MACHINE SOLUTIONS INC.

USER MANUAL

BEAHM DESIGNS FLARE SYSTEM

MODEL 610-TF

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WELCOME

Machine Solutions, Inc. (MSI) would like to take this opportunity to thank you for purchasing your new 610-TF Flare System. At MSI, we are dedicated to bringing innovative process development solutions to both medical device and nonmedical organizations. MSI looks forward to helping your organization provide life-improving devices to your customers, today and tomorrow.

MACHINE DESCRIPTION

The Beahm Designs Inc. Model 610-TF is a system for the purpose of thermo-forming the ends of thermoplastic tubings and materials by advancing the material over a heated tooling. Once the material is loaded on the system all process parameters are controlled by the system.

SAFETY

- Place the system on a level, sturdy surface at an ergonomically viable height for the user.
- Use of eye protection when working with compressed gases and heated materials is advised.
- The maximum observed Sound Pressure Level is below 70 dBA.
- Hot dies will become hot during operation and, depending on temperature set-point, can cause severe skin burns if contact occurs.

Caution: high voltage. Remove power and use safety precautions when servicing.

Caution: hot surface. Contact may cause burn. Allow to cool before servicing.

Caution: pinch point. Keep hands and body parts clear while in operation.

USER ALERTS

Do not use or otherwise operate the machine in any manner other than that in which it is explicitly intended. Examples: Do not attempt to sit on or climb on the equipment, do not place heavy objects or containers of liquid on the machine, do not to insert any foreign objects into the machine and do not attempt to bypass any guards.

Note: The equipment is not for use with materials that can decompose or ignite below the maximum operating temperature of the machine. Hazards are materials that outgas hazardous substances and or ignite. (260°C/500°F).

Note: This equipment is not for use in an ATEX environment.

CONTENTS

Included with the system are the following contents:

- Benchtop Flare System
- Power cord

INSTALLATION

1. Place the system on a level, sturdy surface.
2. Connect the power cord to the main control unit.
3. Connect the air supply hose assembly to the system and then to a clean, dry and filtered compressed air source.

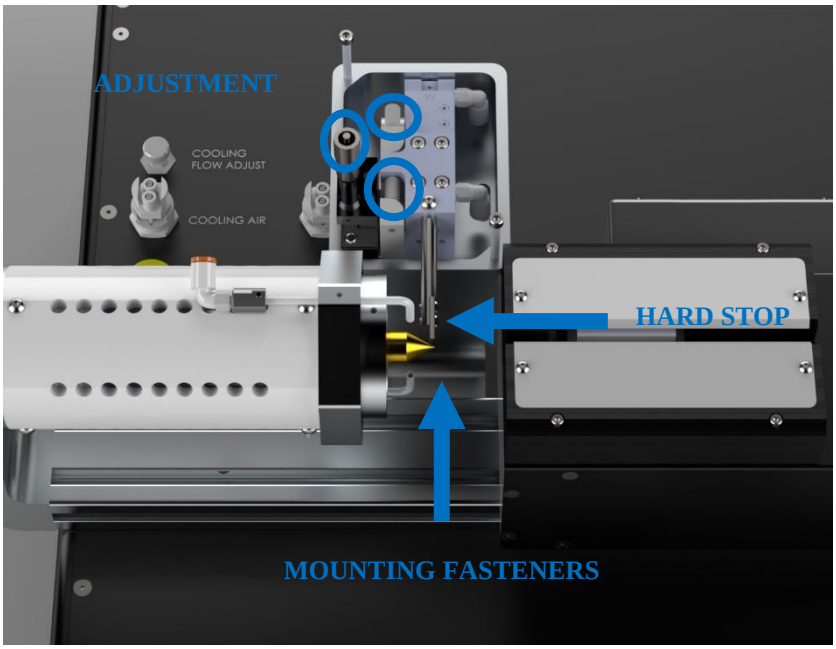
SET UP AND CONFIGURATION

Proper sizing of the flare dies and alignment of the tooling are crucial to optimizing process results and repeatability. The following guidelines are the recommended methods. However, all applications vary and several iterations of tooling process development may be required and may not follow all of the recommended guidelines.

Hard Stop

The hard stop is essential to prevent over or under flaring of the material and works in conjunction with the "Advance Distance" parameter accessed via the system parameter keypad. The position of the hard stop varies greatly with each application and experimentation will be required to optimize the position. The following are general guidelines for set-up.

1. Loosen the mounting fasteners at the rear of the hard stop assembly mount.
2. Position the hard stop as close as possible to the flare geometry.
3. Tighten the mounting fasteners.
4. Measure the distance from the face opposite of the flare tool to the start of the tool flare geometry.
5. Enter this distance as the "Advance Distance."



Thruster Position

Thruster position should be as close as possible to the flare tool to minimize flex or compression of the material during the flare process.

1. Loosen the two fasteners at the front of the thruster assembly.
2. Position the thruster assembly as required.
3. Tighten the two fasteners.

Standard Grips

This is the most forgiving of the tooling.

1. Adjust the pressure such that the tubing does not slip during the process but also does not "grip" the core pin/mandrel within the tube.

Profiled Grips

Profiled grips are typically contoured to the material O.D. and combined with the high force grip actuator. The combination is used when the material is of a higher than usual durometer or the flare geometry is challenging, or both.

System Options

Many optional accessories are available to enhance the functionality of the system and improve process yield. Contact Beahm Designs' sales department or visit our web site www.machinesolutions.com for more information on available accessories and to request a quote. Examples of available accessories are:

-Vision systems with or without on-screen crosshair line generators.
-Laser line generators.
-Extended product support trays/guides
-Product grip nests/alignment tooling

SYSTEM CONTROLS AND FEATURES

Located on the front panel are the following controls and/or displays and their function.

Figure 1. 610-TF Flare System Front Panel

Table 1. 610-TF Front Panel Controls and Functions

Item	Function
1	Controls the temperature of the die head.
2	Indicates when the system power is on by illuminating and off when not illuminated.
3	Reset the machine, after E-stop or power off is pressed.
4	Cut all the Power to the machine.
5	Initiates process sequence.
6	Cuts all the power and air to the machine. Reset the E-stop by rotating the switch clockwise until it pops out again.
7	Interrupts the process sequence and resets the system timer.
8	Used to enter flare parameters other than temperature.
9	Loosen to adjust thruster position. Ree-tighten.
10	Displays the pressure applied to the product grips.
11	Regulates the pressure of the product grips.

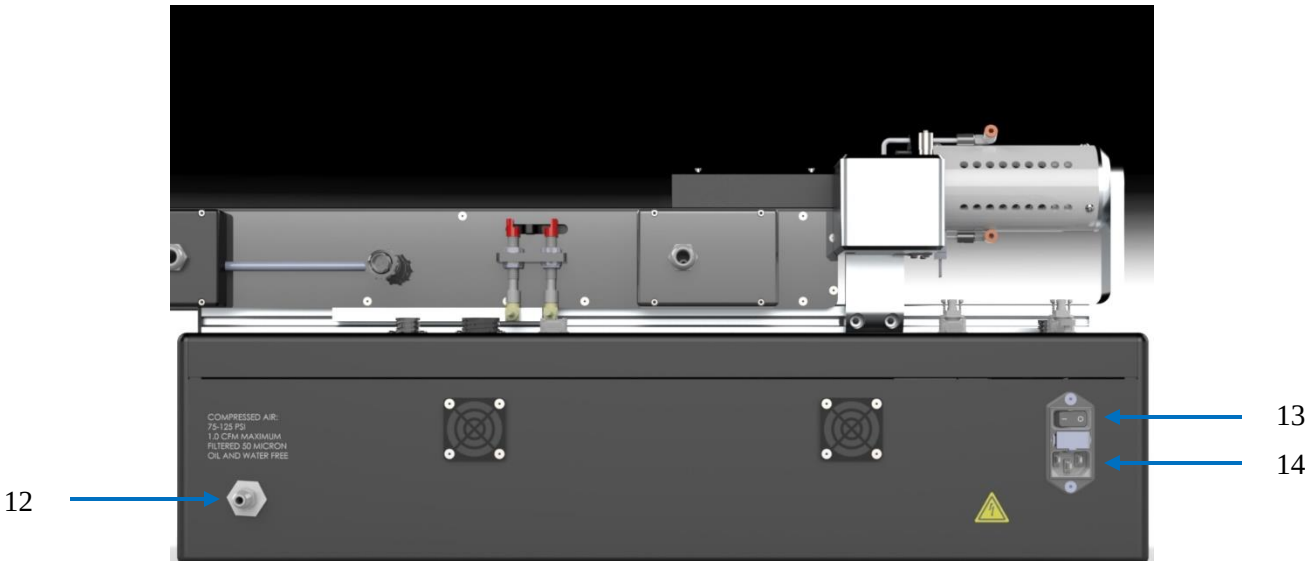


Figure 2. 610-TF Flare System Back Panel

Table 2. Back Panel Controls and Functions

Item	Function
12	Supplies air to machine
13	Turns system power and air on and off
14	Connects to power cord

PARAMETER SETTINGS

Temperature
This is the temperature of the flare tool and typically is not at a set point that melts the material but softens it enough to thermoform it.

- Depress and hold the up or down arrow key of the temperature controller to scroll to the desired temperature. After two seconds the new value will be accepted, and the temperature will ramp to the new set point.

Flare Distance
This is the distance required to advance the material over the flare tool to form the required geometry.

- On power up or after depressing the STOP/RESET switch select YES on the HMI keypad and this will be the second parameter displayed.
- Key the value and depress ENTER on the keypad.

Flare Speed
This is the speed that the material is advanced over the flare tool to form the required geometry.

- On power up or after depressing the STOP/RESET switch select YES on the HMI keypad and this will be the third parameter displayed.
- Key the value and depress ENTER on the keypad.

Dwell Duration
This is the duration of time that the material remains over the flare tube in order to allow the material to remain formed.

- On power up or after depressing the STOP/RESET switch select YES on the HMI keypad and this will be the fourth parameter displayed.
- Key the value and depress ENTER on the keypad.

Cool Duration
This is the duration of time that the material is cooled in order to set the flared geometry prior to withdrawal from the tool.

- On power up or after depressing the STOP/RESET switch select YES on the HMI keypad and this will be the second parameter displayed.
- Key the value and depress ENTER on the keypad.

Adjusting Grip Head Pressure

- Rotate the regulator knob clockwise or counterclockwise until the pressure gauge displays the desired value.

RUN PROCESS

1. Slide the tubing over the flare pin guide mandrel and lightly against the hard stop.
2. Depress the start switch.
3. Upon completion of the process cycle, remove the material from the flare tool.

Abort Process Sequence

This process may be aborted at any time during operation.

1. Depress the stop/reset switch.
2. The system will home and the product will be released.
3. Remove product.

MAINTENANCE

Note: Ensure the machine is unplugged for any servicing or maintenance work.
Note: Perform these steps ONLY when the machine is at room temperature.

Caution: pinch point/crush hazard. Keep fingers, hands, and clothing clear of moving parts.

Caution: hot surface. Contact may cause burn. Allow to cool before servicing.

Cleaning

1. Use 99% isopropyl alcohol to wipe down the outside of the machine. Do not attempt to clean the inside of the machine. Machine should not be washed down.
2. Cleaning should be with a soft dry cloth only.

Exchanging Flare Tool

Note: Perform these steps ONLY when the flare tool is at room temperature.

1. Unthread the tool from the heater assembly.
2. Install the replacement tool onto the 10-32 threaded post ensuring the rear of the tool is flush against the heater assembly.

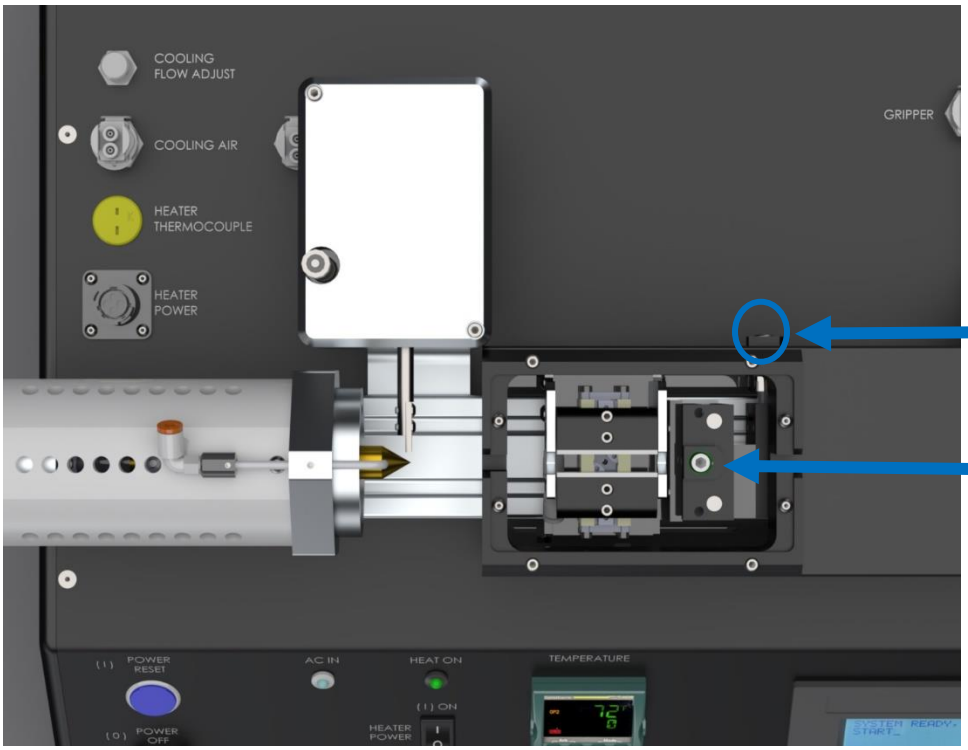
Exchanging Grip Heads

1. Remove the two fasteners from each grip head.
2. Replace the grip heads with alternates.
3. Re-install all fasteners.

Aligning Tooling

Note: Alignment should be performed on a prepared product subassembly.
Alignment MUST be performed with system power off and heads at ambient temperature.
Alignment must be performed on a flat and reasonably level surface.

1. Prepare a material assembly.
2. Remove the rear, forward pneumatic bulkhead cover.
3. Position the material assembly within the grips but not over the flare tool and manually close the grips.
4. Adjust the Y-axis and Z-axis of the grip assembly until the material is aligned with the flare tool.
5. Run samples to verify alignment.
6. Replace the real bulkhead cover.



DIAGNOSTICS AND TROUBLESHOOTING

Table 3. Diagnostics and Troubleshooting

Issue	Possible Causes	Solution
Temperature not stable	• Thermocouple loose	• Auto-tune (MSI recommends process auto-tune @ process temperature.) • Re-install thermocouple
"Open" flashing on temperature controller	• Break in thermocouple wire/ thermocouple failure	• Verify all connections from controller to remote TC jack • Replace thermocouple
No heat at Die	• Defective heating element • Defective power control	• Replace heating element
.Err code in display	• Temperature controller • Software failure	• Replace/Reprogram temperature controller
System will not power on	• IEC power cord not fully Connected • Fuse needs to be replaced	• Verify installation • Replace fuse

SPECIFICATIONS

Table 4. System Specifications

Description	Range	Resolution	Accuracy *
Temperature Controller	Ambient-750°F	1.0 deg.	+/-.75% F.S.
Temperature accuracy at flaring tool	Approx. 3% heat dissipation can be expected at process temperature.		
Hard Stop Advance	0.1-5 mm	0.1 mm	+/- 0.1 mm
Flare Distance	0.1-25 mm	0.1 mm	+/-0.2 mm
Flare Speed	0.1-15 mm/sec	0.1 mm/sec	+/-0.1 mm/sec
Heat Duration	1-60 seconds	1.0 sec	+/- .1 sec
Cool Duration	1-60 seconds	1.0 sec	+/- .1 sec.
Grip Pressure	0-60 psi	1.0 psi	+/-1.6% F.S.
Optional 100 psi Gauge Upgrade	0-100 psi	5.0 psi	+/-1.6% F.S.

***Note: Accuracies are based on component manufacturers specifications.**

Facility Requirements

1. Voltage: 120-240 VAC, 50/60 hz
2. Wattage: 10 amps (500 watts)
3. Compressed Air: 60-125 psi, clean dry compressed air

CRITICAL PARTS

For replacement or spare parts, please contact us at service@machinesolutions.com, or call 928-556-3109.

Table 5. Critical Parts List

Part Number	Description	Quantity
1330455-003	4-WAY VALVE 24 VDC	3
1348043-001	Pressure gauge 0-60 psi	1
1343250-001	2-way pneumatic valve 24VDC	1
1131433-001	Solid state relay	1
1148103-001	Drive/Controller	1
119106-001	Relay, PLC, 24VDC, Din Rail, 1PDT	4
1143287-001	Relay, 24VDC, Integrated	1
1150440-001	Temperature Controller	1
1153590-001	Heater Cartridge, 120VAC, 1.5in, 100W	1
1143133-001	Thermocouple, K Type, 0.125 OD	1
1145600-001	Contactor	1
1148096-001	HMI	1

CUSTOMER SUPPORT AND SATISFACTION

Machine Solutions Inc. is proud of the advanced engineering and quality construction of each piece of equipment that we build. It is our goal to provide equipment that exceeds the expectations of the customer. By implementing the highest standards and applying our experience to provide a quality product, we maintain an ongoing, positive working relationship with all our customers.
Machine Solutions Inc. welcomes your comments and inquiries about our products and services.

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