if PAC output light 5 comes on. c. Check the bowl driver controller internal circuitry.	a. Check for a shorted winding on both magnets. Repair the short then replace the bowl driver controller fuse. b. Replace and reprogram the PAC if faulty. c. Replace parts, or the controller, as necessary.

SECTION 13
SPARE PARTS

PART DESCRIPTION	PFT PART NUMBER	QTY	MANUFACTURER	MANUFACTURER'S PART NUMBER
Level One Spare Parts (Maintain this minimum inventory of parts for standard mechanical wear items on the machine.)				
Auto Transmission Fluid-Dextron II	9800391484	4 QTS		
SAFETY VALVE ASSEMBLY	8004636T	1	PennEngineering®	
VALVE, BOOSTER CYLINDER	8002228	1	SMC	NVFR3100R-5FZ
VALVE, MAIN CYLINDER	8002229	1	SMC	NVFR3400-5FZ
SENSOR, SAFETY	8009715	1	OMRON	E3Z-T81
VALVE, 4 WAY 2 POSITION	8003211	1	SMC	VQZ2151-5LO
AIR CYL. (SHUTTLE)	8000680	1	COMPACT AIR	BFH12X1
AIR CYL. (PUSHER)	8000467	1	COMPACT AIR	BFH12X2
GRIPPER	8006257	1	PennEngineering®	
LINEAR SLIDE	8006258	1	PennEngineering®	

PART DESCRIPTION	PFT PART NUMBER	QTY	MANUFACTURER	MANUFACTURER'S PART NUMBER
Level Two Spare Parts (Add these items to the spare parts in inventory when no downtime can be tolerated.)				
PAC Controller	PS202592	1	Xsight	KM-SPT-XS720T15-P110
SSR24V	PS190445	6	Phoenix	2905293
100OHM	8005954	1	OHMITE	02F1740
25OHM	8008716	1	OHMITE	B8J25RE
15.6in Touch screen PC	MDS025030005	1	Imalligent	HTPC6000-4G-SSD128G-8145U-2E