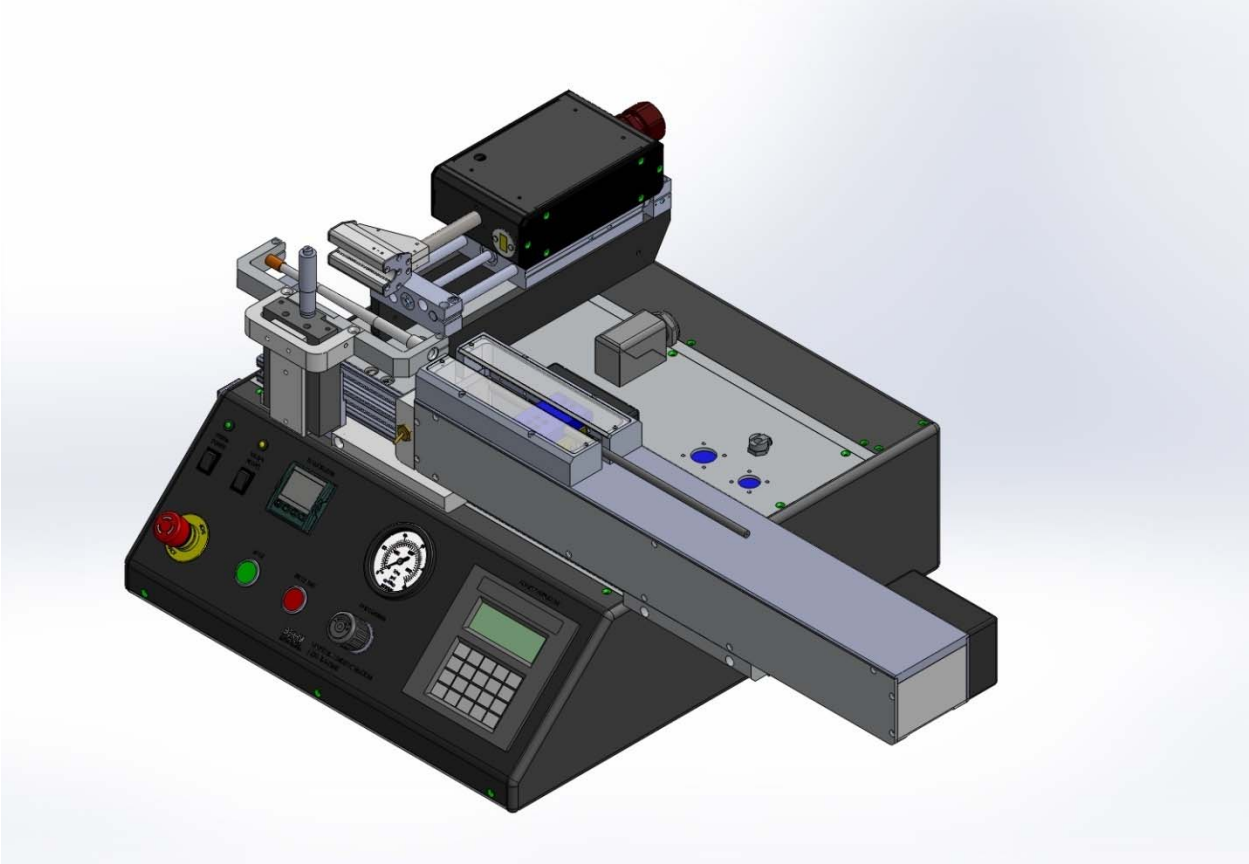
# Model 510-A Tipping System#



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## Section 1: Overview

The Beahm Designs Inc. Model 510-A is a system for the purpose of thermo-forming the ends of thermoplastic tubing's and materials by advancing the material into a heated tooling. Once the material is loaded on the system all process parameters are controlled by the system.

## Section 2: Contents

Included with the system are the following contents;

2.1 Tipping system
2.2 IEC Power Cord
2.3 Compressed Air Supply Hose Assembly

## Section 3: Installation

**Note: See Maintenance section for facilities requirements**

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

## Section 4: Set Up and Configuration

Considerable differences exist between the set up of each application based on tipping die type, material and size as well as material to be tipped. The following instructions are provided as guidelines and the actual set up may differ based on experimentation and refinement in order to attain the most efficient process.

### 4.1 Fundamentals of set up

#### 4.1.1 Tipping Die Mounting

The standard die tooling is designed to constrain the die between two bushings, one at each end of the die. The bushings are then clamped by the tooling mount bracket. This configuration provides a convenient means to mount many die configurations and materials with minimal tooling cost and avoids special flange requirements on the die.

#### 4.1.2 Grip Positioning

The material insertion stage can be adjusted along the main tooling rail to allow the grip assembly to accommodate various product configurations, tipping die toolings and/or grip head styles. Typically the grips should be positioned as close to the entrance of the tipping die to minimize compression of the material during the insertion step.

#### 4.1.3 Grip Heads

The standard grip heads feature flat, silicone faced surfaces and are effective for most mid to low durometer materials. Larger diameters and higher durometers may require contoured grips in conjunction with the optional high force grip pneumatics.

#### 4.1.4 Tipping Die Positioning

The die mount assembly can be adjusted along the tooling rail and allows for the thermal nozzle to engage the die for optimal heating of the material to be tipped.

**4.5 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.

Installation instructions are included with each specific accessory.

## Section 5: Controls and Features

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

| | Description | Function |
|---|---|---|
| 5.1 | **Main power switch** | Toggles system power and air on and off. |
| 5.2 | **Power on indicator** | Indicates when system power on by illuminating, off when not illuminated. |
| 5.3 | **Start switch** | Initiates process sequence. |
| 5.4 | **Stop/Reset switch** | Interrupts the process sequence and resets the system timer. |
| 5.5 | **Temperature Controller** | Controls the temperature of the material forming. |
| 5.6 | **Parameter Keypad** | Used to enter process parameters other than temperature and pressure. |
| 5.7 | **Pressure regulator** | Regulates the pressure of the die head actuation cylinder. |
| 5.8 | **Pressure gauge** | Displays the pressure applied to the die head actuation cylinder. |

## Section 6: Parameter Settings

**6.1 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.

6.1.1 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.

**6.2 Insertion Depth**

This is the distance that the material will be inserted into the tipping die tooling.

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

**6.3 Insertion Speed**

This is the speed that the material is advanced into the tipping die tool to form the required geometry.

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

**6.4 Pre-Heat/Insertion Delay Duration**

This is the duration of time that the thermal nozzle heats the die and material prior to insertion.

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

6.4.2 Key in the value and depress ENTER on the keypad.

**6.5 Heat Soak Duration**

This parameter holds the thermal nozzle in place to heat the die and material after insertion is complete.

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

6.5.2 Key in the value and depress ENTER on the keypad.

**6.6 Post Insertion Length (optional)**

This parameter is custom to specific product configurations and is intended to add extra insertion force during the cooling cycle to reduce or eliminate the occurrence of voids.

6.6.1 On power up or after depressing the STOP/RESET switch select YES on the HMI keypad and this will be the fifth parameter displayed.

6.6.2 Key in the value and depress ENTER on the keypad.

**6.7 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.

6.7.1 On power up or after depressing the STOP/RESET switch select YES on the HMI keypad and this will be the sixth parameter displayed.

6.7.2 Key the value and depress ENTER on the keypad.

**6.7 Adjusting Grip Head Pressure**

6.7.1 Rotate the regulator know clockwise or counterclockwise until the pressure gauge displays the desired value.

## Section 7: System Operation

7.1 Pass the material through the grip heads and into the tipping die until resistance is met.

7.2 Toggle the grip switch to close the grips and secure the material.

7.3 Depress the START switch.

7.4 Upon completion of the process cycle, remove the material from the tipping die tool and grips.

## Section 8: Maintenance

**Note: Perform these steps ONLY when the tooling is at room temperature.**

**8.1 Exchanging tipping die**

8.1.1 Loosen the distal die bushing clamp fastener.
8.1.2 While holding the tipping die, slide the bushing away from the die.
8.1.3 Slide the die out of the proximal bushing.

**8.2 Exchanging Die Tooling Assembly**

8.2.1 Remove the two fasteners at the front of the "U-Bracket"
8.2.2 Slide the assembly upwards.

**8.3 Exchanging Grip Heads**

8.3.1 Remove the 4 ea. Fasteners from each grip head.
8.3.2 Replace grip heads with alternates.
8.3.3 Re-install all fasteners.

**8.4 Exchanging thermal Nozzles**

8.4.1 Loosen the set screw at the top of the nozzle adapter.
8.4.2 Simultaneously slide the thermal nozzle and thermocouple connector forward.
8.4.3 Slide the alternate nozzle over the heater tube while simultaneously inserting the thermocouple connector into the jack.

**8.3 Aligning Tooling**

**Note: Alignment MUST be performed with system power off and the thermal nozzle at ambient temperature.**
**Alignment must be performed on a flat and reasonably level surface.**

8.3.1 Loosen the two fasteners securing the die tooling assembly to the tooling rail.
8.3.2 Loosen the two fasteners securing the material thrust assembly to the tooling rail.
8.3.3 Manually slide the thermal nozzle fully forward.
8.3.4 Adjust the die tooling assembly left or right until the nozzle aligns with the form area of the die. Secure the two fasteners.
8.3.5 Adjust the Z-Axis of the die tooling such that the die is centered within the thermal nozzle.
8.3.6 Adjust the thruster assembly such that the grip shields are within .25" of the die tooling. Secure the two fasteners.

**8.4 System Specifications**

| | Description | Range | Resolution | Accuracy |
|---|---|---|---|---|
| 8.4.1 | Temperature | 70-750° F | 1.0 deg. | +/-.25% F.S. |
| 8.4.2 | Insertion Depth | .1-25.0mm | 0.1mm | +/- 0.1mm |
| 8.4.3 | Insertion Speed | .1-15mm/sec. | 0.1mm | +/-0.1mm |
| 8.4.4 | Pre-Heat Duration | 1-59 sec. | 1.0 sec. | +/-0.1 sec. |
| 8.4.5 | Heat Soak Duration | 1-360 seconds | 1.0 sec. | +/- 0.1 sec. |
| 8.4.6 | Post Insertion Length | 0-5mm | 0.1 mm+/- | +/- 0.1mm |
| 8.4.7 | Post Insertion Speed | 0.2-10mm/sec. | 0.1 mm | +/-0.1mm/sec |
| 8.4.8 | Cool Duration | 1-360 seconds | 1.0 sec. | +/- .1 sec. |
| 8.4.9 | Die Pressure | 0-60 psi | 2.0 psi | +/-1.5% F.S. |

**8.5 Calibration**

**IMPORTANT NOTES;**

- **A) It is recommended that calibration be performed by a certified service, preferably with the system in the location of use. Calibration procedures are the domain of these service providers.**
- **B) Calibration refers to the process of verifying that each of the systems' instruments that control a process parameter is within manufacturers' specification.**
- **C) Calibration DOES NOT refer to the process of measuring the temperature at the center of the tooling and "matching" the value to the temperature controller set point.**
- **D) The measured value at the tooling may not match the temperature controller set point and the.**

8.5.1 Calibrate the temperature controller annually.
8.5.2 Calibrate the thruster parameters annually.
8.5.3 Calibrate the pressure gauge annually.

**8.6 Tuning Temperature Controllers (Eurotherm Model 3216e)**

**Note; Auto tuning can be performed at any temperature set point within the system operating specifications however best results are attained at temperatures about 300 Deg. F**

8.6.1 Depress the "SCROLL" button until "ATUN" appears.
8.6.2 Depress the "UP" arrow button until "ON" appears.
8.6.3 Tune sequence will begin automatically in 60 seconds.
8.6.4 The system will resume standard operation automatically upon completion of tune sequence. No further action is required. If fluctuation persists contact technical support.

**8.7 Critical Spare Parts (contact Beahm Designs for current Price and delivery)**

| Item | P/N | Description |
|---|---|---|
| 8.7.1 | 5002 | 4-WAY VALVE 24 VDC |
| 8.7.2 | 5125 | GRADE A GAUGE |
| 8.7.3 | 5478 | 2-way pneumatic valve |
| 8.7.4 | 5478 | 3-way pneumatic valve |
| 8.7.5 | 5038 | Solid state relay |
| 8.7.6 | 5502 | PLC |
| 8.7.7 | 5055 | DPDT Relay |
| 8.7.8 | 5057 | 4PDT Relay |
| 8.7.9 | 5347 | Temperature Controller |
| 8.7.10 | 5053 | Heating element |
| 8.7.11 | 5138 | Proximity Sensor |

**8.8 Diagnostics (Troubleshooting)**

| | Issue | Possible Causes | Solution |
|---|---|---|---|
| 8.8.1 | Temperature not stable | Nozzle has been replaced | Auto-tune<br>Re-install thermocouple(s) |
| 8.8.2 | S.br | Sensor Break<br>Extension wire disconnected. | |
| | | | |
| 8.8.3 | Blank HMI screen | HMI malfunction<br>PLC malfunction | Replace HMI<br>Replace PLC |
| 8.8.4 | .Err code in display | Temperature controller software failure. | Replace temperature controller. |

| | | | |
|---|---|---|---|
| 8.8.5 | System will not power on. | Emergency stop switch depressed.<br>IEC power cord not fully connected. | Rotate switch knob to engage.<br>Verify installation. |

**8.9 Facilities Requirements**

| | | |
|---|---|---|
| 8.9.1 | Voltage: | 108-132 VAC 50/60 Hz. |
| 8.9.2 | Wattage: | 500 max. |
| 8.9.3 | Compressed Air: | 60-125 psi, 0.5 CFM, filtered 50 micron or greater, oil and water free |

## Section 9: Warranty

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:

9.1 The asserted defect is not present,

9.2 The asserted defect is attributable to misuse, improper installation, alteration (including removing or obliterating labels and opening or removing external covers (unless authorized to do so by Beahm Designs), accident or mishandling while in the possession of someone other than Beahm Designs, Inc.

9.3 The Product was not sold to you as new.

**Return Material Authorization (RMA)**

No Product may be returned directly BDI without first contacting BDI 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 to receive replacement product under warranty. An unauthorized return, i.e. one for which an RMA number has not been issued, will be returned to you at your expense. To request an RMA, please call 408-395-5360 or email info@beahmdesigns.com