ONYX29

Program Development Wizard Software Guide #0029.00.905

Revision 04.00



Program Development Wizard (PDW) for the ONYX29

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1 Overview

The Program Development Wizard (PDW) is designed to provide ONYX29 users with the capability to quickly and easily develop and execute profiles for new devices and assemblies. Once the user responds to the structured questions in the Wizard, a complete rework process structure (ie. Thermal Profile, Removal, Site Cleaning and Replacement) is automatically created.

The user is then automatically directed to the execution mode where the complete (or partial) new process can be run. During the Thermal Profiling Process, "1-Pass" allows the user to make on-the-fly adjustments to the process parameters.

We hope that you find the Wizard to be an easy and effective way to develop new programs.

Sincerely,

Air-Vac Engineering

Contact: Brian P. Czaplicki Director Marketing & Sales brian.czaplicki@air-vac-eng.com

2 Program Development Wizard

1. Click on the PDW (Prog Dev Wizard) icon in the Views tab to enter the Wizard.

🏴 Visual Machir	nes 1.60.43 BETA 3 - (003.02.014 / Onyx29RI 1.
Eile View Iools	Help
Bobot Position X =	114.5620. Y = 221.8210. Z = 118.6730 -X +X -Y +Y -Z +
Views	Program Execution No Program
Execution	Image: Second
Programming	Dry Run Training Inspection Speed: 100 + [%]
Part Type Library	Chart Reverse
Calibration	<pre><verify location="" site=""> of <u7> aborted</u7></verify></pre>
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Configuration	
CSV Reporting	
Prg Dev Wizard	

- 2. Select (highlight) the master template program that you want to use. In this case, we want to create a Lead-Free BGA process, so we will select the LF Master template.
- 3. Select Next.

Wizard							
? Program Development Wizard							
Program Devel 1 Template Program 2 Board Data 3 Component 4 Nozzle & Feeder 5 Thermo Profile	2	Name	Description DO NOT EDIT DO NOT EDIT DO NOT EDIT DO NOT EDIT Browse and Load Template	Author Air-Vac (bpc 0 Air-Vac (bpc 0 Air-Vac (bpc 0 Air-Vac (bpc 0			
Help			< Back Next >	Cancel			

- 4. Type in the board name.
- 5. Measure the board thickness in millimeters. Use the up/down arrow to change the thickness from 3.0mm to the actual thickness of the new board.

USER NOTES: IMPORTANT INFORMATION

- Board thickness is one of the three parameters used to determine "near-board" position.
- 6. Select Next.
 - The "Next" box will not become active until all required data is entered.

Wizard	
? Program Developm	ent Wizard 🧟
Wizard ? Program Developm 1 Template Program 2 Board Data 3 Component 4 Nozzle & Feeder 5 Thermo Profile	ent Wizard Board Name (=Program Name): 10975 Rev C 4 Board Dimension Thickness: 3.000 ± 5
Help	6 < Back Next > Cancel

- 7. Use the pull down list to select the master component type. In this case, we want to create a Lead-Free BGA process, so we will select the master Lead-Free component type.
- 8. Name the new component type. Typically the component size and solder type is used. In this example, the new component name is 15mm Lead-Free. The description field is optional.
- 9. Measure and enter the component dimensions in mm, in this example 15mm.

USER NOTES: IMPORTANT INFORMATION

- The component length and width is used for both component alignment (corner viewing) and automatic site cleaning.
- The component thickness is one of the three parameters used to determine "nearboard" position.
- The "Next" block will not be active until all required data is entered.
- 10. Select Next.

		5
Template Program Board Data	Single Component	
Component	Component Type	
Nozzle & Feeder	ect a Template Component Type:	
	7 Air Vac MASTER LEAD FREE BGA_PDW	•
	New Component Data	
	Name: 15 mm LEAD FREE 8	
	Description:	
	Width (Y): 9 15.000 ÷ [mm] 9 Length (X): 15.000 ÷ [mm]	

- 11. Use the pull down list to select the nozzle. Typically the nozzle matches the component X/Y dimensions (ie. N15EZ15 is used for a 15mm component).
- 12. If the nozzle you need is not on the pull down list, a new nozzle can be added (see PDW advanced features).
- 13. The default hot air flow will be set automatically based on the nozzle selected.
- 14. The default nozzle back-off distance is 1.5mm.
- 15. The component shuttle should be used as the component feeder (see the PDW advanced features if you want to create a custom feeder).
- 16. Flux supply is typically manual with a brush or flux pen. Use the pull down arrow to select "Automatic" if you have a custom flux pedestal for the device or "No Fluxing" if you will use solder paste.

USER NOTES:

- Selecting the correct nozzle is important for proper reflow of the device. Also, each nozzle has a specific length, which is one of the three parameters used to determine "near board" position.
- The nozzle must not be in contact with the BGA/CSP during reflow. A sufficient nozzle back off distance is required to allow for growth of the nozzle, component and board during reflow. The default back off distance is 1.905mm (0.075").
- 17. Select Next.

Wizard		
? Program Develo	opment Wizard	\mathcal{Q}
1 Template Progran 2 Board Data 3 Component 4 Nozzle & Feeder 5 Thermo Profile	Nozzle Select a Nozzle for Soldering/Removal: N15EZ15 11 • Add Nozzle 12 13 Default Hot-Air Flow for Thermo Profiles: Nozzle Back-Off Distance: 1.905 • 14 Component Supply	
	Select a Feeder: component shuttle 15	
	Select a Fluxer: 16 No Fluxing Mo Fluxing Image: Comparison of the second s	
Help	< Back Next > Canc	el

- 18. The Wizard is ready to automatically save the new program based on the user provided board name. The default save folder is "Programs", or you can create a new folder.
- 19. Select Save.

Save in: Programs Image: Constraint of the second sec	Save Program t	0					? 🔀
AV Import Box Exports Import Import Desktop PDWTemplates System Files 0 Micro BGA LF MASTER (IR Arm).itp 0 402 Lead Free (NMX hot gas nozzle).itp 0 402 Lead Free (NMX hot gas nozzle).itp My Documents Micro Tip SC Master (IR Arm) (LF).itp PCB011 (IR Arm).itp PCB011 (Rev D.itp PCB011 Rev D.itp rev d temp.itp Import Z BACKUP AV LF Master (IR Arm).itp My Network File name: My Network File name:	Save in:	C Programs		2	- + 1	* 📰 🕇	
My Network Pile name: 10975 REV Cite 18 Save	My Recent Documents Desktop My Documents My Documents	AV Exports Import PDWTemplate System Files O Micro BGA L O402 Lead Fri 10970 REV C. Micro Tip SC N PCB011 (IR A PCB011 Rev I PCB011 Rev I Rev d temp.itp 2 BACKUP AV	es F MASTER (IR Arm).itp ee (NMX hot gas nozzle itp Master (IR Arm) (LF).itp rm).itp D.itp D.itp LF Master (IR Arm).itp TL Master (IR Arm).itp).itp	2 Dispense Der	mo (TARRA'	/ 144, 0.8 mm
My Network File name: 10975 REV C.itp 18 Save		<					>
	My Network Places	File name:	10975 REV C.itp	18	-	J [Save

20. The Wizard automatically creates the new component type. PLEASE WAIT!

Program Development Wizard

Component Type <15 mm LEAD FREE> is getting created...

21. Click on the "Edit Thermal Profile" bar. The master thermal profile will be displayed, in this case it is the Master Lead-Free Development profile.

Template Program	There Des files	
D	i nermo Profiles	
Component	Edit Thermo Profile 21	
Nozzle & Feeder		
Thermo Profile		

USER NOTES:

- 22. The top heater flow rate (SLM) has been automatically adjusted based on the nozzle you selected.
- 23. The top and bottom heater temperatures and the stage trigger temperatures were developed based on Air-Vac's profiling experience and have proven to work "as-is" for 90% of new applications. <u>Parameter changes should only be made based on process knowledge or application-specific information.</u>
- 24. Thermocouple channel #2 is used to trigger all stages except preheat based on solder joint temperature (see advanced features for use of multiple TC's to control the process).
- 25. Select OK.



26. Select Next.



CONGRATULATIONS!

You have developed a complete Rework Process for your new device/board. The Wizard will now escort you directly to the execution screen.

3 Thermal Profiling

- 1. The Wizard automatically escorts you to the program execution mode where the newly created program is automatically loaded and ready to run.
- 2. Select Start.



3. Right click on the small part green or red dot. The Process List created by the Wizard is displayed. A green dot indicates the Process will be executed, a red dot means it is not selected.

USER NOTES:

- The graphical image of the new Program you created in the Wizard includes the following processes:
 - Thermal
 - Removal
 - Site Cleaning
 - Soldering
 - A If you activate all processes (all buttons green), all four processes will be run in sequence. However,
 - **B** If you have created an instrumented test board for process development only, and you want to only develop the Thermal Profile at this time, activate the thermal process (green button) only (other processes have red buttons).



• The footswitch can be depressed to resume the process instead of clicking on Resume with the mouse.

4. Select Resume.

🛤 Visual Machines 1.60.43 BETA 3 -	003.02.014 / Onyx29RI 1.2.0.9)	
Eile View Tools Help	alizing Substrate	
Robot Position X = 114.5610. Y = 221.8210.2	120.0000 -X +X -Y +Y -Z +Z Disable Park Jog Head Vacuum ON/OFF Manual Motion X/	Y ZA
Program Execution	Selection Dialog	
? 10975 REV C 10975 REV C.itp	10975 REV C Select Process Lists to be processed	
🚅 📽 * 🖬 🏷 Options * 🛛 0	ALL XNot Executed	
🚸 🏼 🗇 🖉 Direct Execution 👻	Table Selection	
Dry Run Training Inspection	Show All	
Speed: 100		
Select Process Lists		
4 Stop Process Properties	Part Part Thermal Removal Ste Cleaning Ste Cleaning Stoldering	

- Install the board into the machine and position the supports. Select Resume. 5.
- 6.

10 WH	isual Mac	hines 1, 60, 43 BETA 3 - (003, 02, 0					
Eile	e <u>V</u> iew <u>T</u> o	pols <u>H</u> elp					
Rol	bot Position	X = 114.5620. Y = 221.8210. Z = 120.0000					
Prog	ram Exect	ution					
? 10975 REV C 10975 REV C.itp							
Ŷ	* • *	🐚 🔹 Options 🔹 0 of 🚺 🛨					
٠	Di 🖉	rect Execution*					
Dry I	Run Train	ing Inspection					
Spee	ed:	100 100 100					
		1					
5		Manual Board Load					
6		1. Load the board into the Board Carrier					
	Resume						
at la	Tresume						
lo C	C						
Ē	Retry						
tion	A						
xecu	Skip						
ш	Stop	Stop current Program Execution					
		Process Properties					

- 7. Un-check the "Robot Enabled" box to de-power the head.
- 8. Use the blue machine handle to move the head.
- 9. Position the laser pointer on one corner of the device.
- 10. Click the "Set Position" box under **Position 1.**

🕀 Vision Unit Teach			
? Place Position of <p< th=""><th>'art></th><th></th><th>Ð</th></p<>	'art>		Ð
Position 1 X: 73.709 (mm) Y: 151.078 (mm) Move to Pos 1 Set Position 10	Position 2 0.000 \div [mm] 0.000 \div [mm] Move to Pos 2 \clubsuit Set Position	Final Position 73.709 [mm] 151.078 [mm] Move to Final Pos Robot enabled 7	Current Position:



- 11. Position the laser pointer on the **opposite corner** of the device.
- 12. Click on the "Set Position" box under **Position 2.**
- 13. Click on "Move to Final Pos". The laser pointer will move to the center of the part.

USER NOTE:

If the Laser Pointer is not centered over the device, depower the robot and repeat the opposite corner Teaching Process.

14. Select OK.

🗣 Vi	sion Unit Teach			
?₽	lace Position of <	°art>		Ð
X: Y:	Position 1 74.788 + [mm] 152.213 + [mm] Move to Pos 1	Position 2 89.357 + [mm] 166.229 + [mm] Move to Pos 2	Final Position 82.073 [mm] 159.221 [mm] Move to Final Pos 13	Current Position: 89.357 + [mm] 166.230 + [mm]
	Set Position	Set Position	☐ Robot enabled	ancel OK 14







15. Change the nozzle if prompted to do so.

CAUTION:

Nozzle may be hot. Use nozzle handling tool to change nozzle.

USER NOTE:

• The nozzle required for the process was user-defined during the PDW (Wizard).

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∐ <u>E</u> ile	e <u>V</u> iew <u>T</u> ools <u>H</u> elp
Rol	bot Position X = 199.9980. Y = 20.0000. Z = 120.0000
Prog	ram Execution
?	10975 REV C
-	
\$	Direct Execution*
Dry	Run Training Inspection
Spee	ed: 100 100
15	Change Nozzle: N15EZ15 (bga)
	Morale aucessfully changed
16	Nozzle sucessfully changed
16	Nozzle sucessfully changed
16 Joutroo	Nozzle sucessfully changed
16 Tor Control	Nozzle sucessfully changed Resume Resume
ecution Error Control	Nozzle sucessfully changed Resume Resume Kip
Execution Error Control	Nozzle sucessfully changed Resume Stop Stop current Program Execution
Execution Error Control	Nozzle sucessfully changed Resume Resume Kip Stop current Program Execution Retry Process Properties

16. Select Resume

17. Install a thermocouple under the BGA and plug into T/C **Channel #2**.

USER NOTES:

- Keep the T/C wire off the black bottom heater to prevent the T/C wire from melting.
- See PDW advanced features if you want to use multiple T/C's to measure joint temperature.
- Air-Vac uses ultra-fine gauge (.003" dia.) thermocouples from Omega Engineering (1-888-TC-OMEGA, part #5 SRTC-TT-IC-40-36; pkg of 5).
- 18. Select Resume.







- 19. The vision cube will come out to allow fine positioning of the nozzle over component.
- 20. Click Resume.



- 21. Nozzle will force touch on board. Head moves to park position. Stabilization event.
- After stabilization, nozzle will go back to site and touch component. Nozzle then retracts and head moves to IR sensor position.
- The Interactive Soldering Profile is displayed.

- 22. After board reaches target temp, nozzle moves back to the programmed height (1.905mm).
- 23. IMPORTANT: Click on the "Training" box. It will be highlighted in yellow and the "1-Pass" function will activate.
- 24. The Preheat stage will begin automatically. Heaters will turn on and T/C temperatures will be graphically and digitally displayed.
- 25. The Preheat stage will continue until the trigger temperature is reached (140C, T/C#5: IR Probe).

23	I → 1-Pass					Z+	25									
	-	-	-	-	-	Z·										
	Stage	Time [sec]	Top [°C]	Top [SLM]	Bot [°C]	Trigger	Trigger [C]	Center Cool	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]	
24	Preheat	240	125	30	325	5: IR Probe	140						0	20	1.905	22
	Soak	60	225	30	250	2: Joint TC	200						0	20	0	
	Ramp	20	275	30	250	2: Joint TC	216						0	20	0	
	Reflow	40	295	30	250	2: Joint TC	235						0	20	0	
	Cooldown	20	0	30	0	2: Joint TC	216		~				0	20	0	
	Cooldow	60	0	30	0	Time	0		~				0	20	0	



- 26. The Soak stage begins once the Preheat trigger is reached.
- 27. The Soak stage will continue until the trigger temperature is reached (200C, T/C#2 Joint).
- 28. The Ramp and Reflow stages follow automatically as shown.
- 29. The actual time spent in each stage (except Preheat) is automatically recorded for production-based replay without joint T/C's.

	▼ 1-Pass				*	Z+									
		29	•	-	•	Z.	•	[
	Stage	Time [sec]	Top [°C]	Top [SLM]	Bot [°C]	Trigger	Trigger [C]	Center Cool	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]
	Preheat	240	125	30	325	5: IR Probe	140						0	20	1.905
6	Soak	60	225	30	250	2: Joint TC	200	27					0	20	0
ᅴ	Ramp	20	275	30	250	2: Joint TC	216						0	20	0
8	Reflow	40	295	30	250	2: Joint TC	235						0	20	0
	Cooldown	20	0	30	0	2: Joint TC	216						0	20	0
	Cooldow	60	0	30	0	Time	0						0	20	0

- 30. During the Reflow Stage, we determined that the top heater temperature (295) needed to be increased to achieve the 235 Joint Trigger target in a reasonable time.
- 31. One mouse click on the Top Heater "Up" arrow creates a new stage called "Reflow 1".
- 32. Four addditional mouse clicks on the Top Heater "Up" arrow increases the heater temp by 20 degrees, to 315 (each click increases by 5 degrees).

USER NOTE:

• See PDW advanced features for more information on 1-Pass.



- 33. The first Cooldown stage records the time from joint max temperature down to 216. Cooling air is injected into the nozzle during this event.
- 34. The second Cooldown stage cools the board and nozzle down.

F	✓ 1-Pas:	s	•			*	Z+		•								
T	•	1	-	-	-	-	Z·		•								
	Stage		Time [sec]	Top [°C]	Top [SLM]	Bot [°C]	Trig	gger	Trigger [C]	Center Cool	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]
S	oak	2	60	225	30	250	2: Jo	oint TC	200						0	20	1.905
B	lamp		20	275	30	250	2: Jo	oint TC	216						0	20	0
R	flow	3	15	295	30	250	2: Jo	oint TC	235						0	20	0
B	leflow 1	3	27	315	30	250	2: Jo	oint TC	235	4					0	20	0
С	ooldown	3	10	138	30	0	2: Jo	oint TC	216						0	20	0
C	ooldow		60	0	30	0	Time	ŝ.	0						0	20	0

The following is a brief description of each stage (Event):

- **PREHEAT:** Preheats the entire board to minimize the thermal differential between the reflow site and the rest of the board. Preheat minimizes board warpage and reduces the amount of component heating required to achieve reflow.
- **SOAK:** Presoak is the period between preheat and soak.
- **SOAK1:** Flux is activated during the soak1 stage. Typically, significant voiding will occur without proper soak.
- **RAMP:** Quickly takes the solder joints from the end of soak to the beginning of reflow.
- **REFLOW 1:** Time over liquidus until the heaters are shut off.
- **REFLOW 2:** Time until the joints fall back below liquidus.
- **COOL EVENTS:** Turns off the heaters and cools board and component.

The following are typical time/temperature targets for each stage (Event):

	Tin/Lead	Lead-Free
PREHEAT - Topside Board Temp (°C)	90-120 avg=100	130-150 avg=140
- Temp (°C) - Time (seconds)	101-139 20-40	141-169 20-40
SOAK1 (joint) - Temp (°C) - Time (seconds)	140-165 35-50	170-200 40-60
RAMP (joint) - Temp (°C) - Time (seconds)	165-182 15-30	201-216 20-35
REFLOW 1 (joint) - Temp (°C) - Time (seconds)	183-210 30-50	217-240 35-55
REFLOW 2 (joint) - Temp (°C) - Time (seconds)	210-183 10-25	240-217 5-20
COOL 1,2,3	Heaters Off, cooling b	oard and component
Typical solder liquidus temp (°C) Typical max joint temp (°C) Typical max package temp (°C)	183 210 230	217 240 260

NOTE: Total Reflow time is the sum of the Reflow 1 and Reflow 2 times. Ideally this should total 60 to 70 seconds, but between 45 and 80 seconds is acceptable in most cases.

- 35. The Interactive Soldering Development screen will appear. You have three (3) options:
 - Save the thermal profile and create production profiles
 - Cooldown and Re-run
 - Simply continue
- 36. If you wish to save the thermal profile and create production processes for removal and replacement, check "Save Development Thermo Profile" and "Assign Production Profiles".
- 37. Click on the "Create Production Profiles and Continue" bar.

He-L	Doing Options
	Prost Development Themes Devile
	Cool down bostore first (initial temperatures)
	Top Heater Flow: 60 ↔ [SLM] Delta Temp. Trigger: 0 ↔ [deg] Top Heater Idle Flow: 20 ↔ [SLM] Board Temp Trigger: 0 ↔ [deg] Verify Thermo Profile
	Redo Interactive Soldering Development
Prod V	luction Profile Creation Save Development Thermo Profile Assign Production Profiles

- 38. If you want to re-run the thermal profile without saving the first run, select "Cool down heaters first...) and "Verify Thermo Profile".
- 39. Enter "70" in the Bottom Heater Trigger Box.
- 40. Click on the "Redo Interactive Soldering Development" bar.

-										
Не	-Doing Uptions									
ſ	Reset Development Thermo Profile									
	 Cool down heaters first (initial temperatures) 									
	Top Heater Flow: 60 🛨 [SLM]									
	Delta Temp, Trigger: 0 🛨 [deg] 🔽 Use Top Heater									
	Top Heater Idle Flow: 20 + [SLM]									
	Board Temp Trigger: 0 🗧 [deg]									
	Verify Thermo Profile 39									
	Redo Interactive Soldering Development 40									
Pre	Production Profile Creation									
ſ	✔ Save Development Thermo Profile									
ſ	Assign Production Profiles									
	Create Production Profiles and Continue									
	nale Cambinus									

USER NOTES:

- If you made any on-the-fly changes using 1-Pass, the changes will be displayed in the Thermal Profile for you to edit prior to the second run.
- If you do not want to carry forward the changes you made during the first run, put a check in the "Reset Development Thermo Profile" box and the profile will be reset to the original master.

- 41. The nozzle will raise up automatically.
- 42. The top and bottom heater cooling routines will activate to cool down the top heater and board.
- 43. The thermal profile parameters will be displayed. Make changes as required based on analysis of first run results.
- 44. Select OK.

 Visual Machines 1.60.43 BETA 3 - (003.02.014 / Onyx29RI 1.2.0.9)

 Eile View Tools Help
 42
 Heater Cool Down: Top Heater @ 47 <= 44 [*C] | Board Temperature @ 149 <= 131 [*C]</th>



- 45. The heaters will continue to cool down until target temperatures are reached. The Interactive Soldering Profile screen will re-appear for run #2 and the nozzle will automatically return to the reflow position.
- 46. Save the thermal profile and assign production profiles after you achieve good thermal results as per the previous instructions.



47. If you do not want to save the profile and you do not want to re-run it, select the "Continue" bar under Simply Continue.

- D-i O-K		
e-Doing Uptions		
Reset Development Therr	no Profile	
Cool down heaters first (ini	tial temperatures)	
Top Heater Flow:		
Delta Temp Trigger:		- Use Top Heater
T U . U .		Stabilisation Process
I op Heater Idle Flow:		
Board Temp Trigger:	0 🛨 [deg]	
🔲 Verify Thermo Profile		
Redo Intera	ctive Soldering Develo	opment
roduction Profile Creation		
Save Development Them	no Profile	
Assign Production Profiles		
1		(
Create Proc	luction Profiles and Co	ontinue

The heaters will continue to cool for an additional 30 seconds.



This completes the Thermal Profiling Process.

4 Removal

- 1. SHUT OFF the Training function used in the Wizard by clicking on the "Training" box. The box color should change from yellow (training mode) to gray (production mode).
- 2. Resume.

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Progr	am Execu	ition	
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	1 - E	options▼	1 of 1 🛨
\$	•	Execution*	
Dry F	Run <mark>Trai</mark>	ning Inspection	
Spee	ed:	100	100 1 [%]
2	Resume	Direct Acces Select Tool/No	ss ozzle
ror Contr	5 Retry		
ecution Er	∩ Skip		
E	Stop	Stop current Program	Execution
		Process Proper	ties

- 3. The nozzle will force touch the device.
- 4. Resume.



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<u> </u>	<u>V</u> iew <u>T</u> ools <u>H</u> elp
Prog	am Execution
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♦	Direct Execution*
Dry F	Run Training Inspection
Spee	d: 100 100 100
4 lott	Continue
TOL CO	Retry
ecution Er	∩ Skip
Exe	Stop current Program Execution
	Process Properties

- 5. The interactive soldering screen will appear and the nozzle will retract to preheat position then return to desoldering position.
- 6. The Soak, Ramp and Reflow stages have been automatically converted to time-based events (ie. Production profile).
- 7. The Cooldown stage has been automatically changed to zero time as cooldown is not desired for removal.

▼ 1-Pass		-		-	Z+	-								
-	•	-	•	•	Z·	•								
Stage	Time [sec]	Top [°C]	Top [SLM]	Bot [°C]	Trigger	Trigger [C]	Center Cool	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]
Preheat	240	125	20	325	5: IR Probe	140						0	20	1.905
Soak	60	225	30	250	Time	200						0	20	0
Ramp	20	275	30	250	Time	216						0	20	0
Reflow	15	295	30	250	Time	235						0	20	0
Reflow 1	27	315	30	250	Time	216						0	20	0
Cooldown	0	315	30	250	Time	218	П				Π	0	20	0

- 8. After the reflow stage is complete, the nozzle will force touch the device, the vacuum will activate and the part will be removed and dropped off onto the shuttle.
- 9. The majority of the solder from the removed device remains on the pads. This is called residual solder, which must be removed by site cleaning.





This completes the Removal Process.
5 Site Cleaning

1. Remove the hot gas nozzle and install the site cleaning nozzle.

CAUTION: NOZZLES ARE HOT!

- Always use nozzle handling tool to change nozzles.
- Make sure that the black vacuum cup is properly engaged with the vacuum port as shown below.
- 2. Resume. The site clean vacuum will activate automatically.

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Elle	e ⊻iew <u>T</u> o	ools <u>H</u> elp	
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?	10975 REV	C.itp	
<u>s</u>		🐚 🔹 Options 🕶	0 of 1 🕂
٠	Di	irect Execution*	
Dry	Run Train	ing Inspection	
Spee	ed:	100	100 + [%
	Chang	e Nozzle: Site ((5mm tip)	Clean Nozzle ()
	Chang	e Nozzle: Site ((5mm tip)	Clean Nozzle 0
	Chang	e Nozzle: Site ((5mm tip)	O O nanged
	Chang	e Nozzle: Site ((5mm tip)	Clean Nozzle 0 nanged
outrol	Chang	e Nozzle: Site ((5mm tip)	Clean Nozzle 0 nanged
or Control	Chang Resume	e Nozzle: Site ((5mm tip)	Olean Nozzle
In Error Control	Chang	e Nozzle: Site ((5mm tip)	Clean Nozzle O nanged
cution Error Control	Chang Resume	e Nozzle: Site ((5mm tip)	Onanged
Execution Error Control	Chang Resume	Pe Nozzle: Site ((5mm tip) Nozzle sucessfully cl	nanged
Execution Error Control	Chang Resume 5 Retry Skip	e Nozzle: Site ((5mm tip)	Dean Nozzle
Execution Error Control	Chang Resume	e Nozzle: Site ((5mm tip)	nanged



3. The vision system will open and the site clean heating tube will be displayed over the site. Verify that the site clean heating tube is centered over the site.

The image below shows that the 5th row of pads in from each side intersect the site clean heating tube, indicating proper centering of the site clean nozzle. If you cannot see the entire site from the center view position on minimum zoom, leave the site clean nozzle positioned as is.



4. Use the X/Y wheels on the front of the machine to fine tune the site cleaning nozzle position if required.



USER NOTE:

- If the site clean nozzle is not properly centered, adjacent discretes maybe displaced during site cleaning.
- See Section 9 for Advanced Site Cleaning Features.

5. Resume.

inin Vi	sual Mach	nines 1.60.43 BB	TA 3 - (003.02.0
<u> </u>	<u>V</u> iew <u>T</u> ool	ls <u>H</u> elp	
Mainl	enance		×
?¦	0975 REV 0975 REV C.	C .itp	
1	s - 🖬 🎙	 Options▼ 	0 of 1 🛨
٠	Ø Dire	ect Execution *	
Dry F	Run Trainin	g Inspection	
Spee	d:	100	100 1 [%]
-	Resume	position IR Se	nsor
Tor Contro	5 Retry		
ecution E	∩ Skip		
Ex	Stop S	Stop current Program	Execution
		Process Proper	ties

6. The target and actual board temperature will be displayed at the top of the screen. This event will continue until the target board temperature is reached.

😬 Visual Machines 1.60.43 BET/	4 3 - (003.02.014 / Onyx29RI 1.2.0.9)	
Eile ⊻iew <u>T</u> ools <u>H</u> elp	Temperature of IR Probe (#5) to reach 120*C Current at 97*C	7
Program Execution		
? 10975 REV C 10975 REV C.itp		
💕 💕 * 📸 🍢 Options *	0 of 1 🛨	
🔶 🐠 Direct Execution*		
Dry Run Training Inspection		
Speed: 100		
Start	II Pause	
Executing Assembly Processes	PL 1 / 1	
Wait (Thermocouples)		
<i>PL Name:</i> Board <i>PL Name:</i> Site Cleaning		
ASM Name: Part		
PTY Name: 15 mm LEAD FREE		
Part Name: Part		

7. The Site Clean nozzle is preheated for 1 minute. Apply tacky flux to the site.

USER NOTE:

• Do not abort the preheating timer. Preheating the Site Clean nozzle is critical.



- The vacuum tip will come down close to, but not touching the site.
- 8. The tip will remain in this position initially to soften the solder on the site.
- 9. The tip will then automatically force touch the site and retract very slightly. The Site Clean nozzle will automatically remove the solder from the site.

USER NOTES:

- Keep hands off the machine during force touch and site cleaning.
- The size of the site cleaning pattern is the component X/Y dimensions.
- See Section 10 (Advanced Site Cleaning Features) if modification of the standard Site Clean parameters is required.

9





- 10. The Site Clean nozzle will raise up. Re-flux the site for second pass cleaning.
- 11. Resume.

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Prog	ram Execu	tion	
?	10975 REV 10975 REV (/ C Ditp	
₩.	- 1	Options -	0 of 📘 🛨
\Rightarrow	🔷 🛛 Dir	ect Execution*	
Dry I	Run Traini	ng Inspection	
Spee	ed:	100	100 🕂 [%]
11	H Besume	Continue	
ror Control	5 Retry		
kecution Er	A Skip		
G	Stop	Stop current Program E	xecution
		Process Propert	ies

The site will be cleaned again in reverse direction and faster to remove any remaining solder.

12

- 12. The board will cool for 30 seconds.
- 13. Clean the site with an alcohol swab and inspect the pads.
- 14. Resume.



This completes the Site Cleaning Process.

6 Replacement

1. Remove the Site Clean nozzle and install the nozzle for component replacement.

CAUTION: HOT NOZZLE

• Use nozzle handling tool to change nozzle.

2. Resume

MM A	isual Mac	hines 1.60.43 BETA 3 - (003.02.0
<u>∐</u> <u>F</u> ile	: <u>V</u> iew <u>T</u> o	ols <u>H</u> elp
Rot	oot Position	X = 199.9980. Y = 20.0000. Z = 120.0000
Prog	ram Execu	ition
?	0975 REV	/C
-	1 - 1	Notions▼ 0 of 1
	Di 🖉	rect Execution *
Dry F	Run Train	ing Inspection
Spee	ed:	100 100 100
	-	
1	Chan	ge Nozzle: N15EZ15 (bga)
2		Nozzle sucessfully changed
	Resume	
utro		
D CO	Rohm	
Eme	neuy	
utio	2	
Exec	Skip	
100000		Stop current Program Execution
	Stop	
		Process Properties

- Verify polarity and load the component in the adjustable insertion tool. Install the insertion tool in the component shuttle. 3.
- 4.
- 5. Resume

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Eile View	<u>I</u> ools <u>H</u> elp			
Manual Mo	tion X/Y	ZNY	Coarse Motion	
Program E	kecution			
? 10975	REV C REV C.itp			
	- 4 '	Options *	1 of	1 🛨
	Direct Exec	ution *		
Dry Run	Training Ins	pection		
Speed:		100	100	: [%]
3 Veri	ify polarity Continue	<mark>y and lo</mark>	ad compon	ent



- The component will be automatically picked up, and brought to vision for alignment. 6.
- 7.





• Corner #1 of the device and site will be displayed based on the "X" and "Y" component dimensions you entered in the wizard.



USER NOTE:

If the component X/Y dimensions are 15mm or less, the entire image can be shown rather than the corners.

- 8. Click on the "Process Properties" bar to change top and bottom lighting or to change the zoom magnification. **NOTE: Any changes you make to these settings is automatically saved.**
- 9. Use the X/Y wheels and motorized theta on the front of the machine to align the spheres and pads in Corner 1.
- 10. Click on the "OK" box to close Process Properties.





11. Click on the "Skip" box after Corner #1 alignment is complete to go to Corner #2.



- If Corner #2 shows misalignment after aligning Corner #1 (as shown below), this means there is a theta error. If you align Corner #2 with "X" and "Y" only, the Corner #2 error will be transferred back to Corner #1.
- To correct for theta error, first make a 50% correction with theta, then finalize with X/Y.



12. After Corner #2 is aligned in this manner (as shown below), click on the "Skip" box to return to Corner #1.



- 13. IF CORNER #1 IS MISALIGNED, repeat the alignment process <u>(ie. 50% theta</u> <u>correction, finalize with X/Y).</u> Click on "Skip" to recheck Corner #2. You can continue to skip between Corners #1 and #2 as many times as needed until both corners are aligned.
- 14. Click on Resume after both corners are aligned.



• The vision system will close.

15. Apply flux to the site.

USER NOTE:

- This prompt will only appear if you selected "Manual Fluxing" in the Wizard.
- 16. Select Resume to continue.
- 17. The part will be automatically placed under force control.

IMPORTANT:

• Keep hands off machine during force placement.

WH V	'isual Mac	hines 1.60.43 BETA 3	- (003.02.0
Eile	e <u>V</u> iew <u>T</u> o	ols <u>H</u> elp	
Ma	nual Motion	X/Y Z/VY Coarse	Motion
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Dry	Run Traini	ing Inspection	
Spe	ed:	100	100 1 [%]
15	app	ly flux to site if neces	isary
		Continue	
16			
Ē	Resume		
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En	Hetry		
ution	A		
Exec	Skip	Stop current Program Execut	tion
	Stop		
		Process Properties	



18. Resume.

	isual Mac	hines	1.60.43	BET	A 3 - (00	3.02.0
<u> </u>	e <u>V</u> iew <u>T</u> o	ols <u>H</u> e	lp			
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٨	Di	rect Exe	cution *	1		
Dry	Run Train	ing In:	spection			
Spe	ed:		100		100	+[%]
8	Resume	Continu	ue			
Error Control	Resume	Continu	ue			
secution Error Control	Resume		Je			
Execution Error Control	Resume 5 Retry 5kip Skip	Continu	ue urrent Prog	Iram E	xecution	

- 19. The interactive soldering screen will appear and the nozzle will retract.
- 20. After the Preheat stage is complete, the Soak, Ramp, Reflow and Cooldown stages will execute. Note that these stages have time-based triggers as they have been automatically converted to a production profile in the Wizard.



21. The nozzle retracts and the board is cooled down prior to handling.



The entire Rework Process for the new device is now complete.

7 Advanced Features – Program Development Wizard

7.1 Using Multiple TC's to Monitor Joint Temperature & Control The Thermal Profiling Process.

- 1. The default TC setup in the Wizard is for TC#2 to be attached to the joints and to control the thermal process.
- 2. If desired, multiple TC's can be attached to the joints and the average temperature can control the process. Click on "TC Groups".

Ther	mo	Profiles																
?	The	ermo Pro	ofiles o	f Part	Туре	< 15	mm LEAD	FRE	E>									
*		2	TC Group	s 💈	b		Profile Graph					dvand	ced C	onfig & S	Statistic	s Bo	oard Tem	nperature Process Sensor
F	Profil	e Name			12-12													
	▶ 0 Master LEAD FREE DEVELOPMENT S					S												
	_																	
+		Stage	Time [sec]	Top [°C]	Top [SLM]	Bot [°C]	Trigger	Trigger [C]	Center Cool	Top Cool	Bot Cool	Gas	Vac	Force [N]	Speed [%]	dZ [mm]	Force Servo	
X	•	Preheat	240	125	30	325	5: IR Probe	140						0	20	1.875		
		Soak	60	225	30	250	2: Joint TC	200						0	20	0		
1		Ramp	20	275	30	250	2: Joint TC	1						0	20	0		
+		Reflow	40	295	30	250	2: Joint TC							0	20	0		
		Cooldown	20	0	30	0	2: Joint TC	216						0	20	0		
		Cooldow	60	0	30	0	Time	0		V	V			0	20	0		
										OK								
-	_			_		_						_	_					

- 3. TC Groups 1 through 4 are preset for 1,2,3 and 4 TC's respectively. If you want some other TC configuration, you can edit a group or configure a new group.
- 4. Select "OK" when done.

? TC Groups Editor							5
Name	Channel #	Trigger	TC #1	TC #2	TC #3	TC #4	TC #
TC Group 1	100	Average					
TC Group 2 3	101	Average					
TC Group 3	102	Average					
TC Group 4	103	Average					
TC Group 5	104	Average					
TC Group 6	105	Average					
TC Group 7	106	Average					
TC Group 8	107	Average					
TC Group 9	108	Average					
TC Group 10	109	Average					

5. Use the trigger pull down list to change the trigger to the desired TC group in the Soak, Ramp, Reflow and first Cooldown stages. In this case we will use "101:TC Group 2" which will average the TC's plugged in to Channels #1 and #2.

Ther	mo	Profiles																	
2.	The	ermo Pro	files o	f Parl	Type	<15) FRE	E>										N
Abin.	120.	1007			. уг-						~					-Y			
1			C Group	s §	2			Profile	Graph		A	dvan	ced C	onfig &	Statistic	s B	oard Terr	nperature Process (Sensor
F	Profil	e Name																	
	Ma	ister LEAD FI	REE DE\	/ELOPM	IENT	S													
-		Chara	Time	Тор	Тор	Bot	Timer	Trigger	Center	Тор	Bot	C		Force	Speed	ďZ	Force		-
T		Stage	[sec]	[°Ć]	[SLM]	[°C]	Irigger	[Ĉ]	Cool	Cool	Cool	las	Vac	[N]	[%]	[mm]	Servo		
X		Preheat	240	125	30	325	5: IR Probe	140						0	20	1.875			
		Soak	60	225	30	250	101: TC	200						0	20	0			
1		Ramp	20	275	30	250	101: TC	216						0	20	0			
+		Reflow	40	295	30	250	101: TC	235						0	20	0			
	•	Cooldown	20	0	30	0	2: Joint 💌	216		•				0	20	0			
		Cooldow	60	0	30	0	2: Joint TC	^		~	-			0	20	0			
							3:					92 - P							
_	-					_	4:		_										
		_	_	_		5	100 TC Ge	un 1		UK	_	_	_		_	_			
						J 1	100. TC Gr												

6. The multiple stage trigger TC's you selected will be displayed during Interactive Soldering at the bottom right corner of the screen.



If one of the two joint TC's shorts out or appears to be reading incorrectly, simply uncheck it and it will be ignored.

7.2 Configuring A New Nozzle

1. If the nozzle you need to use for a new process is not on the pull down list, click on the "Add Nozzle" box.

1 Template Program 2 Board Data	Nozzle Select a Nozzle for Soldering/Removal:	1	
4 Nozzle & Feeder	N27EZ35	Add Nozzle	
5 Thermo Profile	N13EZ13 N15EZ15 N21EZ21 N23EZ23 N25EZ25 N27EZ27 N37EZ35 N31EZ31EB Select a Feeder: component shuttle	Add Feeder	
	Flux Supply		
	Manual (Brush)	•	

2. This will take you to the Nozzle Manager. Click on "New Hot Air Nozzle". A new nozzle will be added to the bottom of the list.

	Name	Description	Length (dx)	Width (dy)	Obj Det	Align	Z Offset	Open Vac	. Closed Vac	. Default Flow
ė.	N7EZ7	csp	0 mm	0 mm			-2.5 mm	37.74%	80.15%	40
	NCAL 1		0 mm	0 mm			8 mm	0%	50%	40
	Site Clean Nozzle (5mm tip)		5 mm	5 mm			4 mm			40
	Site Clean Nozzle (micro tip)		2.3 mm	2.3 mm			1.5 mm		Į.	40
in.	N23EZ23	Description	0 mm	0 mm			-2.5 mm	22.23%	79.11%	40
éna -	N1103B1103	qfp	0 mm	0 mm			0 mm	17.89%	49.6%	40
	NMX090DVG	Description	0 mm	0 mm			0 mm	14.03%	49.14%	40
e a	NMX257DVG	Description	7 mm	7 mm			0 mm	50.42%	74.57%	40
in.	NMX188DVG		0 mm	0 mm			0 mm	37.01%	66.87%	40
	Motion offset nozzle	motion offset nozzle	3 mm	3 mm			1.7 mm	0%	50%	40
e 2	N5EZ5	Description	5 mm	5 mm			-2.5 mm	0%	50%	40
1000	NMX for laser pointer test	Description	0 mm	0 mm		,]	0 mm	69.59%	72.62%	40
	Site Clean Nozzle (Micro Tip)		2.2 mm	2.2 mm			1.5 mm			0
à	N27EZ35	Description 4	10 mm	10 mm		ourse and sound	0 mm	0%	50%	40

You will now need to do the following:

- 3. Highlight the new nozzle and then rename it (N27EZ35 in this case).
- 4. Add a description if desired.
- 5. Enter the length and width of the nozzle in mm in the boxes at the bottom of the page.
- IMPORTANT! Measure the overall length of the nozzle with calipers. The standard length nozzle is 66mm. The length of the new nozzle minus 66mm must be entered into the Z offset box at the bottom of the page. In this case, the new nozzle (N27EZ35) measures 63.5mm (typical length for EZ nozzles) so the Z offset is –2.5mm (63.5mm – 66.0mm).
- 7. The Object Detection and Align boxes should be blank.
- 8. The open and closed vacuum levels are not relevant.
- 9. Set the default flow for the new nozzle based on the following nozzle size chart:

Nozzle Size (mm)	Top Heater SLM (standard liters/minute)
Less than 10mm	25 LPM if no bypass holes (35-40 if yes bypass holes)
10-15 mm	30-35 LPM
16-26 mm	35-40 LPM
27-30 mm	45-50 LPM
31-34 mm	55-60 LPM
35-40 mm	60-65 LPM
Above 40 mm	65+ LPM
NMX Nozzles	40-60 LPM

10. Click on OK to return to the Wizard.

11. The new nozzle and default flow rate for the new nozzle are now displayed.

Wizard		
? Program Develop	oment Wizard	Q
1 Template Program 2 Board Data 3 Component 4 Nozzle & Feeder 5 Thermo Profile	Nozzle 11 Select a Nozzle for Soldering/Removal: 11 N27E235 Default Hot-Air Flow for Thermo Profiles: 50 11 Nozzle Back-Off Distance: 1.875 1 [mm] Component Supply Sole to Fonder	
	component shuttle Add Feeder	
	Flux Supply Select a Fluxer:	
	Manual (Brush)	
Help	(Back Nevt) C	ancel
Help	<back next=""> C</back>	ancel

7.3 Configuring A Custom Feeder

The Component Shuttle is typically used to supply a component to the machine. The Universal Insertion Tool centers the device on the shuttle to provide accurate pick up.

However, some components may require alternate pick up methods. For example, 0402's and other extremely small devices may need to be picked directly from tape or waffle trays. In addition, the extremely small size of these parts may require vision assistance for accurate pickup, which is not possible with the shuttle. In such cases, board-level custom feeders can be created and used to accomplish this objective.

IMPORTANT:

Configuring a custom feeder is an involved process. We recommend that customers contact Air-Vac Engineering for assistance when configuring a custom feeder for the first time.

1. Select "Add Feeder"

2 Board Data 3 Component 4 Nozzle & Feeder 5 Thermo Profile	Nozzle Select a Nozzle for Soldering/Removal: N27EZ27 Default Hot-Air Flow for Thermo Profiles: 40 ÷ [SLM] Nozzle Back-Off Distance: 1.905 ÷ [mm]	Add Nozzle]
	Component Supply		-
	component shuttle	Add Feeder	1
	Flux Supply		7.1
	Select a Fluxer:		
	Manual (Brush)		

- You are now in the Feeder Manager.
- 2. Click on "New Feeder"
- 3. Rename the New Feeder. In this case it is "0402 Tape Strip".
- 4. Add a description if desired.
- 5. Input the number of X and Y pockets. In this case we have a single row of twenty 0402's, therefore X is 1 and Y is 20.
- 6. Check "By Row" if you want to pick by row (ie. X). In our case, we only have 1 row so this is unchecked, which means it will pick by column (ie.Y).
- 7. Manual loader is the mechanism that controls the Component Shuttle. In this case, we will not use the shuttle so "None" is selected.
- 8. The corner pocket positions then need to be taught. In this case, pocket 1 will be the first 0402 and pocket 2 will be the last (20th) 0402. Click on "Teach 1st Pocket Center".

	Waffle Feeder Manager									
	? Waffle Feeder Manager									
2	🞛 New Feeder 🗅									
	Name	Description	X Pockets	Y Pockets	By Row	Man. Loader	ML Poc	1st Pos	2nd Pos	3rd Pos
	component shuttle	component shuttle	1	1	•	Manual Loa	1	(349.034 m	(0 mm, 0	(0 mm, 0
	0402 tape strip	vision-assisted pick	1	20		None	1	(85.326 m	(83.799	(0 mm, 0
	3	4		5	6	7				
				-						
			_							
		8 8								
	Selected Feeder Details:									
		Feach 1st Pocket Center	First	Pocket Center:		Second Pock	et Center:	Third P	ocket Cente	a:
	Number Pockets in X: 1 🛨 🕇	each 2nd Pocket Center	3 X:	85.32	6 1 [mm]	X:	83.799 🗧	[mm] X:	0.00	10 ÷ [mm]
	Number Pockets in Y: 20 ÷		2 Y:	112.14	9 ± [mm]	Y: 1	49.472 🔅	[mm] Y: [0.00	10 🛨 [mm]
		each 3rd Pocket Center	Z:	0.00	0 🛨 [mm]	1				

9. Double click on "Vision Unit (Laser Pointer X/Y)".

	Teach Position ? Teach Position 1 of <0402 tape strip> Select an item to teach a position	Þ
	Available teach methods/items:	
	Head of Robot (x/y/z)	
	Z-Height of Robot (Z)	
9	Vision Unit (Laser Pointer xy)	

- 10. Uncheck the "Robot Enabled" box to depower the robot head.
- 11. Use the blue ring to position the laser pointer over the center of pocket 1.
- 12. Select "Set Position" under position 1.
- 13. Select "OK".



USER NOTES:

- The custom feeder should be set up in an area where no bottom heating occurs. In this example, the 0402 feeder is set up over the front right corner of the preheater. The front and right rear preheater panels will be programmed to be off for this profile.
- The custom feeder Z height should be the same height as the board.

14. Select "Accept".



15. Select "Teach 2nd Pocket Center"

🗄 New Feeder 🛛 🗋									
Name	Description	X Pockets	Y Pockets	By Row	Man. Loader	ML Poc	1st Pos	2nd Pos	3rd Po
omponent shuttle	component shuttle	1	1		Manual Loa	1	(349.034 m	(0 mm, 0	(0 mm, 0
1402 tape strip	vision-assisted pick		20	tono Chinan	None	1	(199.999 m	(199.999	(0 mm, 0

16. Double click on "Vision Unit (Laser Pointer X/Y).



- 17. Uncheck the "Robot Enabled" box.
- 18. Use the blue ring to position the laser pointer over the center of the last (ie. 20th) 0402.
- Select "Set Position" under **Position 1** even though you are teaching Position 2. Note the Position 2 column is grayed out.
- 20. Select "OK".

Position 1	Position 2	Final Position	Current Position:
200.002 ÷ [mm]	0.000 + [mm]	200.002 <u>+</u> [mm]	200.002 ± [m
323.681 + [mm]	0.000 + [mm]	323.681 <u>*</u> [mm]	306.410 📩 [m
Move to Pos 1	Move to Pos 2	Move to Final Pos	
🕀 Set Position	Set Position	🗖 Robot enabled	20
19		17	





21. Select "Accept"



22. Note that the X/Y coordinates for the first pocket and second (ie. Last) pocket are now displayed below. Also note that the X position is the same for both pockets as there is only 1 row of 0402's in this case.

Selected Feeder Details:	Teach 1st Pocket Center Teach 2nd Pocket Center Teach 3rd Pocket Center	23 12	First Pock X: Y: Z:	xet Center: 200.002 308.401 0.000	22 [mm] [mm]	Second Pocket Center: X: 200.002 Y: 306.410	Third Pocket Center. X: 0.000 Y: 0.000) + [mm] - [mm]
			OK					

- 23. The new feeder is now displayed.
- 24. Select "Next" to continue in the Wizard.

Program Developr	nent Wizard	¥
1 Template Program 2 Roard Data	Nozzle	
3 Component	Select a Nozzle for Soldering/Removal:	
4 Nozzle & Feeder 5 Thermo Profile	N27EZ35	
	Default Hot-Air Flow for Thermo Profiles: 50 📫 [SLM]	
	Nozzle Back-Off Distance: 1.875 [mm]	
	Component Supply	
	Select a Feeder:	
	0402 tape strip Add Feeder	
	Flux Supply	
	Select a Fluxer:	
	Manual (Brush)	
	24	
Help	< Back Next >	Cancel

7.4 Vision Assisted Custom Feeder Pick-Up

- 1. To add vision-assisted pick up for picking parts from the new feeder, go to the Part Type Library after completing the Wizard.
- 2. Highlight the new part type.
- 3. Double click on the Soldering Process List.

e <u>V</u> iew <u>T</u> ools						
nual Motion X.	Y ZAY Coarse Motion					
Mieure	Part Type					
views	? PART TYPE Global Library					
	- Manage the global part types			100000		
Execution	1 I I I I I I I I I I I I I I I I I I I	Filter:	✓ Clear Optio	ns 🕶 🖸 Thermo Pro	ofiles	
	Name /	Description		Category	Package T	Ar
	2 1	Description		None	🞛 Bumped 📃	T
	1 Air Vac Micro-BGA LEAD FREE Master	Pivoting IR Arm (013108 b	c)	None	🔡 Bumped 🔽	1
- granning	1 Air Vac Micro-BGA TIN LEAD Master_F	P Pivoting IR Arm (013108 b	c)	None	🔛 Bumped 🔽]
-	2 Air Vac MASTER LEAD FREE BGA_PE	0 IR in Vision (013108 bc)		None	🚼 Bumped 🔽	
Tune Library	2 Air Vac MASTER TIN LEAD BGA_PDV	V IR in Vision (013108 bc)		None	🚼 Bumped 🔽	
	3 Air Vac Micro-BGA LEAD FREE Master	IR in Vision (013108 bc)		None	🚼 Bumped 🔽	[
	3 Air Vac Micro-BGA TIN LEAD Master_F	P IR in Vision (013108 bc)		None	🚼 Bumped 🔽	E
Collingation	abcde	testing		None	🚼 Bumped 🗌	
Calibration	x Micro BGA Master (Lead Free)	Pivoting IR Arm (032307 t	oc)	None	Bumped	1
	xyz FLEXBGA 280 (16 mm) (LEAD FREE) PCB011 Rev C (IR Arm 03	2307 bc)	None	🚼 Bumped 🗌	[
\sim	xyz CABGA 84 (7 mm) (LEAD FREE)	PCB011 Rev C (IR Arm 03	2307 bc)	None	Bumped]
laintenance	xyz PBGA 196 (15 mm) (LEAD FREE)	PCB011 Rev C (IR in Arm	032307 bc)	None	🚼 Bumped 🗌	[
	xyz PBGA 676 (27 mm) (LEAD FREE)	PCB011 Rev C (IR in Arm	032307 bc)	None	Bumped	E
	xyz TARRAY 144 (10 mm) (LEAD FREE)	PCB011 Rev C (IR in Arm	032307 bc)	None	🔠 Bumped 🗌	[
onfiguration	xyz TARRAY 64 (6 mm) (LEAD FREE)	PCB011 Rev C (IR in Arm	032307 bc)	None	Bumped	[
	yyy 07mm (CTBGA 84) (PCB011 REV D) ((L PCB011 Rev C (IR Arm 03	2307 bc)	None	🚼 Bumped 🗌	1
	yyy 10mm (CVBGA 360) (PCB011 REV D)) (PCB011 Rev C (IR Arm 03	2307 bc)	None	Bumped	E
SV Reporting	yyy 12mm (CTBGA 228) (PCB011 REV D)) (PCB011 Rev C (IR Arm 03	(2307 bc)	None	🔡 Bumped 🗌	[
	yyy 13mm (CVBGA 432) (PCB011 REV D)) (PCB011 Rev C (IR Arm 03	(2307 bc)	None	Bumped	E
A	yyy 15mm (PBGA 196) (PCB011 REV D) (L PCB011 Rev C (IR Arm 03	(2307 bc)	None	🔡 Bumped 🗌	[
j Dev Wizard	yyy 27mm (PBGA 676) (PCB011 REV D) (L PCB011 Rev C (IR Arm 03	2307 bc)	None	Bumped]
	z Dispensing Demo TARRAY 144	(.062 bd.) (021606 bc)		None	Bumped	[
	z loop	(062 bd) (021606 bc)		None	Bumped	E
	zzz ir sensor test	ONYX29 (machine set up	only)	None	🔛 Bumped 🗌	
	Zzz laser nointer test	DNYX29_(machine_set un	nnluì	None	Rumped	
	Part Type Dimensions				opuons	
	Length (X): 1.000 = [mm]				Default Pick Position (Center	ter)
	Width (Y): 1.000 ÷ [mm]				C Custom Pick Position	-1
	Thickness (Z): 1.000 + [mm]				Pick Offset X: 0.000	-
					Pick Offset Y; 0.000	-
	Property Links					
						1
	Name		Tool	Nozzle	Min Access	
	Thermal		Hot Gas Tool	NMX188DVG	Operator	-
	Removal		Hot Gas Tool	NMX188DVG	Operator	_
	Site Cleaning		Hot Gas Tool	Site Clean Nozzle (5mm	n tip) Operator	
LICEC	Soldering with No Fluxing (solder pas	ste) 3	Hot Gas Tool	NMX188DVG	Operator	
Utilities						
Stress Test						
amera Tools			OK			
		u d <mark>un</mark> ler f				

- 4. Check the Infeeder Match (Vision Unit) block to activate it.
- 5. Click on the Heating (Pre-Heater) block. Uncheck Preheater sections #2 (front right) and #4 (rear right).
- 6. Select "OK" to return to page 1 of the Part Library.
- 7. Select "OK" to exit the Part Library.

USER NOTE:

The change is saved automatically.

	General & Process Sequence	
Tool:	Hot Gas Tool (Hot gas Tool with Site Cleaning Nozzle.)	Nozzle:
Reiect Mode:	No Reject	-
Use always	Assembly Position as Pick Position	Min. Group:
Abort Control:	Not Executed (Default)	Abort Message:
Robot Force Table Manual Flu: Dip Fluxer Operator P Pre-Heater	Image: Second state sta	Focus Correction:
 With Reject Bin Intermocoul Wision Unit Mot Gas To 	ol	Corners Selection

6	OK	

8 Advanced Features – 1-Pass Thermal Profiling

1-Pass is a powerful tool that provides on-the-fly thermal profiling adjustment capability.

1. To activate 1-Pass, click on the "Training" box during Interactive Soldering. The "Training" box should be yellow and the 1-Pass check box will activate.

The following are examples of how 1-Pass can be used:

- 2. After 20 seconds in the Soak Stage, it became obvious that TC#2 (Joint) was not going to reach its target temperature (200C) in a reasonable amount of time (45-75 seconds).
- 3. A single click on the top heater Up arrow creates a second Soak Stage named Soak 1.
- 4. Six additional clicks on the Top Heater Up arrow increased the top heater by 30 degrees (5 degrees per click) from 190 to 220C).
- 5. The total Soak Stage time is now the sum of the initial Soak Stage (20 seconds) plus the user-added Soak Stage (51 seconds) or a total of 71 seconds.
- 6. After 24 seconds in the Reflow Stage, it was apparent that TC#2 would not reach its target (240C) in a reasonable time (45-75 seconds).
- 7. A single click on the Top Heater Up arrow created a new Reflow Stage named "Reflow 2".
- 8. Five additional clicks on the Top Heater up arrow increased the temperature by 25 degrees (5 degrees per click) from 265 to 290.
- 9. The total Reflow Stage time is now the sum of the initial Reflow Stage (24 seconds) plus the user added Reflow Stage (37 seconds) or a total of 61 seconds.

					8							
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∐ Eile ⊻iew <u>T</u> ools <u>H</u> elp		1			3							
Program Execution	1	I 1.Pas	ss					Z+	-			
? 10975 REV C 10975 REV C.ito		-	ĺ	•	-	-	•	Z.	•			
💕 💕 * 📸 🐂 Options •	1 of 1 🛨	Stage		Time [sec]	Top [°C]	Top [SLM]	Bot [°C]	Trigger	Trigger [C]	Center Cool	Top Cool	Bot Cool
& A I Execution*		Soak	2	20	190	30	250	Time	200	2		
Dry Run Training Inspection		Soak 1		51	220	4 30	250	2: Joint TC	200			
		Ramp		35	250	30	250	2: Joint TC	216			
Speed: 100	100 ÷ [%]	Reflow	6	24	265	30	250	Time	240	5		
		Reflow 2	7	37	290	8 30	250	2: Joint TC	240			
		Cooldown		12	152	30	0	2: Joint TC	216			
Start Executing Assembly Processes	• •	11	sec	;	1:	22 °	°C	248	3°C		2: 1	

USER NOTES:

- 1-Pass allows the user to change all the parameters in Interactive Soldering, however Air-Vac recommends the following:
 - Increase/Decrease top heater temperature as the Primary means for making profile changes on the fly. The recommended temperature range change is +/- 10-25 degrees.

IMPORTANT: Decreasing top heater temperature by more than 10 degrees is not recommended as this will create a non-linear heating curve which may not yield optimal soldering results. If the original temperatures are too high, Air-Vac recommends stopping, editing the parameters and re-running.

- Increase/decrease top heater flow rate (slm) as a secondary means for making profiling changes on the fly. The recommended flow rate change is +/- 5 LPM.
- Changing bottom heater temperature is not recommended due to slower response time of the bottom heater.
- The trigger temperature can be changed if necessary. The recommended maximum change is +/- 5 degrees.
9 Advanced Features – Site Cleaning

Site cleaning parameters can be modified if required for specific applications.

- 1. Activate Training mode (yellow highlight)
- 2. Activate the Site Cleaning process



- 3. This is a 35mm perimeter-only site with no center pads.
- 4. The photo below indicates that centroid of the 35mm site is not centered under the Site Clean nozzle.





5. Use the X/Y wheels to center the site clean nozzle over the centroid of the site as shown below.



- You have access to all key site clean parameters because "Training Mode" was selected.
- 6. The heater temperature and flow can be adjusted if required.

Program Execution	Direct Access Training
? 10975 REV C 10975 REV C.itp	Control Heating
Image: Speed: 100	Nozzles: Use current mounted nozzle Site Clean Nozzle (5mm tip) Flow Control Hot Flow: 35 ÷ [SLM] 6
Direct Access Configure Process Properties	Heater by-pass (fast cool down) Gas Source Air Special Gas Source
D Retry	Temperature Control
Skip Skip Stop current Program Execution	Ulipuration: 0.00 → [sec]
Process Properties	

7. In Site Cleaning Approach, the X/Y margin of 1mm can be changed to zero. Do this if there are discretes very close to the site. This will reduce the size of the site clean pattern to the exact component size entered in the Wizard.

Process Sequence:	Available Processes:
 ✓ ▲ Approach ✓ ➡ Site Cleaning ✓ ▲ Depart ✓ ▲ Move Safe 	 Approach Site Cleaning Depart Move Safe
Approach Properties Site Clean Nozzle:	
Approach Properties Site Clean Nozzle: Site Clean Nozzle (5mm tip)	
Approach Properties Site Clean Nozzle: Site Clean Nozzle (5mm tip) Vise Current Mounted Site Clean Dimensions	an Nozzle or above selected one
Approach Properties Site Clean Nozzle: Site Clean Nozzle (5mm tip) Vise Current Mounted Site Cle Dimensions Vise Object Dimensions	an Nozzle or above selected one
Approach Properties Site Clean Nozzle: Site Clean Nozzle (5mm tip) Vise Current Mounted Site Clean Dimensions Vise Object Dimensions	an Nozzle or above selected one

8. Under Site Cleaning, A - we will change the pattern from snake (cleans entire site) to rectangular. B -This change activates the "Lap Count Box". C – Change the Lap Count from zero to 2. These changes will result in a rectangular site clean pattern. After the first rectangular pass is complete, the site clean nozzle will index inward 4.5mm (line width) and make a second pass. Custom site clean patterns can also be created using the pattern generator. Contact Air-Vac Engineering for further assistance on site cleaning.

	? Site Cleaning E
8	Process Sequence: Available Processes: ✓ ▲ Approach ▲ Approach ✓ ▲ Site Cleaning ✓ Depart ✓ ▲ Move Safe ▲ Move Safe
E	Site Clean Properties Position Offset Offset X: 0.000 ÷ [mm] Offset Y: 0.000 ÷ [mm] X-Y Motion • Rectangular Profile Velocity: 20 ÷ [%] • Rectangular Profile Line Width: 4.500 ÷ [mm] • Snake Profile Lap Count: 2 ÷ C □ X-Y Motion 30 ÷ [sec] □ Start Delay: □ Activate Site Clean Vac after Start Delay □ ✓ Before Force Touch ○ ÷ [sec] □
	Z Motion Fixed Height Z-Move: 0.035 ↔ [mm] Vacuum Level: 35 ↔ [%] Blocked Vac Level: 0 ↔ [%] Touch Force: 0.80 ↔ [N] Vacue Force Table

10 Details of Automatic Program Creation

1. The Wizard has automatically created a program based on user input. In this case we named the program "10975 Rev C", based on the board name. The program can be found in the Programming view.





- 2. The Wizard has also automatically created a new part type named "15mm LEAD FREE" based on our input. The new part type is stored in the part type library.
- 3. The new part type has Thermal, Removal, Site Cleaning and Soldering Processes. Double click on the Thermal Process List.

	Part Type				
ews					
N	 Manage the global part types 	y .			
	*1 * X * 1 * *	Filter:	+ Clear	Options • 🖸 Thermo) Profiles
	Name /	Description		Category	Package
	15mm LEAD FREE	Pivoting IR Arm (013108 bc)	1	None	🚼 Bumped
remmine	2 Air Vac MASTER LEAD FREE BGA_	PD IR in Vision (013108 bc)		None	🔠 Bumped
gi annining	2 Air Vac MASTER TIN LEAD BGA_PI	DW IR in Vision (013108 bc)		None	🔡 Bumped 💽
•	3 Air Vac Micro-BGA LEAD FREE Mas	ter IR in Vision (013108 bc)		None	🔡 Bumped 💽
	3 Air Vac Micro-BGA TIN LEAD Master	P IR in Vision (013108 bc)		None	🔡 Bumped 💽
ype Library	abcde	testing		None	🔛 Bumped
	low flow test	Description		None	🔠 Bumped
	PBGA 5.5x13.5mm	Gemini CPU		Symbol	Bumped
libration	PBGA 8x12mm	SDRAM: Gemini, Aquarius C	CPUs	Symbol	Bumped
(19)	x Micro BGA Master (Lead Free)	Pivoting IR Arm (032307 bo	2)	None	Bumped
2ª	xyz FLEXBGA 280 (16 mm) (LEAD FRI	EE) PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped
ntenance	xyz CABGA 84 (7 mm) (LEAD FREE)	PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped
	xyz PBGA 196 (15 mm) (LEAD FREE)	PCB011 Rev C (IR in Arm 0	32307 bc)	None	Bumped
	xyz PBGA 676 (27 mm) (LEAD FREE)	PCB011 Rev C (IR in Arm 0	32307 bc)	None	Bumped
figuration	xyz TABBAY 144 (10 mm) (LEAD FREI	E) PCB011 Rev C (IR in Arm 0	32307 bc)	None	Bumped
	xyz TARRAY 64 (6 mm) (LEAD FREE)	PCB011 Rev C (IR in Arm 0	32307 bc)	None	Bumped
9⊞	yyy 07mm (CTBGA 84) (PCB011 REV D)) (L PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped
Reporting	yyy 10mm (CVBGA 360) (PCB011 REV	D) (PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped
\bigcirc	vvv 12mm (CTBGA 228) (PCB011 REV	D) (PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped
¥ I	vvv 13mm (CVBGA 432) (PCB011 REV	D) (PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped
ev Wizard	vvv 15mm (PBGA 196) (PCB011 REV D) (L., PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped [
	ww 27mm (PBGA 676) (PCB011 REV D) (L., PCB011 Rev C (IR Arm 032	(307 bc)	None	Bumped
	z Dispensing Demo TARRAY 144	(.062 bd.) (021606 bc)		None	Bumped
	zloop	(062 bd) (021606 bc)		None	Bumped
	zzz ir sensor test	ONYX29 (machine set up o	onlu)	None	Bumped
	zzz laser pointer test	ONYX29 (machine set up o	only)	None	Bumped
	- Part Tupe Dimensions			- Assess	- Options
					Derault Pick Position (Le Custor: Dials Desition
	Width (Y): 15.000 - [mm]				Custom Fick Fostion
	Thickness (Z): 1.000 ÷ [mm]				Pick Dirset A: 0.000
					Pick Uffset Y 0.000
	Proposed Liste				
2	🔴 Name		Tool	Nozzle	Min. Acce
3	Thermal		Hot Gas Tool	N15EZ15	Operator
_	Removal		Hot Gas Tool	N15EZ15	Operator
	Site Cleaning		Hot Gas Tool	Site Clean Nozzle (5mm tip) Operator
Itilities	Soldering with Manual Fluxing		Hot Gas Tool	N15EZ15	Operator
ess Lest			1000		
iera Tools			OK		

- 4. The process steps for "Thermal" are displayed.
- 5. Click on any block to see the details.



- 6. Removal process steps.
- 7. Automatic creation of production-based removal profile for 15mm Lead-Free device shown here.

🛤 Visual Machin	ies 1.60.43 - (003.02.014 / Onyx29RI 1.2.0.9)			
Eile <u>V</u> iew <u>T</u> ools	Help			
Views	Process List Editor ? Removal - 15mm LEAD FREE 6			
Execution	General & Process Sequen	ce		
	Tool: Hot Gas Tool (Hot gas Tool with Site Clea	aning Nozzle.) 💌 Nozzle:	N15EZ15 (bga)	•
	Reject Mode: Reject to Reject Bin	✓ Reject Bin:	Reject Bin	
Programming	Use always Assembly Position as Pick Position	Min. Group:	Operator	•
	Abort Control: Not Executed (Default)	Abort Messag	e: <%PL> of <%ASM> aborted	
Part Type Library	General Processes	👔 🦆 📍 Interactive Solds	ering DA C	Ctrl.: Show Always 🔹
Calibration	Interactive Soldering Kobot Robot Interactive Soldering Interac	esses) Thermo Profile:	112.47.444	
\$	Force Table	(Robot) Themo Pro	ofiles	
Maintenance	▼ Dip Fluxer 7 ♥ Image: Constraint of the state of	(Lieneral Proce ng (Interactive S Do not show stage (Robot)	table csv File	
Configuration	Pre-Heater Pick (Robot) Reject Bin Control Heating (Ho Thermosouriles Move (Robot)	ot Gas Tool)	to Trace DB	

- 8. Site cleaning process steps.
- Site cleaning details. 9.

💌 Visual Machines 1.60.43 - 🛛	(003.02.014 / Onyx29RI 1.2.0.9)	
Eile <u>V</u> iew <u>T</u> ools <u>H</u> elp		
Views ? Site Clear	aning - 15mm LEAD FREE 8	Ē
Execution	General & Process Sequence	
Tool:	Hot Gas Tool (Hot gas Tool with Site Cleaning Nozzle.) 💌 Nozzle: Site Clean Nozzle (5mm tip) ()	
Reiect Mode:	no Reject	
Programming 🔽 Use alway	ays Assembly Position as Pick Position Min. Group: Operator	
Abort Control:	Not Executed (Default) Abort Message: <%PL> of <%ASM> aborted	
Part Type Library	Processes 🔺 🗙 Show Properties 👔 🦊 ? Site Cleaning DA Ctrl.: Show Always	•
Calibration Calibration Calibration Maintenance Configuration CSV Reporting CSV Repor	Processes Interventions Interventions	

- 10.
- Soldering process steps. Automatic creation of production-based soldering profile shown here. 11.

💌 Visual Machines 1.60.43 - (003.02.014 / Onyx29RI 1.2.0.9)				
Eile View Tools	Help			
Views	Process List Editor ? Soldering with Mar	nual Fluxing - 15mm LEAD FRE	EE 10	Έ
Execution	Ge	neral & Process Sequence		
	Tool: Hot Gas To	ol (Hot gas Tool with Site Cleaning Nozzle.)	Nozzle: N15EZ15 (bga)	
Programming	Reject Mode: No Reject	sition as Pick Position	Min. Group: Operator	-
Part Type Library	Abort Control: Not Execute General Processes Control Interactive Soldering Robot Force Table Manual Fluxer Dip Fluxer Operator Panel Pre-Heater Reject Bin Forceouples Vision Unit	d (Ucerault) Show Properties ↓ Heating (Pre-Heater) ↓ ↓	Abort Message: <%PL> of <%ASM> aborted Abort Message: <%PL> of <%ASM> aborted Thermo Profile: Soldering 2.18.2008 11.13.47 AM Themo Profiles Do not show stage table Automatically save csv File Automatically save to Trace DB	s
Prg Dev Wizard	■ 0402 reject bin ₩ Waffle Feeder - plac Å Hot Gas Tool	Place (Robot) Park (Robot) Control Heating (Hot Gas Tool) Stop Heating (Pre-Heater)		

11 Thermal Profile Analysis & Printing

Any Thermal Profile that is saved can be analyzed and printed for documentation purposes.

- 1. Click on the "CSV Reporting" icon under Views.
- 2. Click on the green ball at the top of the page.
- 3. If necessary, change the look in directory to "Program Files/Visual Machines/Interactive Soldering Exports". Scroll through until you find the file that you want (look for the board name at the beginning of the export file name and the date/time at the end of the file name.
- 4. Double click on the desired export file to open it.



In this case, TC#1 and #2 are the joints (user defined) and TC#5 is the board (IR Sensor).

- 1. Change the "Time Above (seconds)" box to 216 as this is a Lead-Free profile (ie. Reflow starts at 217).
- 2. The time above 216 for all TC's will be automatically displayed.
- 3. Use the yellow bars to determine the length of the Soak Stage.
 - **A** Position the first yellow bar where the average joint temperature is 170 (start of Lead-Free Soak).
 - **B** Position the second yellow bar where the average joint temperature is 200 (end of Soak).
 - C The time in Soak will be displayed in yellow. In this case 34 seconds.
 - **D** Position the first blue bar (use right side of mouse) at the end of the Reflow Stage.
 - E Position the second blue bar (use right side of mouse) near the end of the profile.



4. Thermal profile analysis.

		<u>Target</u>	<u>Actual</u>
•	A – Time in Soak Stage	45-75 seconds	34 seconds
•	B – Time over Reflow	45-75 seconds	38-47 seconds
•	C - Maximum Joint Temperature	235-240C	234-238C
•	D - Heating Slope	<3°/sec	.81°84°/sec
•	E – Cooling Slope	<-5°/sec	-2.79° to –2.88°/sec
-		-57300	-2.73 to -2.007300

Although the profile achieved targeted maximum joint temperature and the heating/cooling slopes met the targets, the time in both the Soak and Reflow stages were less than the minimum targets.

In this instance, Air-Vac recommends re-running the Thermal Profile. Lower the top heater temperature in both the Soak and Reflow stages by approximately 15-20 degrees, which will extend both the Soak and Reflow time, in an effort to meet targeted duration times.



12 Miscellaneous

12.1 Online Help

Online help is available any time a black question mark is visible on the screen.

Teach		0	$\textcircled{\begin{tabular}{lllllllllllllllllllllllllllllllllll$
The standard teach dialog allows teaching an x/y/z/theta position us Normally the standard teach dialog is opened when clicking on Set	ing different teach items and method: Position buttons.	3.p	
Teach Position			
? Teach Position 1	T		
Select an term to teach a position	$\overline{\mathbf{A}}$		
Available teach methods/items:			
Head of Robot (x/y/z)	🕀 Via <mark>i</mark> on Unit Teach		\mathbf{X}
Z-Height of Robot (Z)	Place Position of <part></part>		d
Vision Unit (Laser Pointer xy)	e for help on this page Position 1 Posi	tion 2 Final Position	Current Position:
	X: 210.753 + [mm] 0	000 - [mm] 210.753 - [mm]	200.000 - [mm]
	Y: 2/6.65/ [mm] 0	300 = [mm] 2/6.65/ = [mm]	380.000 <u>-</u> [mm]
	Set Position	et Position	
			o 1 0r 1
Leach Positon with selected method or item			
X:] 250.000 - [mm] Y:] 250.000 - [mm] Z:] 125.000 - [mm]			
Move to 🔽 on Safe Height with Head	<u>Cancel</u> <u>Accept</u>		
The vision unit gives one possibilities to teach positions:			
• Vision Unit: Teaches only x/y positions with the laser pointer.			
Standard Teach Dialog			
Functions			
 Available teach methods/item: Displays a list of items or meth Teach position with selected method or item: Click this butto Current taught positions: Defines the coordinates of the current Click the move to button to have the robot head moving to the cu Activating on Safe Height moves the head only in x and y and 	ods that can be used to teach a sing n to start using the selected teach m position. Individual coordinates can b rent taught position. leaves the z axis on safe height. Dis	e coordinate or a entire position. #hod or item. e manually changed. #bling it, will move the z axis down to	the taught position.
WANRING Disabling the on safe height option is a danger to the machin	e, because the z axis can crash ir	to a surface when the z coordina	te is wrong.
 Cancel button does cancel the teaching. Accept button does accept the new taught position. 			
Teach procedure			
I Machines 1.60 👔 Reference Guide 🎽 1a.bmp - Paint			100 (Note 4:06

12.2 Dry Run Mode

If the "Dry Run" mode is activated (yellow highlight), the robot will execute all movements, however, no heat will turn on. This is an excellent way to test a program.

Prog	m Execution
?!	1975 Rev C 1975 Rev C.itp
	🖓 🖈 🎽 🐂 🔹 Options 🔹 👘 0 of 🔽 🛨
4	Direct Execution *
Dry	un Training Inspection
Spee	100
trol	Continue
Error Con	5 Retry
Execution	Skip Skip Stop current Program Execution
	Stop Process Properties
	1 100000 1 10portos

12.3 Training Mode

If the "Training" mode is activated (yellow highlight), the user has real-time access to the process parameters. Operators should not have access to the Training mode. Restricting operator access can be done via setup of operator login and password. Please contact Air-Vac Engineering for further information.

Program Execution	Direct Access Training					
? 10975 Rev C 10975 Rev C.itp	? Interactive Soldering Soldering with advanced editi	ing capabilities	E			
😅 📽 * 📷 🍋 * Options * 0 of 1 🛨	Thermo Profile:					
🚸 🐠 orrect Exposition*	Removal 2.4.2008 2.15.40 PM	•				
Dry Run Training Inspection	Themo Profiles					
Speed: 100 [100 - [%]						
	Do not show stage table Automatically agus agu Fila					
Direct Access Thermo Profil	les					
Configure Process Prop ? Thermo	o Profiles of Part Type <	15mm LEAD F	REE>			
Go on with next Process	🛐 🛛 TC Groups 🏻 📥	Pr	rofile Graph	Advanced Config & S	tatistics Board Ten	nperature Process Sensor
Besume Profile Nam	ne	- T				
2 0 Master Li	EAD FREE DEVELOPMENT	S 300				
B S S Removal 2	2.4.2008 2.15.40 PM	P 250			····	<u>\$</u>
E Hetry Soldering 2	2.4.2008 2.15.40 PM	200				
		150				
Skip		100			•	
Stop current Program Execu		50				
Stop		0				
Process Properties		0	50	100 150	200 250	300
+ St	tage Time Top Top B	lot Trigger T	rigger Center Top	Bot Gas Vac Force	Speed dZ Force	
≻ Preh	leat 240 125 35 3	25 9: IR Pro	96 🗌 🗌		20 1.905	
Soak	< 60 <mark>225</mark> 35 2	50 Time	180 🗌 🔲	0 0	20 0 🗌	
1 Ram	ip 24 275 35 2	50 Time	216		20 0 🗌	
Heno	2007 10 275 35 2 1 אור 1 7 281 35 2	50 Time	235		20 0 0	
Coold	down 0 281 35 2	50 Time	216 🗌 🔲		10 0 🔲	
					· · · · · · · · · · · · · · · · · · ·	
			OK			
g						

12.4 Program Status Indicator

The current position in the program is always displayed during execution.





12.5 Z-Height "Stackup"

The nozzle should never contact the device or the board prior to force placement. Three parameters determine the "Z" height stackup:

- Nozzle Length
- Component Height
- Board Thickness

If the nozzle contacts the device or board prior to force placement, one or more of these three parameters is incorrect. Contact Air-Vac Engineering for further assistance.

12.6 Saving/Backing Up/ Transferring Programs

Saving Programs



Saving Programs



Go to Programming View. 1 Pa 1 -Click on Import and Export 1 Program Icon. 3 -Select Import Program. ? 🗙 Browse for Import Program File Look jn: 🔁 Exports 💽 🔶 🖻 🗕 01 AV LEAD FREE MASTER(012805).zip Ì My Recent Documents Highlight program to transfer. Desktop Double click on program or click My Documents on Save. My Compute • My Network Places 01 AV LEAD FREE MASTER(012805).zip File <u>n</u>ame • <u>O</u>pen -Files of type Program Import Files (*.zip) Cancel Browse for Target Folder for Program File <01 AV LEAD FREE MASTER(012805)... ? Save in: 🛅 Programs • + 🗈 💣 📰- PBGA 27mm (TIN LEAD) (.062 board PBGA 35mm (LEAD FREE) (.062 bd) 🗀 AV Ò Select folder to copy into. 🛅 Brian C My Recent Documents 🚞 Don M PBGA 35mm (LEAD FREE) (.125 SMS BPBGA 35mm (TIN LEAD) FREE) (.125 Smd BPBGA 35mm (TIN LEAD) (.062 bod; QFP 160 208 (TIN LEAD) (.062 bd), SBGA 37.5 mm (TIN LEAD) (.062 bd) SBGA 42.5 mm (LEAD FREE) (.100 br Exports 🚞 Import P C Kenn Y Desktop C Rop W Steve G System Files Ð Image: Second mass Image: My Documents PBGA 14 × 22 mm (TIN LEAD) (.062 board).itp BPBGA 27mm (LEAD FREE) (.062 board).itp My Computer < > My Network Places 01 AV LEAD FREE MASTER(012805).itp File <u>n</u>ame: • Save Save as type: Program Files (*.itp) -Cancel

Transferring Programs



Transferring Programs

Creating Multi-Component/ Multi-Panel Programs

Use PDW (Process Development Wizard) to create Programs (thermal, removal, site cleaning and replacement) for first component. BZF can be taught at this time.

Creating the Multi-Component, Multi-Panel Assembly





All saved programs will be shown. We will save the all components taught for the multi-component assembly (Placed in the Part Type Library). We will delete all but the first program to create one program with multiple components.





The program will be shown in the Programming View.

Click on the Program Icon.

Select the first program taught.

The programming view-detail will be shown.

Under program/options

The show selection dialog at program start with should have "last selection" choosen.

(Because we have assemblies with shields over them.)

Visual Machine	s 1.60.53b - (003.05.099 /	Onyx29 1.2.0.18)	Go to Substrate/Board
Manual Motion X/	ZAVY Coarse Motion		
Views Execution	Program Editor Difference Difference Log Viewer Check Result Substrate/Roard	Substrate/Board - Dimensions & BZF Substrate/Board Dimensions Board Zero Frame (BZF) Length (X): 100.000 + (mm)	Enter the panel x and y dimensions
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Click on Set Position under Board Frame (BZF) to set the BZF.

 Select Vision Unit (Laser Pointer xy). Double Click.

The vision unit will extend and the laser light will be activated.



Uncheck Robot enabled.

Move the laser light to the spot for the the BZF. Care must be taken to center the cross-hair in the center of the location as all the components will be taught referencing this.

Click on Set Position to reccord.

To check, recheck Robot enabled and click on Move to Final Pos. The laser light cross-hair should be in the center of the taught location.

Click on Ok.



Click on Accept to save the Set Position.

Do not right click the mouse. The Head of Robot position will be saved.

To modify the panel color and BZF location for picture double click on the picture of the panel.

To change BZF on picture, measure center of BZF to edge of board with calipers and record x and y dimension.

Click on BZF icon.

Drag BZF until the x and y dimension matches actual dimension.

To change color, click on Set Color

Click on OK

Elle View Tools	Help Y Z/VY Coarse Motion		Go to Images/Panels
Views Execution Programming Prot Type Library Part Library	Program Editor Program Diptions Log Viewer Check Results Substrate/Board Parts (0) Assemblies (0) Optimization Visual Summary Traceability Reporting	? Images/Panels - Definitions Copy + Translete Panels - Definitions Copy + Translete Copy + Translete Panels - Definitions Copy + Translete Copy + Translete Panels - Definitions Pan	u) Pitch Rot 0.000 ± (mm)
California California Refinite Provider California Cali		X 0.000 ± [mm] Image Ink Dot Positio X 0.000 Image Dimensions Outer Length (%) 120.000 ± [mm]	Change the Image Dimension x and y to match the dimensions in the Substrate / Board screen. Click on the Image and correct the BZF location
Utilities	LINEY IL PARTIES	OK	as previously done.



Go to Process Sequences

Correct the Operator Messages (2) to reflect the new BZF location.



Go to Images / Panels

Confirm these coordinates match the same as substrate/board Dims.

- 1. Copy the master to create panels as per pallet.
- 2. The new panels will be shown. Rename.
- 3. Click on the BZF panel Icon to create the BZF for each panel. See next page.

Check Results	XX	STATE OF ANY ANY
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Teach Board Zero Frame (BZF) Position elect an item to teach a position	0
vailable teach methods/items:	10000
😃 Head of Robol (#/y/z)	
Z-Height of Robot [Z]	12.2
Vision Unit (Laser Pointer xy)	
Ieach Positon with selected method or item	

Select Vision Unit (Laser Pointer xy). Double Click.

The vision unit will extend and the laser light will be activated.

Move the laser light to the spot for the the BZF. Care must be taken to center the cross-hair in the center of the location as all of the components will be taught referencing this. Use the Direct View camera as an aid.

Uncheck Robot enabled.

Click on Set Position to reccord.

To check, recheck Robot enabled and click on Move to Final Pos. The laser light crosshair should be in the center of the taught location.

Click on Ok.

Click on Accept to save the set position. Do not right click the mouse as Head of Robot position will be saved.



After Parts (components) have been created.

Insert Part Type from Part Library.





