

MACHINE SOLUTIONS INC.



USER MANUAL

BEAHM DESIGNS THERMAL TRAVERSER 410-A



BEAHM
DESIGNS

Machine Solutions Inc. 2951 W. Shamrell Blvd. Flagstaff, Arizona 86005 USA
Tel: 928.556.3109 • Fax: 928.556.3084
info@machinesolutions.com • www.machinesolutions.com

© 2011 Copyright Machine Solutions Inc. All rights reserved.

Table of Contents

Purpose	3
Overview	3
Contents.....	3
Installation.....	3
Uncrating	3
Leveling	3
Connections	4
Safety	4
Setup and Configuration	5
System Controls and Features	5
Parameter Settings	6
System Operation	7
Maintenance	7
Switching from Fahrenheit to Celsius.....	10
Schematics	11
Warranty and Servicing	11
Return Material Authorization	11
Component Data Sheets	11

List of Tables

Table 1. System Controls, Displays and Functions	6
Table 2. System Specifications	9
Table 3. Critical Spare Parts	10
Table 4. Diagnostics	10

List of Figures

Figure 1. Back side input panel	4
Figure 2. Front panel system controls and features	6
Figure 3. Thermal Nozzles	7
Figure 4. Nozzle set screw	8
Figure 5. Thermocouple tip	8

Purpose

The purpose of this document (*Original Instructions*) is to describe the mechanical, electrical and software design of the control system for the Thermal Traverser, 410-A. This document also includes operator instructions.

Overview

The Beahm Designs Inc. Model 410-A Lamination System is a system for the purpose of recovering heat shrinkable materials onto a catheter shaft type of substrate by means of traversing a thermal nozzle along the length of the materials at a controlled speed.

Contents

Included with the system are the following contents:

1. IEC Power Cord
 2. Compressed Air Supply Hose Assembly
-

Installation

Note: See Maintenance Section for facilities requirements

Uncrating

1. Remove all lag screws that hold the machine to the crate.
2. Carefully remove the machine from the crate.
3. Remove the four, ¼ inch, machine bolts attached to the 2x4 wood on the bottom of the machine.
4. Unwrap the machine by removing the cellophane stretch wrap.

Leveling

1. Place the system on a sturdy, and level surface.
2. Connect the power cord to the system and then to a 110-240 VAC 50/60 Hz. Outlet.
3. Connect the air supply hose assembly to the system and then to a clean, dry, and filtered compressed air source.
4. Auto-tune Temperature Controllers (please refer to Page 9. for procedure details).

Connections



Figure 1. Back side input panel



Caution: high voltage.

1. Locate the input panel on the rear panel of the machine. See Figure 1.
2. Connect a power cord to the power connector.
3. Plug the power cord into a source with the following specifications:

Important: connecting to the wrong voltage will result in machine damage not covered under warranty.

- 120 or 240 VAC (refer to the machine label)
- 50/60 Hz

Safety

- Use of eye protection when working with compressed gases and heated materials is advised.
- The maximum observed Sound Pressure Level is below 70 dB(A).
- Do not to use the equipment other than as prescribed. For example: 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 insert any foreign objects into the machine and do not attempt to bypass any guards or otherwise operate the machine in any manner other than that in which it is explicitly intended.



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.

Setup and Configuration

Proper sizing of the **thermal nozzle** 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.

1. **Thermal Nozzle Diameter** - The nozzle diameter should be .187"-.25" larger than the material to be processed.
2. **Thermal Nozzle Width** - The factory supplied width of 0.5" is optimal for lamination speed. (Custom sizes, made-to-order available).
3. **Proximal (Home) Grip** - This assembly must not be moved from its factory mounted position or damage to the system may occur.
4. **Grip-to-Grip Distance** - Position the proximal grip such that the heads do not grip the heat shrink but securely hold the product mandrel; Loosen the two fasteners at the bottom-rear of the assembly. Reposition the assembly and then tighten the two fasteners.
5. **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.beahmdesigns.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:

	Description	Function
1.	Power Off switch (ACIN)	Toggles system power and air on and off.
2.	Power On indicator	Indicates when system power on by illuminating, off when not illuminated.
3.	Heater Power switch	Toggles heater power on and off.
4.	Heater power indicator	Indicates when heater power is on by illuminating, off when not illuminated.
5.	Start switch	Initiates process sequence.
6.	Stop/Reset switch	Interrupts the process sequence and resets the system timer.
7.	Emergency Stop switch	Interrupts all system power and air.
8.	Power Reset switch	Returns all system power and air following an Emergency Stop.
9.	Temperature controller	Controls the heated air set point.
10.	Grip pressure regulator	Controls the pressure to the product grips.
11.	Grip pressure gauge	Displays the grip pressure.
12.	HMI Keypad	Inputs traverse speed and distance parameters and displays operator prompts.
13.	Heater Air Flow	Meters the heater air flow rate.

Table 1. System Controls, Displays and Functions



Figure 2. Front panel system controls and features

Parameter Settings

1. **Temperature** - Depress and hold the up or down arrow key of the temperature controller to scroll to the desired temperature. After 2 seconds the new value will be accepted, and the temperature will ramp to the new set point.
2. **Grip Head Pressure** - Rotate the regulator knob clockwise or counterclockwise until the pressure gauge displays the desired value.
3. **Nozzle/Lamination Profiles** - Follow Human Machine Interface (HMI) screen prompts,

based on the program loaded, to enter lamination speed, length, and delay parameters.

4. **Heater Air Flow** - Rotate the flow meter knob clockwise or counterclockwise until the flow rate reaches the desired level.

System Operation

1. On initial power up, if the heater assembly is not in the “home” position the HMI will display the prompt “PRESS START TO RESET”. Ensure the main door is closed and depress the start switch to reset the system.
2. Once reset, the HMI will display the prompt “PRESS YES TO ACCESS PARAMETERS, NO TO CONTINUE” If yes is depressed, system parameters will be accessed. If NO is selected, the system will run the last entered values, even after a power cycle.
3. If YES selected;
 - 3.1. “Traverse Delay”; this parameter will delay the heater nozzle from traversing for the duration entered in seconds.
 - 3.2. “Laminate speed” Zone 1-4; this parameter will determine the speed in mm/sec. at which the thermal nozzle will travel along the components.
 - 3.3. “Laminate Length” Zone 1-4; this parameter will determine the length in mm that the thermal nozzle will travel along the components.
3. Load product between the product grips and activate the grips.
4. Close the main door and depress the START switch. The thermal nozzle will extend to the product, remain at the start position for the set delay duration then traverse along the parts.
5. Upon return to the start position (home), open the main door and depress the START switch.
6. Deactivate the grips and remove the product.

Maintenance

Note: Perform these steps ONLY when the thermal nozzle is at room temperature.



Figure 3. Thermal Nozzles

1. Exchanging Thermal Nozzle(s)

- 1.1. Loosen the set screw at the top of the nozzle adapter.

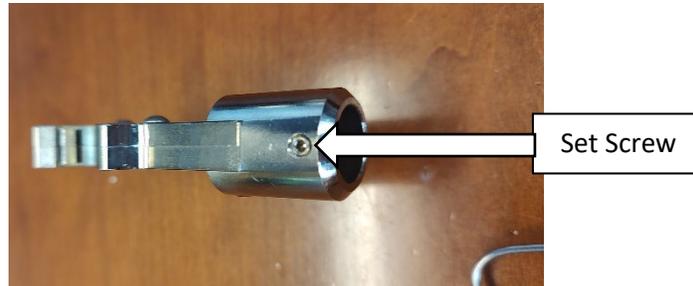


Figure 4. Nozzle set screw

- 1.2. Slide the nozzle while simultaneously removing the thermocouple connector.

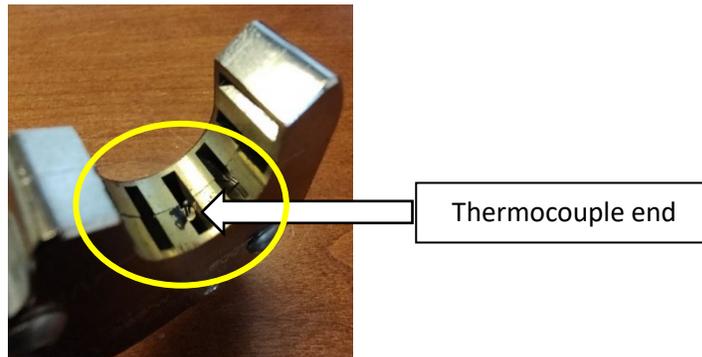


Figure 5. Thermocouple tip

- 1.3. Install the replacement nozzle/thermocouple connector.
- 1.4. Tighten the set screw in the adapter.

2. Exchanging Grip Heads

- 2.1. Remove the fasteners in each grip head.
- 2.2. Replace the grip head with the alternate.
- 2.3. Reinstall the mounting fasteners.

3. Aligning Tooling

Note: Alignment should be performed on a prepared product subassembly.

Alignment MUST be performed with system power off.

Alignment MUST be performed with heads at ambient temperature.

Alignment MUST be performed on a flat and reasonably level surface.

- 3.1. Place a lamination subassembly within the proximal and distal grip assemblies.
- 3.2. Adjust the Vee guide and each grip such that the lamination subassembly is centered within the nozzle opening.

4. System Specifications:

	Description	Range	Resolution	Accuracy
4.1.	Temperature	200-750° F	1.0 deg.	+/-0.75% F.S.
4.2.	Speed	.16-20mm/sec.	0.1mm/sec.	+/-5%
4.3.	Length	1-XXXmm	1.0mm	+/-0.8mm/100mm
4.4.	Pressure	0-100 psi	2.0 psi	+/-3.5% F.S.
4.5.	Heater Flow	5-50 SCFH	5.0 SCFH	+/-7% F.S.

Table 2. System Specifications

5. Calibration

IMPORTANT NOTES:

- Calibration should be performed by a certified service, preferably with the system in the location of use. Calibration procedures are the domain of these service providers.
- Calibration refers to the process of verifying that each of the systems' instruments that controls a process parameter is within specification.
- Calibration DOES NOT refer to the process of measuring the temperature at the center of the thermal nozzle and "matching" the value to the temperature controller set point.
- The measured value at the thermal nozzle will rarely match the temperature controller set point and the delta will increase towards the center of the nozzle.
- For temperature stability verification it is recommended that the air be measured .062"-.093" from the exit point of one of the flow ports. Stability should be +/-2.0 Degrees over one hour or at a minimum over the duration of a typical process cycle (customer/product specific)
- Flow meters must be verified vs. calibrated since they cannot be adjusted if out of manufacturers specifications.
 - 5.1. Calibrate the temperature controller annually.
 - 5.2. Calibrate the pressure gauge annually.
 - 5.3. Verify the actuator speed and distance annually.
 - 5.4. Verify the heater air flow meter annually.

6. Tuning Temperature Controller (3216e)

Note: Auto-tuning can be performed at any temperature set point within the system operating specifications. This machine needs to be auto tuned at the temperature and air flow that your product will be processed at.

- 6.1. Ensure heater power is off and heater is at room temperature.
- 6.2. Enter the process temperature setpoint using the ▼ or ▲ buttons.
- 6.3. Press ⏻ until **R.TUN** is displayed.
- 6.4. Press ▼ or ▲ to select **On**.
- 6.5. Press ⏻ **to begin the auto tune process.**
- 6.6. **Turn heater power ON.**

Please note, after following this sequence, auto tune can take several minutes to start and complete.

Equipment User Manual

A full description of auto-tune and the purpose of other parameters in the level 2 list is given in the 3200 Manual located online at <https://www.eurotherm.com/download/3200-engineering-manual-ha028651-iss-15/>

Switching from Fahrenheit to Celsius

If the system is equipped with the Eurotherm model 3216, use the following instructions:

- a. Press and hold the page button (left most) until Lev 1 appears.
- b. Press up arrow to Lev 2 appears.
- c. Press scroll to code 0.
- d. Press up arrow key for code 2.
- e. Press scroll button until units appear.
- f. Press up or down arrow key to select C.

7. Critical Spare Parts (contact Machine Solutions for current price and delivery)

Item	P/N	Description
7.1.	1150440-001	Temperature controller
7.2.	1148103-001	Drive/controller
7.3.	1148096-001	HMI Keypad
7.4.	1131433-001	Heater SCR
7.5.	110254-001	Heater
7.6.	1330445-003	4-way valve

Table 3. Critical Spare Parts

8. Diagnostics (Troubleshooting)

	Issue	Possible Causes	Solution
8.1.	Temperature not stable	Thermal Nozzle replaced. Thermocouple loose	Auto-tune Re-install thermocouple
8.2.	S.br	Sensor Break Thermocouple not installed	Determine break and repair Install thermocouple
8.3.	No heat at nozzle	Heater air flow too low Defective heating element Defective power control	Increase air flow Replace heating element. Contact Beahm Designs
8.4.	.Err code in display	Temperature controller software failure	Replace temperature controller
8.5.	System will not power on	Emergency stop switch depressed. IEC power cord not fully connected	Rotate switch knob to engage. Verify installation

Table 4. Diagnostics

9. Facility Requirements

- 9.1. Voltage: 108-242 VAC 50/60 Hz.
- 9.2. Wattage: 500 max.
- 9.3. Compressed Air: 60-125 psi, 0.83 CFM, filtered 50 micron or greater, oil and water free.

Schematics

Refer to the Thumb drive for copies of the schematic.

Warranty and Servicing

Beahm Designs Inc. (BDI) products are backed by a 1-year warranty on parts and labor. Warranty is void for any product returned if BDI determines that:

1. The asserted defect is not present.
2. The asserted defect is attributed to misuse, improper installation, alteration (label removal and/or destruction, opening or removing external covers without authorization by Beahm Designs Inc.), mishandling and/or mishaps.
3. The product was not sold to customer as new.

Return Material Authorization

Product may not be returned to Beahm Designs Inc. without first contacting BDI Aftermarket for a Return Material Authorization (RMA) number. If it is determined that the Product may be defective, you will be given an RMA number and instructions for Product return. End Users are required to include a copy of the RMA receipt inside the return box, in order to receive replacement product under the warranty. All unauthorized returns i.e., one for which an RMA number has not been issued, will be returned at the customers expense. To request an RMA, please contact us at [928-556-3109](tel:928-556-3109) or email info@machinesolutions.com

For additional information on Beahm Designs, Hot Air Systems, please visit <http://machinesolutions.com/our-products/>

Component Data Sheets

A full description of the 3200 Series PID Temperature Controllers and the purpose of other parameters in the level 2 list is given in the 3200 Manual located online at <https://www.eurotherm.com/download/3200-engineering-manual-ha028651-iss-15/>