MACHINE SOLUTIONS INC.

USER MANUAL

BEAHM DESIGNS SPLIT DIE THERMAL BONDER

MODEL 320-B

BEAHM DESIGNS

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Welcome

Machine Solutions, Inc. (MSI) would like to take this opportunity to thank you for purchasing your new 320-B Split Die Thermal Bonder machine. 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.

Purpose

The purpose of this document (*Original Instructions)* is to describe the electrical and software design of the control system for the Split Die Thermal Bonder, 320-B. This document also includes operator instructions.

Overview

The Beahm Designs Inc. Model 320-B Split Die Thermal Bonder is a system for the purpose of thermal bonding or welding thermoplastic components to other materials by means of a pair of heated dies. The system features two die heads that remain at a constant process temperature vs. cycling the heat on and off. Each die head features one half of the bond diameter and are "opened" or separated from each other to allow the components to be positioned within the bored diameter. Digital timers control the bond and cool durations and integrated tooling secure the components during the process.

Contents

Included with the system are the following contents:

- Die Base and Control Unit
- IEC Power cord
- Compressed Air Supply Hose Assembly

Installation

1. Place the system on a level, sturdy surface at an ergonomically viable height for the user.
2. Connect the electrical and pneumatic umbilical's to the die base unit.
3. Connect the power cord to the main unit.
4. Connect the air supply to the system and then to a clean, dry, and filtered compressed air source.

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).
- Die jaws 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 the equipment other than as prescribed. 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 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.

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.

Set Up and Configuration

Proper sizing of the die heads 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 the recommended guidelines.

Die Head Diameter - In most applications, the bore of the die heads should be in contact with the heat shrink or other protecting sleeve covering the bond area.
A .002”-.003” interference is usually sufficient.

Use the following steps to determine the bore diameter.

1. Assemble the components to be bonded.
2. Install the protective sleeve over the bond area.
3. If using heat shrink, then pre-shrink the sleeve.
4. Measure the diameter at the bond area.
5. Subtract .002”-.003” from this measurement.
6. Bore this diameter through the die heads.

Refer to Appendix for die head sizing.

Die Head Width - The die head width can vary greatly between applications and especially between butted (Butt) joints and overlap (Lap) joints. Since the 320-B is most used for Lap Joints the die head width should be sized equal or slightly greater than the length of the overlap of the materials.

Grip/Positioning Nests - This is the most forgiving of the tooling. The included, standard vee configurations are more than adequate for most applications. More important than the guide design and dimensions is alignment with the die heads. Refer to the maintenance section for the alignment procedure.

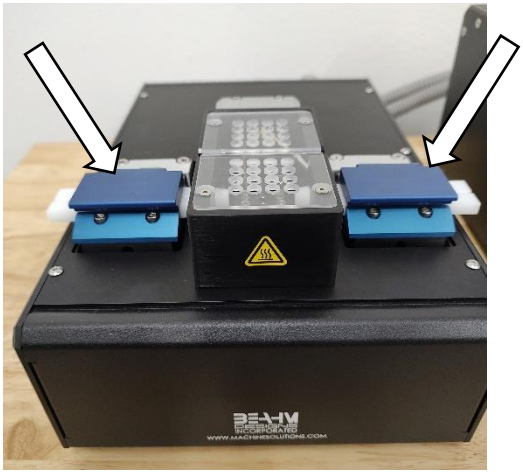

Figure 1. Grip/Positioning nests

System Controls and Functions

Located on the front and back panels of the Split Die Thermal Bonder are the following controls and/or displays and their functions:

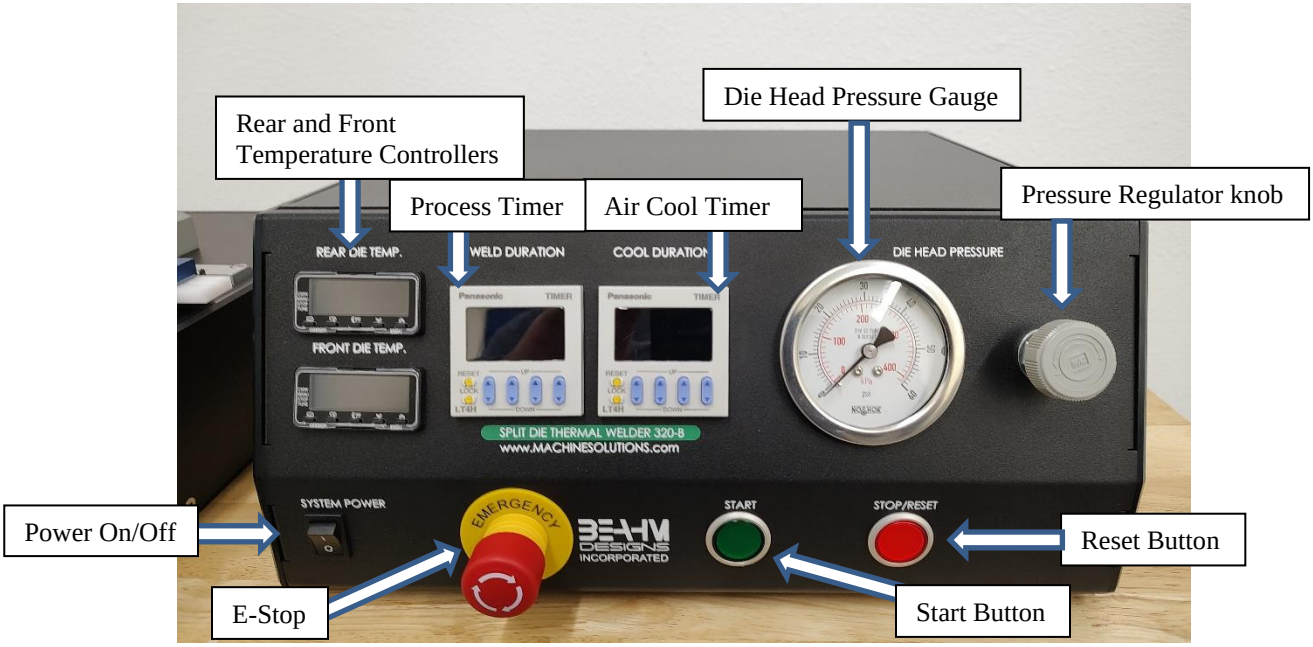

Figure 2. 320-B Split Die Thermal Bonder Front Panel

Description	Function
Main power switch	Toggles system power and air on and off.
Start switch	Initiates process sequence.
Stop/Reset switch	Interrupts the process sequence and resets the system timer.
Front Die temperature controller	Controls the temperature of the front die head.
Rear Die temperature controller	Controls the temperature of the rear die head.
Heat Duration Timer	Controls the duration that the die heads are closed and/or in contact with the product.
Cool Duration Timer	Controls the duration the cooling air flows
Die head pressure regulator	Regulates the pressure of the die head actuation cylinder.
Die head pressure gauge	Displays the pressure applied to the die head actuation cylinder.

Table 1. Control and Display Functions (Front)

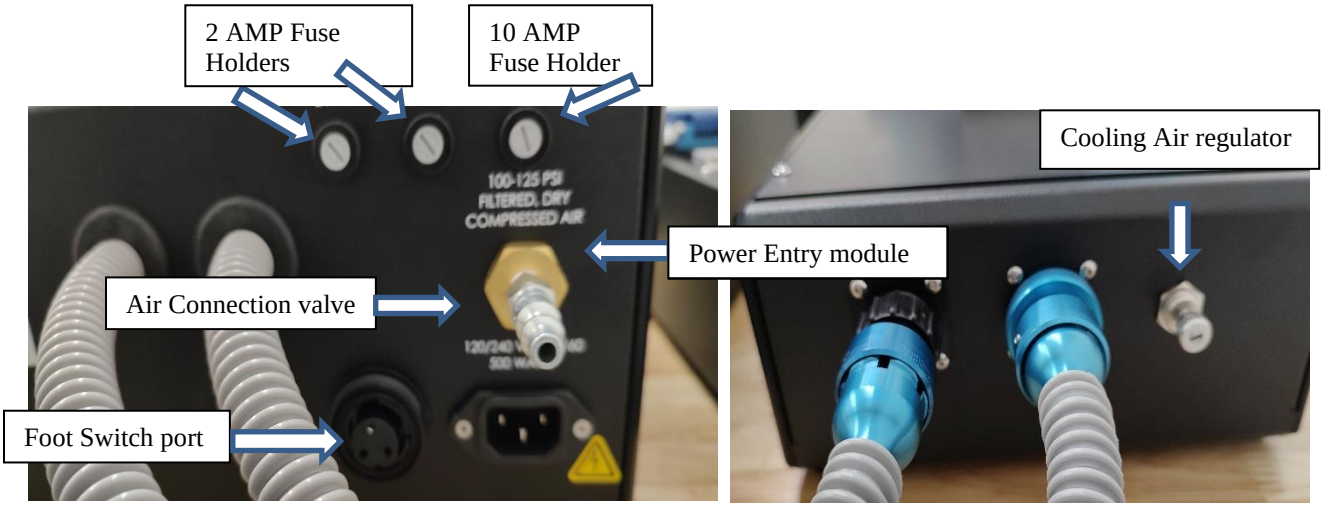

Figure 3 320-B Split Die Thermal Bonder Back Panel

Description	Function
Power Entry Module	Connects to power cord
Industrial System Air Connection	Controls system air supply.
Foot Switch	Allows connection to foot pedal.
Two 10 Amp Fuse Holders	Protects power distribution
Cooling Air Regulator	Control flow of cooling air.

Table 2. Control and Display Functions (Back)

Parameter Settings

1. **Temperature Controller – (Optional Eurotherm Temperature Controller)**
   - 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.
   - Set the die temperature on EACH temperature controller by pressing the UP/Down arrow key once to display the set temperature, then again to change it.

Refer to System Operation for instructions on Omega Temperature Controller.

2. **Setting Heat Duration** - Depress the upper or lower half of the corresponding time digit change its value. Depress the STOP/RESET switch to reset the timer to the new value.

3. **Setting Cool Duration** - Depress the upper or lower half of the corresponding time digit change its value. Depress the STOP/RESET switch to reset the timer to the new value.

4. **Adjusting Die Pressure** - Rotate the regulator knob clockwise or counterclockwise until the pressure gauge displays the desired value.

System Operation

Temperature Controllers (Omega Platinum Model)

Please note, the Omega temperature controllers have been auto tuned and are set for optimal performance. Contact Beahm Designs for further diagnostics and instructions.

PID Configuration (PRoG > PId.S)

	Navigate to the desired setting. Settings include the following: • ACtN – Action direction moves up or down to SP1. • A.to – Autotuning Timeout sets a maximum amount of time for Autotuning. • AUto – Initiates Autotuning • GAIN – Select the proportional, integral, and derivative factors for manual tuning. • %Lo – Low clamping limit for Pulse and Analog outputs • %HI – High clamping limit for Pulse and Analog outputs • AdPt – Fuzzy logic adaptive tuning
	Select the desired parameter.

Action Response (PRoG > PId > ACtN)

	Select the Direction (ACtN) parameter.
	Navigate to the desired setting. Settings include the following: • RVRS – "Reverse Action": Increase to SP1, such as heating (factory default) • dRCt – "Direct Action": Decrease to SP1, such as cooling • RVRS/dRCt – Increase or Decrease to SP1, such as heating/cooling
	Select the indicated setting.

Autotune Timeout (PRoG > PId > A.to)

	Select the Autotune Timeout (A.to) parameter.
	Set the amount of time before the Autotune process gives up and times out in Minutes and Seconds (MM.SS). Slowly responding systems should have a longer time-out setting.
	Select the indicated setting.

Autotune (PRoG > PId > TUNE)

↵	Select the Autotune (AUto) command. The unit displays StRt.
↵	Confirm Autotune activation. The unit attempts to optimize the P, I, and d settings by stimulating the system and measuring the response. If the A.to time out period expires before the Autotune operation can complete, the unit displays a failure message E007. If the Autotune operation completes successfully, the unit displays the message “doNE” and the Run mode is switched to IDLE.

The Autotune function will select the tuning algorithm depending on the stability of current process and the error difference between current process and the Control Setpoint (SP1). If the process is relatively stable (i.e: at room temperature), a bump test will be performed to determine the plant characteristics.

If the process is hot, or if the process is within 10% of Control Setpoint, limit cycle oscillation will be performed with the tuning setpoint taken at the process value when the Autotune function is triggered. Autotuning may be performed as many times as needed or when the operating conditions (i.e: process load, or setpoint) have changed significantly. To obtain good tuning results, ensure the process is stable prior to triggering autotune function. The process is stable when it is at ambient temperature, or it is tracking Control Setpoint (SP1) in auto mode.

Adjusting Temperature on Controllers (Omega Platinum Model)

1. Press the right arrow button one time until “SP-1” is displayed. ▶
2. Press the enter button to access the temperature screen. ↵
3. Use the left and right arrow buttons to set desired temperature. ◀ ▶
4. Once the desired temperature is set, press the enter button to return to the main screen. ↵ Heaters will ramp to correct temperature.

Temperature Controller Layout and Description of Button Actions

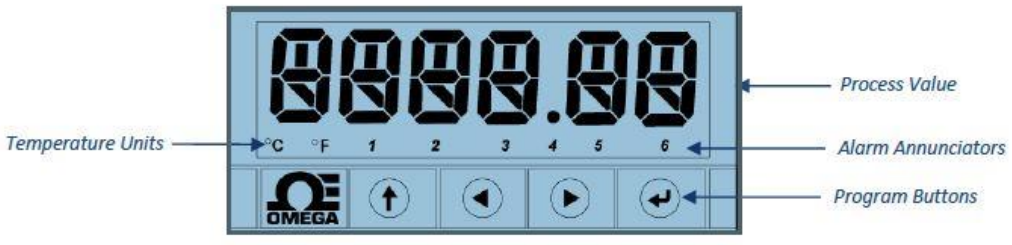

Figure 4: Controller Layout

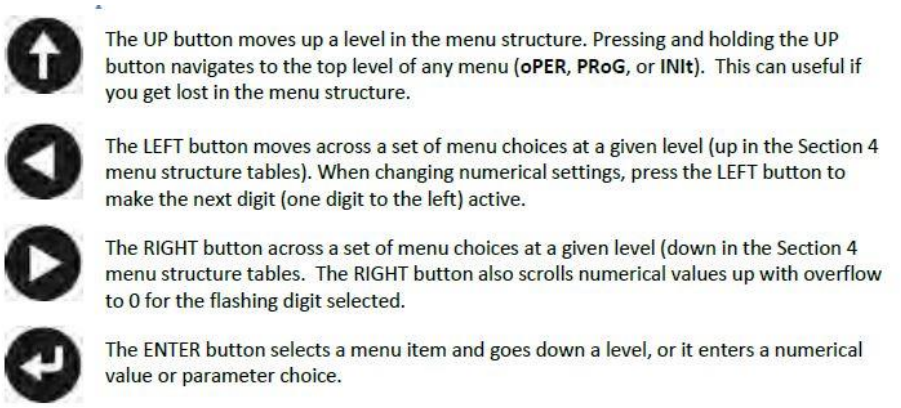

Figure 5: Description of Button Actions

NOTE: For a more detailed look at the complete menu structure, please refer to the following pages. A full description of features can be found here: https://assets.omega.com/manuals/M5451.pdf.

Resetting the temperature controller

NOTE: Press '↑' to select the operator menu (Oper)
NOTE: See the following chart for the correct settings for the Beahm 320B. Settings to change in RED.

1. Initialization Mode Menu (INIt)
    a. The following table maps the Initialization Mode (INIt) navigation:

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
INPt	t.C.	k					Type K thermocouple
		J					Type J thermocouple
		t					Type T thermocouple
		E					Type E thermocouple
		N					Type N thermocouple
		R					Type R thermocouple
		S					Type S thermocouple
		b					Type B thermocouple
		C					Type C thermocouple
	Rtd	N.wIR	3 wI				3-wire RTD
			4 wI				4-wire RTD
			2 wI				2-wire RTD
		A.CRV	385.1				385 calibration curve, 100 Ω
			385.5				385 calibration curve, 500 Ω
			385.t				385 calibration curve, 1000 Ω
			392				392 calibration curve, 100 Ω
			391.6				391.6 calibration curve, 100 Ω
	tHRM	2.25k					2250 Ω thermistor
		5k					5000 Ω thermistor
		10k					10,000 Ω thermistor
	PRoC	4–20					Process input range: 4 to 20 mA
			Note: This Manual and Live Scaling submenu is the same for all **PRoC** ranges.				
			MANL	Rd.1	____		Low display reading
				IN.1	____		Manual input for Rd.1
				Rd.2	____		High display reading
				IN.2	____		Manual input for Rd.2
			LIVE	Rd.1	____		Low display reading
				IN.1	____		Live Rd.1 input, ENTER for current
				Rd.2	____		High display reading
				IN.2	____		Live Rd.2 input, ENTER for current
		0–24					Process input range: 0 to 24 mA
		+-10					Process input range: -10 to +10 V
			Note: +- 1.0 and +-0.1 support SNGL, dIFF and RtIO **tYPE**				
		+-1	tYPE	SNGL			Process input range: -1 to +1 V

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
				dIFF			Differential between AIN+ and AIN-
				RtLO			Ratiometric between AIN+ and AIN-
		+-0.1					Process input range: -0.1 to +0.1 V
			Note: The +- 0.05 input supports dIFF and RtIO **tYPE**				
		+-.05	tYPE	dIFF			Differential between AIN+ and AIN-
				RtLO			Ratiometric between AIN+ and AIN-
							Process input range: -0.05 to +0.05 V
tARE	dSbL						Disable tARE feature
	ENbL						Enable tARE on oPER menu
	RMt						Enable tARE on oPER and Digital Input
LINR	N.PNt	____					Specifies the number of points to use
			Note: The Manual / Live inputs repeat from 1..10, represented by *n*				
	MANL	Rd.*n*	____				Low display reading
		IN.*n*	____				Manual input for Rd.*n*
	LIVE	Rd.*n*	____				Low display reading
		IN.*n*	____				Live Rd.*n* input, ENTER for current
RdG	dEC.P	FFF.F					Reading format -999.9 to +999.9
		FFFF					Reading format -9999 to +9999
		FF.FF					Reading format -99.99 to +99.99
		F.FFF					Reading format -9.999 to +9.999
	°F°C	°C					Degrees Celsius annunciator
		°F					Degrees Fahrenheit annunciator
		NoNE					Turns off for non-temperature units
	d.RNd	____					Display Rounding
	FLtR	8					Readings per displayed value: 8
		16					16
		32					32
		64					64
		128					128
		1					2
		2					3
		4					4
			Note: Four digit displays offer 2 annunciators, Six digit displays offer 6				
	ANN.*n*	ALM.1					Alarm 1 status mapped to "1"
		ALM.2					Alarm 2 status mapped to "1"
		oUt#					Output state selections by name
	NCLR	GRN					Default display color: Green
		REd					Red

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
		AMbR					Amber
	bRGt	HIGH					High display brightness
		MEd					Medium display brightness
		Low					Low display brightness
ECtN	5 V						Excitation voltage: 5 V
	10 V						10 V
	12 V						12 V
	24 V						24 V
	0 V						Excitation off
CoMM	USb						Configure the USB port
		Note: This **PRot** submenu is the same for USB, Ethernet, and Serial ports.					
		PRot	oMEG	ModE	CMd		Waits for commands from other end
					CoNt	____	Transmit continuously every ###.# sec
				dAt.F	StAt	No	
						yES	Includes Alarm status bytes
					RdNG	yES	Includes process reading
						No	
					PEAk	No	
						yES	Includes highest process reading
					VALy	No	
						yES	Includes lowest process reading
					UNIt	No	
						yES	Send unit with value (F, C, V, mV, mA)
				_LF_	No		
					yES		Appends line feed after each send
				ECHo	yES		Retransmits received commands
					No		
				SEPR	_CR_		Carriage Return separator in **CoNt**
					SPCE		Space separator in **CoNt** Mode
			M.bUS	RtU			Standard Modbus protocol
				ASCI			Omega ASCII protocol
		AddR	____				USB requires Address
	EtHN	PRot					Ethernet port configuration
		AddR	____				Ethernet "Telnet" requires Address
	SER	PRot					Serial port configuration
		C.PAR	bUS.F	232C			Single device Serial Comm Mode
				485			Multiple devices Serial Comm Mode
			bAUd	19.2			Baud rate: 19,200 Bd

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
				9600			9,600 Bd
				4800			4,800 Bd
				2400			2,400 Bd
				1200			1,200 Bd
				57.6			57,600 Bd
				115.2			115,200 Bd
			PRty	odd			Odd parity check used
				EVEN			Even parity check used
				NoNE			No parity bit is used
				oFF			Parity bit is fixed as a zero
			dAtA	8bIt			8 bit data format
				7bIt			7 bit data format
			StoP	1bIt			1 stop bit
				2bIt			2 stop bits gives a "force 1" parity bit
		AddR	____				Address for 485, placeholder for 232
SFty	PwoN	RSM					RUN on power up if not previously faulted
		wAIt					Power on: **oPER** Mode, ENTER to run
		RUN					RUN's automatically on power up
	RUN.M	dSbL					ENTER in **Stby, PAUS, StoP** runs
		ENbL					ENTER in modes above displays RUN
	SP.LM	SP.Lo	____				Low Setpoint limit
		SP.HI	____				High Setpoint limit
	SEN.M						Sensor Monitor
		LPbk	dSbL				Loop break timeout disabled
			ENbL				Loop break timeout value (MM.SS)
		o.CRk	ENbl				Open Input circuit detection enabled
			dSbL				Open Input circuit detection disabled
		E.LAt	ENbl				Latch sensor error enabled
			dSbL				Latch sensor error disabled
	OUT.M						Output Monitor
		oUt1					**oUt1** is replaced by output type
			o.bRk				Output break detection
				dSbL			Output break detection disabled
				ENbl	P.dEV	____	Output break process deviation
					P.tME	____	Output break time deviation
		oUt2					**oUt2** is replaced by output type
		oUt3					**oUt3** is replaced by output type
		E.LAt	ENbl				Latch output error enabled

Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Notes
			dSbL				Latch output error disabled
t.CAL	NoNE						Manual temperature calibration
	1.PNt						Set offset, default = 0
	2.PNt	R.Lo					Set range low point, default = 0
		R.HI					Set range high point, default = 999.9
	ICE.P	ok?					Reset 32°F/0°C reference value
		dSbL					Clears the ICE.P offset value
SAVE	____						Download current settings to USB
LoAd	____						Upload settings from USB stick
VER.N	1.00.0						Displays firmware revision number
VER.U	ok?						ENTER downloads firmware update
F.dFt	ok?						ENTER resets to factory defaults
I.Pwd	No						No required password for **INIt** Mode
	yES	____					Set password for **INIt** Mode
P.Pwd	No						No password for **PRoG** Mode
	yES	____					Set password for **PRoG** Mode

2. Programming Mode Menu (PRoG)
   a. The following table maps the Programming Mode (PRoG) navigation:

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
SP1	____				Process goal for PID, default goal for **oN.oF**
SP2	ASbo				Setpoint 2 value can track **SP1**, **SP2** is an absolute value
	dEVI				**SP2** is a deviation value
ALM.1	*Note:* This submenu is the same for all other Alarm configurations.				
	tyPE	oFF			ALM.1 is not used for display or outputs
		AboV			Alarm: process value above Alarm trigger
		bELo			Alarm: process value below Alarm trigger
		HI.Lo.			Alarm: process value outside Alarm triggers
		bANd			Alarm: process value between Alarm triggers
	Ab.dV	AbSo			Absolute Mode; use **ALR.H** and **ALR.L** as triggers
		d.SP1			Deviation Mode; triggers are deviations from **SP1**
		d.SP2			Deviation Mode; triggers are deviations from **SP2**
		CN.SP			Tracks the Ramp & Soak instantaneous setpoint
	ALR.H	____			Alarm high parameter for trigger calculations
	ALR.L	____			Alarm low parameter for trigger calculations
	A.CLR	REd			Red display when Alarm is active

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
		AMbR			Amber display when Alarm is active
		GRN			Green display when Alarm is active
		dEFt			Color does not change for Alarm
	HI.HI	oFF			High High / Low Low Alarm Mode turned off
		oN	____		Offset value for active High High / Low Low Mode
	LtCH	No			Alarm does not latch
		yES			Alarm latches until cleared via front panel
		botH			Alarm latches, cleared via front panel or digital input
		RMt			Alarm latches until cleared via digital input
	CtCL	N.o.			Output activated with Alarm
		N.C.			Output deactivated with Alarm
	A.P.oN	yES			Alarm active at power on
		No			Alarm inactive at power on
	dE.oN	____			Delay turning off Alarm (sec), default = 1.0
	dE.oF	____			Delay turning off Alarm (sec), default = 0.0
ALM.2					Alarm 2
oUt1					**oUt1** is replaced by output type
	Note: This submenu is the same for all other outputs.				
	ModE	oFF			Output does nothing
		PId			PID Control Mode
			ACtN	RVRS	Reverse acting control (heating)
				dRCt	Direct acting control (cooling)
				RV.DR	Reverse/Direct acting control (heating/cooling)
		PId.2			PID 2 Control Mode
			ACtN	RVRS	Reverse acting control (heating)
				dRCt	Direct acting control (cooling)
				RV.DR	Reverse/Direct acting control (heating/cooling)
		oN.oF	ACtN	RVRS	Off when > SP1, on when < SP1
				dRCt	Off when < SP1, on when > SP1
			dEAd	____	Deadband value, default = 5
			S.PNt	SP1	Either Setpoint can be used of on/off, default is SP1
				SP2	Specifying SP2 allows two outputs to be set for heat/cool
		ALM.1			Output is an Alarm using ALM.1 configuration
		ALM.2			Output is an Alarm using ALM.2 configuration
		RtRN	Rd1	____	Process value for oUt1
			oUt1	____	Output value for Rd1
			Rd2	____	Process value for oUt2
			oUt2	____	Output value for Rd2

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
		RE.oN			Activate during Ramp events
		SE.oN			Activate during Soak events
		SEN.E			Activate if any sensor error is detected
		OPL.E			Activate if any output is open loop
	CyCL	____			PWM pulse width in seconds
	RNGE	0-10			Analog Output Range: 0–10 Volts
		0-5			0–5 Volts
		0-20			0–20 mA
		4-20			4–20 mA
		0-24			0–24 mA
oUt2					**oUt2** is replaced by output type
oUt3					**oUt3** is replaced by output type (1/8 DIN can have up to 6)
PId	ACtN	RVRS			Increase to **SP1** (i.e., heating)
		dRCt			Decrease to **SP1** (i.e., cooling)
		RV.DR			Increase or Decrease to **SP1** (i.e., heating/cooling)
	A.to	____			Set timeout time for autotune
	tUNE	StRt			Initiates autotune after StRt confirmation
	GAIN	_P_	____		Manual Proportional Band setting
		_I_	____		Manual Integral Factor setting
		_d_	____		Manual Derivative Factor setting
	rCg	____			Relative Cool Gain (heating/cooling mode)
	oFst	____			Control Offset
	dEAd	____			Control Dead band/Overlap band (in process unit)
	%Lo	____			Low clamping limit for Pulse, Analog Outputs
	%HI	____			High clamping limit for Pulse, Analog Outputs
	AdPt	ENbL			Enable fuzzy logic adaptive tuning
		dSbL			Disable fuzzy logic adaptive tuning
PId.2	*Note:* This menu is the same for PID menu.				
RM.SP	oFF				Use **SP1**, not remote Setpoint
	oN	4–20			Remote analog Input sets **SP1**; range: 4–20 mA
			Note: This submenu is the same for all **RM.SP** ranges.		
			RS.Lo	____	Min Setpoint for scaled range
			IN.Lo	____	Input value for **RS.Lo**
			RS.HI	____	Max Setpoint for scaled range
			IN.HI	____	Input value for **RS.HI**
		0–24			0–24 mA
		0–10			0–10 V
		0–1			0–1 V

Level 2	Level 3	Level 4	Level 5	Level 6	Notes
M.RMP	R.CtL	No			Multi-Ramp/Soak Mode off
		yES			Multi-Ramp/Soak Mode on
		RMt			**M.RMP** on, start with digital input
	S.PRG	____			Select program (number for **M.RMP** program), options 1–99
	M.tRk	RAMP			Guaranteed Ramp: soak SP must be reached in ramp time
		SoAk			Guaranteed Soak: soak time always preserved
		CYCL			Guaranteed Cycle: ramp can extend but cycle time can't
			Note: tIM.F does not appear for 6 digit display that use a HH:MM:SS format		
	tIM.F	MM:SS			"Minutes : Seconds" default time format for R/S programs
		HH:MM			"Hours : Minutes" default time format for R/S programs
	E.ACt	StOP			Stop running at the end of the program
		HOLd			Continue to hold at the last soak setpoint at program end
		LINk	____		Start the specified ramp & soak program at program end
	N.SEG	____			1 to 8 Ramp/Soak segments (8 each, 16 total)
	S.SEG	____			Select segment number to edit, entry replaces # below
			MRt.#	____	Time for Ramp number, default = 10
			MRE.#	oFF	Ramp events on for this segment
				oN	Ramp events off for this segment
			MSP.#	____	Setpoint value for Soak number
			MSt.#	____	Time for Soak number, default = 10
			MSE.#	oFF	Soak events off for this segment
				oN	Soak events on for this segment

3. Operating Mode Menu (oPER)
   a. The following table maps the Operating Mode (oPER) navigation:

Level 2	Level 3	Level 4	Notes
RUN			Normal Run Mode, process value displayed, **SP1** in optional secondary display
SP1	____		Shortcut to change Setpoint 1, current Setpoint 1 value in main display
SP2	____		Shortcut to change Setpoint 2, current Setpoint 2 value in main display
MANL	M.CNt	____	Manual Mode, the RIGHT and LEFT buttons control output, displays **M##.#**
	M.INP	____	Manual Mode, the RIGHT and LEFT buttons simulate the input for testing
PAUS			Pause and hold at current process value, display flashes
StoP			Stop controlling, turn off outputs, process value rotating flash, Alarms remain
L.RSt			Clears any latched Alarms; Alarms menu also allows digital input reset
VALy			Displays the lowest input reading since the **VALy** was last cleared
PEAk			Displays the highest input reading since the **PEAk** was last cleared

Level 2	Level 3	Level 4	Notes
Stby			Standby Mode, outputs, and Alarm conditions disabled, displays Stby
tARE			TARE option - only available if enabled in INPt

Changing Temperature Units on the Omega Temperature Controller

1. Press the up button until “oPER” appears on the screen.
2. Press the right arrow until “1 NI t” appears on the screen. Press enter.
3. Press the right arrow until “RdG” appears on the screen. Press enter.
4. “dEC.P” should be on screen. Press right arrow to show “**°F °C**” on the screen. Press enter.
5. Use arrows to switch from °C to °F. Press enter.
6. Press the up arrow to go back to the “1 NI t” screen. Press the left arrow to go back to “oPER”. Press enter to see “RUN” and press enter again to return to normal operating status.

Run Process

1. Position the components to be processed between the die heads and in the tooling nests.
2. Lower the guide covers onto the product.
3. Depress the start button or foot switch to initiate the process sequence.
4. Upon completion of the cooling cycle, lift the guide covers and remove the assembly.

Maintenance

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

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

Exchanging Die Heads

1. Remove upper heat shields.
2. Loosen the thermocouple set screw in each die head and slide the thermocouple out of each head.
3. Remove the fasteners at the base of each die head and remove the die heads.
4. Position the replacement die heads on the die bases with the thermocouple mounting holes facing away from each other.
5. Re-install the fasteners at the base of each die head, DO NOT tighten the fasteners.
6. Manually close the die heads and ensure that they are aligned left-to-right and, while holding the heads together, tighten the base fasteners**.**
7. Fully insert each thermocouple into each die head and lightly tighten each set screw.
8. Re-install each upper heat shield.

Exchanging Vee Guides

1. Raise the guide cover(s).
2. Remove the two fasteners in the guide/insert and remove the guide/insert.
3. Install the replacement guide/insert.
4. Re-install the mounting fasteners.

Aligning Tooling

NOTE: Alignment should be performed on a prepared product subassembly.
NOTE: 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. Remove the Y-Z axis covers of each vee guide/clamp assembly and the Z-axis cover of the die head assembly.
2. Prepare an assembly.
3. Position the assembly within the vee guide assemblies on either side of the die heads and with the bond area.
4. Leave guide covers open.
5. Carefully close the die heads while observing the alignment with the die head bore.

6. Adjust the Z-axis of the die head assembly as required such that the sub assembly is secured by the dies but slightly above the vee guides/inserts.
7. Adjust the Y-Z axis of each vee guide assembly until each guide comes into contact with the first feature of the subassembly on the corresponding side.
8. Close the guide covers.
9. Manually open and close the die heads and verify alignment.
10. Re-adjust each axis as required to obtain optimum alignment.

Preventative Maintenance

1. Check power cable for damage every 12 months and replace as needed.
2. Check setting of pre-regulator every 12 months.

Operational Requirements

System Specifications

Description	Range	Resolution	Accuracy
Temperature	200-750° F	1.0 deg.	+/-.25% F.S.
Air Flow	20-50 SCFH	5.0 SCFH	+/- 4% F.S.

Table 3: System Specifications

Critical Spare Parts

(Contact Beahm Designs for current Price and delivery)

Part Number	Description
120V – 1153590-001 220V – 1157788-001	Heater Cartridge
1143133-001	Thermocouple
3054593-101	Blank Die Heads (0.5”) (Pair)
1348043-001	Air Pressure Gauge
1161899-001	Temperature Controller
1143311-001	Solid State Relay
1143287-001	Relay, 24 VDC
1343250-001	Valve, 2 Way
1330445-003	Valve, 5-2

Table 4. Critical Spare Parts

Diagnostics (Troubleshooting)

Issue	Possible Causes	Solution
Temperature not stable	Thermal Nozzle replaced. Thermocouple loose	Auto-tune. Re-install thermocouple.
S.br	Break in thermocouple wire/ Thermocouple failure	Verify all connections from controller to remote TC jack. Replace thermocouple
No heat at dies	Defective heating element Defective power control	Replace heating element.
.Err code in display	Temperature controller software failure.	Replace temperature controller.
System will not power on.	IEC power cord not fully connected.	Verify installation.

Table 5. Diagnostics and Troubleshooting

Facility Requirements

- Voltage: 120-240 VAC, 50/60 Hz
- Wattage: 10 amps (500 watts)
- Compressed Air: 100-125 psi, clean dry compressed air

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:

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 you 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, to receive replacement product under warranty. An unauthorized return, 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 or email info@machinesolutions.com.

For additional information on Beahm Designs, Split Die Thermal Bonder, please visit http://machinesolutions.com/our-products/.

Appendix

Die Head Sizing

1. Description: This procedure describes the process of sizing the Thermal Die Head tooling.

2. Tools and Equipment:
   - 2.1 Caliper or micrometer

3. Reference
   - 3.1 Figure A-1, Die Head Sizing
   - 3.2 Drawing

4. Procedure
   - 4.1 Assemble components to be bonded over mandrel(s). Figure A-1, 1-2.
   - 4.2 Measure bond length, tubing overlap, and balloon sleeve length. Figure A-1, 1-3.
   - 4.3 Position protective sleeves (fitted PTFE, PET heat shrink, or Polyolefin heat shrink) over bond location. Figure A-1, 1-4.
   - 4.4 For heat shrink sleeves (PET, Polyolefin etc.), shrink the sleeve onto the bond location.
   - 4.5 Measure O.D. of protective sleeve at bond location. Figure A-1, 1-5.
   - 4.6 Machine the die heads to width based on value in step 4.2.
   - 4.7 Bore hole through heads .003” less than the diameter value in step 4.4.
   - 4.8 For Balloon Shield bore size, add .005” to the product OD (without sleeve).

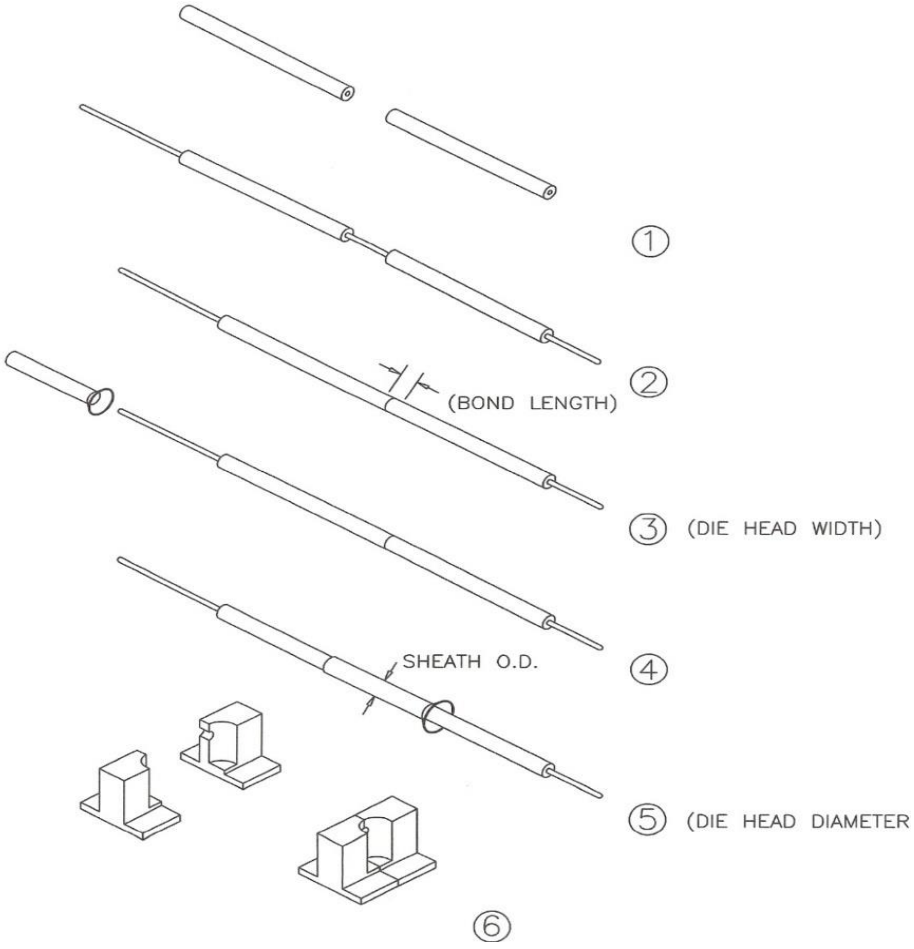

Figure A-1: Sizing Thermal Die Head