Multiple and Additional Tool Setup:

The Torchmate Driver software is designed to activate output lines to control a number of different tools. Discussed in this section will be the configurations for tools that Torchmate sells. This is not an exhaustive list of all the tools that can be attached and controlled from the table. In fact most any tool that can be activated by either a 110/220V outlet turning on and off, a 5V high/low signal, or an open/closed loop can be controlled by the Torchmate system. If a tool not listed here is to be set up please contact Torchmate Technical Support for assistance. This manual will discuss three tools; oxy fuel torches, routers, and plate markers.

Testing Output Lines:

The first step in setting up multiple tools is to determine which output lines turn on which tool, the actual output line will vary depending on the number and type of interfaces wired into the CNC system. Go to 'Configuration' \rightarrow 'I/O' \rightarrow 'Output Lines', by default plasma will be listed in line one.

M Configuration		X
Performance	Output Lines	
General		
🚊 Machine	Line # Description	
Mechanics	1 Plasma	
Homing	2	
Feedrate/Ramping	3	
- Reference Points	4	
- Fixture Offsets	5	
Threading	6	
E-I/O	7	
Input Lines	8	
Output Lines	9	
Analog Output		
M-Code Definitions	12	
- M-Code Execution	14	
G-Code		
Cutter Compensation	16	
Import		
- Tools	Safety Interlocks (Invalid Output Line Combinations)	
Tool Library	Output Set To Output Set To	
Tool Change	Line # Set To Line # Set To	
Tools in Changer	None On None On	
🖃 Sensing 💽 💌	None On None On	
	None On None On	
<u>D</u> K Cancel	None On None On 🗸	

The tools listed here will appear in the 'AUX' tab on the main screen. This screen allows the output lines to be activated for testing.

G-Code Jog Point Home Aux MDI Probe
1 - Plasma (Off)
Feed Hold (Any Key)

In order to enable other lines for testing a description must be entered in the 'Output Lines' menu. A simple description such as '1,2,3,4,...' allows the line to be identified in the 'AUX' menu.

Configuration		
Performance	Output Lines	
General		
- Machine	Line # Description	
Mechanics		
Homing	2 2	
- Feedrate/Ramping	3 3	
Reference Points	4 4	
- Fixture Offsets	5	
Threading	6	
- 1/0	7	
Input Lines	8	
Output Lines	9	
Analog Output	10	
- Programming	11	
	12	
M-Code Execution	13 14	
- G-Code	15	
- Cutter Compensation	16	
Import	10	
- Tools		
Tool Library	Safety Interlocks (Invalid Output Line Combinations)	
- Tool Change	Output Set To Output Set To	
Tools in Changer	Line # Secto Line # Secto	
- Sensing	None _ On None On	
	None On None On	
	None On None On Vone On	
<u>O</u> K Cancel	None On None On 🔽	

Press 'OK' and access the 'AUX' tab output lines should now be listed by the descriptions given. For each interface connected enable two output lines, this will allow all possible outputs to be tested.

	Tore	chr	nat	e - I	10 (G-C	o de	File	e 0	pen	- T	orc	hma	ate.	STR) - 1	For	chm	atet	ie.tl	8									
Ei	e Ed	it	Con	fig <u>u</u> r	atior	n <u>c</u>	ontr	oller	⊻i	iew	Cod	ordir	nates	F	av <u>o</u> r	ites	He	lp												
	Y					_					_												Prog	ram	۱	Set 👻	Ма	chin	e]	Set 👻
							_																X			0000			N/	
	50-																						Y	0	. (0000	Y		N/	A
				_	_	_	_	_	_		_									_	-		Rela	tive		Set 👻	Dis	t To	Go	
							_													-	+		X	0	. (0000	X	0	.0	000
	0-																						Y	0	. (0000	Y	0	.0	000
					_				_		-									-	+		Tool	No	no			-	l le	ength
	-50-																									.0000 Y		<u>.</u>		
																										ve (G43)	_			0.0000
		-10	00				-5	0				C)				5	o				x				Off	line			
															_	*		3-C	ode		Jog		Point	Ho	me	Aux		MDI		Probe
																					1 - 1	1 (Off)				2 - 2	? (Off)		
																					3 - 3	3 (Off)				4 - 4	(Off)		
																~										Feed	Holo	l (Any	Key)

Try each line individually to determine which one activates which tool. Once this is established go back to the 'Output Lines' menu and change the description to reflect the test results.

M Configuration		×
I/O Input Lines Output Lines Analog Output Programming	Output Lines Line # Description Plasma 2 3 Plate Marker	_
	4 5 6 7 8 9 10 11 12 13 14 15	
OK OK Cancel	16 Safety Interlocks (Invalid Output Line Combinations) Output Line # Set To None On None On	

Configuring Tools:

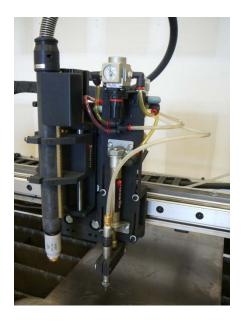
Multiple tools can be configured simultaneously and can then be selected via the 'Tool Drop Down Menu' on the main screen. All tools will need to have an 'M-code Definition' to turn them on and off; additionally a macro will be written to activate the proper tool when that tool is selected in the 'Tool Drop Down Menu' A general understanding of how each tool operates can lead to a better understanding of how the macros will work.

Oxy Fuel Torch:



Torchmate oxy fuel systems use a three hose system to cut, generally oxygen and acetylene is used but not exclusively. In a three hose setup one hose is acetylene, one is the preheat oxygen, and the other is the cutting oxygen. The preheat oxygen and acetylene use manual adjustment knobs to adjust the flame, while the cutting oxygen is activated through a solenoid controlled by the software. There are two timing values that are used, the preheat time and the pierce time. Preheat time is a prescribed amount of time that the torch will sit at a pierce point to warm the metal, during this time only the preheat oxygen and acetylene will be flowing. The preheat time will vary significantly due to the thickness of the material being cut. The second timing factor is the pierce delay, this is the time from when then cutting oxygen fires until the motors begin to move this time is shorter than the preheat time and allows for a good pierce to be established prior to table motion. Oxy fuel torches can be used to cut thicker metals and while slower than plasma the resulting cut will result in little to no bevel.

Plate Marker:



The Torchmate plate marking attachment uses a dual action pneumatic tip to punch metal at a rapid rate. This motion results in an etched-like design that can be used for part numbers, drill centers, or artistic designs. The force the plate marker strikes the material with as well as the frequency of oscillation can be set. By combining these two adjustments with various feed rates different effects can be achieved. The plate marker uses compressed air to run and a computer controlled solenoid to activate.

Router:

The Torchmate Z-axis utilizes a third axis to move a router, this allows for two and a half and three dimension cutting. Quality cuts with a router come from a combination of speed and the correct bit. Routing in the driver software utilizes three dimensional drawings or two dimensional drawings with plunge commands. Routers can cut foam, rubber, wood, acrylic, and many other materials.

Each tool used will need to be defined so that the driver software can reference it, go to 'Configuration' \rightarrow 'Tools' \rightarrow 'Tools' \rightarrow 'Tool Library'. This menu defines each tool, type in the tool name for the description; this

is the only setting that will be changed now. Note the tool number as this will be used in further configuration changes.

Analog Output	Tool Librar	y .					
Programming							
		1		1	1		
- M-Code Execution	Tool #	Description	Diameter	X Offset	Y Offset	Z Offset	H
G-Code			(inches)	(inches)	(inches)	(inches)	
Cutter Compensation	1	Plasma	0.0000	0.0000	0.0000	0.0000	-
Import	2	Оху	0.0000	0.0000	0.0000	0.0000	-
Tools	3	Router	0.0000	0.0000	0.0000	0.0000	-
	4	Plate Marker	0.0000	0.0000	0.0000	0.0000	
Tool Library	5		0.0000	0.0000	0.0000	0.0000	-
Tool Change	6		0.0000	0.0000	0.0000	0.0000	_
····· Tools in Changer	7		0.0000	0.0000	0.0000	0.0000	-
Sensing	8		0.0000	0.0000	0.0000	0.0000	_
Tool Length Sensing	9		0.0000	0.0000	0.0000	0.0000	
Program Zero Sensing	10		0.0000	0.0000	0.0000	0.0000	_
Touch Probe	11		0.0000	0.0000	0.0000	0.0000	
- Preferences	12		0.0000	0.0000	0.0000	0.0000	_
Viewports 📃	13		0.0000	0.0000	0.0000	0.0000	
Point List	14		0.0000	0.0000	0.0000	0.0000	_
Jogqing	15		0.0000	0.0000	0.0000	0.0000	
Pendant	16		0.0000	0.0000	0.0000	0.0000	_
Files	17		0.0000	0.0000	0.0000	0.0000	
Messages	18		0.0000	0.0000	0.0000	0.0000	
Security	19		0.0000	0.0000	0.0000	0.0000	
General	20		0.0000	0.0000	0.0000	0.0000	
General Y	21		0.0000	0.0000	0.0000	0.0000	
	22		0.0000	0.0000	0.0000	0.0000	_

No matter what tool is used a macro will be created to control multiple tools. Begin by going to 'Configuration' \rightarrow 'Programming' \rightarrow 'M-code Definitions'. In this menu create an on and off M-code for any additional tools. These tools will also need 'Action' lines to be enabled; this line is based on which output line activates the tool as determined above, use a '1' for on and a '0' for off. Create as many tool macros as tools.

- I/O	M-Code	Definitions												
Input Lines	M-Code	s to Control Output	Lines	(For Line	Columns	. ч г .	- T	.0	'0' – '	Turn	DEE 'S	' – Ma	Acti	
Output Lines	micode		LINES		Columns	». I-			0 -	runn	011 -	- 140	Aca	
····· Analog Output		General	L				A	ction						-
- Programming - M-Code Definitions	M Code	Description	Program Line First Action	M-Code First Action	Delay (sec)	Ln. 1	Ln. 2	Ln. 3	Ln. 4	Ln. 5	Ln. 6	Ln. 7	Ln. 8	
- M-Code Execution	50	Plasma On	M-Cd	Set Ln	1.5	1								
G-Code	51	Plasma Off	M-Cd	Set Ln	1.0	0				•		•	-	
Cutter Compensation	52	Plate Marker On	M-Cd	Set Ln	0.3	•	•	1		•		•	-	
Import	53	Plate Marker Off	M-Cd	Set Ln	0.5	•	•	0 -		•		•	-	
Tools			M-Cd	Set Ln	0.0	•		•		-	-	•	-	
- Tool Library			M-Cd	Set Ln	0.0	•	•	•		-	-	•	-	
Tool Change			M-Cd	Set Ln	0.0	•	•	•		-	•	•	-	
Tools in Changer			M-Cd	Set Ln	0.0	•	•	•	•	•	•	•	-	
- Sensing			M-Cd	Set Ln	0.0	-	-	•	-	-	-	-	-	•
- Tool Length Sensing				4									►	
- Program Zero Sensing														
Touch Probe	M-Code	s to Execute Macr	os											
Preferences	м				Progr-	am -	•							
- Viewports	Code	Description	Macro		Line F									
Point List					Actio	n								
Jogging	┦┝───				M-Cd									
Pendant					M-Cd									
Files 🗸 🗸					M-Cd									
	<u>ا</u> ا				M-Cd									
	·				M-Cd M-Cd		_							

The delay setting for each tool will be slightly different.

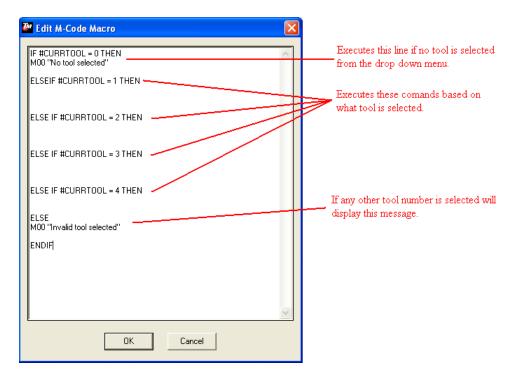
Tool	Tool On Delay	Tool Off Delay				
Oxy Fuel	3+ sec. *	1.5 sec.				
Plate Marker	0.5 sec.	0.5 sec.				
Router	1.5 sec.	1.5 sec.				

*The oxy fuel on delay is the pierce time setting; this will vary by thickness of material.

Two macros need to be created to utilize the tools drop down menu. The first will turn on which ever tool is selected and the second will turn off the selected tool. Begin by defining each macro and the description, use '20' and '21' named 'Start' and 'Stop' respectively.

Configuration														
Analog Output	M-Cod	e Definitions												
Programming	M.Cod	es to Control Outpui	lines	(For Line	Columns	. ч г .	- Tur	. On	'0' – '	Turn (' – Na	Acti	പ
M-Code Definitions		General	CENICS	(FOR CARD	Column	». I ·			0 -	runn	500	- 140		Unit I
M-Code Execution		General	Program	M-Code				ction						_
···· G-Code ···· Cutter Compensation	M Code	Description	Line First	First Action	Delay (sec)	Ln. 1	Ln. 2	Ln. 3	Ln. 4	Ln. 5	Ln. 6	Ln. 7	Ln. 8	
Import	50	Plasma On	M-Cd	Set Ln	1.5	1								
🚍 Tools	51	Plasma Off	M-Cd	Set Ln	1.0	0							-	
Tool Library	52	Plate Marker On	M-Cd	Set Ln	0.0			1						
Tool Change	53	Plate Marker Off	M-Cd	Set Ln	0.0			0					-	
Tools in Changer			M-Cd	Set Ln	0.0	•	•	•	•	•	•		-	
- Sensing			M-Cd	Set Ln	0.0	•		•	•	•	•		-	
- Tool Length Sensing			M-Cd	Set Ln	0.0	-	-	-	-	-	-	-	-	
- Program Zero Sensing			M-Cd	Set Ln	0.0	•	•	•	•	•	•	-	-	
Touch Probe			M-Cd	Set Ln	0.0	-	-	-	-	-	-	-	-	-
- Preferences				4									Þ	
- Viewports														
Point List	M-Cod	es to Execute Macr	os											
Jogging	м				Progr	am -	•							
Pendant	Code	Description	Macro		Line F									
Files					Actio	n								
Messages	20	Start		-	M-Cd									
Security	21	Stop			M-Cd									
General					M-Cd									
					M-Cd M-Cd									
OK Coursel					M-Cd	-	-1							
<u>D</u> K Cancel					M-Ca		•							

Begin with the 'Start' macro, to edit this macro select the 'Macro' field and press the $\mathbf{\nabla}$ that appears, this will prompt an edit window. The 'Start' and 'Stop' macros will have the same basic form, the only difference being that certain commands will be different for each tool.



The commands listed after each tool command will vary. For plasma without an AVHC, plate marker, and router the command will just be the M-code used to turn the output line (M50, M52, ect.). For plasma with an AVHC and Oxy Fuel multiple commands will be executed. For example if M50 turns on plasma, M52 activates oxy fuel, and M54 activates a plate marker the macro will be written like this.

Edit M-Code Macro	
IF #CURRTOOL = 0 THEN	
M00 "No Tool Selected"	
ELSEIF #CURRTOOL = 1 THEN	
M50 M101 I1	
ELSEIF #CURRTOOL = 2 THEN	
G04 ×20 M52	Oxy Fuel with a Preheat Time
ELSEIF #CURRTOOL = 3 THEN	
M54	
ELSE	
M00 "No Tool Selected"	
ENDIF	
<u>D</u> K Cancel	

The order of the tools should match the order they are listed in the tool library previously defined.

Press 'OK' when the macro is finished, and proceed to the 'Stop' macro. The 'Stop' Marco will be written with a similar syntax as the 'Start' macro. For each tool the off commands will be written in, for the off commands no additional lines of code need to be written.

Z	M Edit M-Code Macro	×	
	IF #CURRTOOL = 0 THEN	<u>~</u>	
	M00 "No Tool Selected"		
	ELSEIF #CURRTOOL = 1 THEN		Plasma Off
	M51		
	ELSEIF #CURRTOOL = 2 THEN		
	м53		Oxy Off
	ELSEIF #CURRTOOL = 3 THEN		
	м55		
	ELSE		
	M00 '' No Tool Selected''		
	ENDIF		
		~	
	<u>0</u> K	Cancel	

Press 'OK' once the 'Stop' macro is written. Go to 'Configuration' \rightarrow 'Programming' \rightarrow 'M-code Execution' Change the executed macros from 50 and 51 to 20 and 21 respectively, the software will now execute the multiple tool commands that were written previously.

Market Configuration		×
Analog Output Programming M-Code Definitions M-Code Definitions G-Code Cutter Compensation G-Tools Tools Tool Library Tool Change Tool Change Sensing Frogram Zero Sensing Program Zero Sensing Frogram Zero Sensing Double Preferences Viewports Point List Dogging Pendant Files Messages Security General V Cancel	M-Code Execution Automatic Execution Mode None On Errors Limit/Safety/Spindle Error: M Easic Start (After Hold): M Feed Hold/Error: M Feedrate Move: M In Other Times: M 21	Execute at Start/End of Motion Start of Motion: M End of Motion: M Execute When Idle On Feed Hold/Safety Tripped: M

Defining Tool Offsets:

Tool offsets tell the computer the distance between each tool so that if a tool change is made the driver moves the new tool along the same path.

The first step is to go to the tool drop down menu and select the first tool. Jog the table physically to a location and mark the center of the tool selected. With the center marked go to the program coordinate box and set the zero.

M	Torch	mate - No	o G-Cod	e File Op	en - be	ekerwo	king.stp	- Mul	iToolTes	it.tlg	
File	e Edit	Configurat	ion Con	troller Vie	w Coo	rdinates	Favorites	Help			
					Y						Program <u>Set</u> Machine <u>Set</u>
					80						X 0.0000 X N/A
											Y 0.0000 Y N/A
											Z 0.0000 Z N/A
					40						Relative Dist To Go
					40						X 0.0000 X 0.0000
											Y 0.0000 Y 0.0000
											z 0.0000 z 0.0000
	-8	0	-40		0		40		80	х	
											Tool: #1 - Plasma Length
											Offset: X 0.0000 Y 0.0000 Z 0.0000
					-40						Comp: Positive (G43) V Diam: 0.0000
											Offline
Г							<u> </u>	G-(Code	Jog	Point Home Aux MDI Probe
									jump To l	ine	Faster Program Feedrate: 0.0
								Ca	nce <u>i</u>	<u>G</u> 0	Slower 0.0 Slower
									Time: OI To Go: OI		Reset C Step C Continuous
							-				Start Feed Hold (Any Key)

Next jog the table so that the center of the second tool is at the marked point. From the tool pull down menu select the second tool. Go to 'Coordinates' \rightarrow 'Define Tool Offset'.

	No G-Code File C ration <u>C</u> ontroller !	<mark>lpen - bekerworking.stp - Mult</mark> Jiew Coordinates Fav <u>o</u> rites <u>H</u> elp	tiToolTest.tlg
		Zero Program Zero Machine Zero Relative Enter Program Enter Relative	Program Set Machine Set X -6.2561 X N/A Y 1.0488 Y N/A Z 0.0000 Z N/A
-80	-40	Clear Machine Define Fixture Offset Define Tool Offset Define Reference Point Define Tool Rack Position Adjust Tool Offset40	Relative Set Dist To Go X -6.2561 X 0.0000 Y 1.0488 Y 0.0000 Z 0.0000 Z 0.0000 Tool: #2-Router Length offset: X 0.0000 Z Comp: Positive (G43) Diam: 0.0000
		<u>G-</u>	Offline Code Jog Point Home Aux MDI Probe Z + Y + C Fast C Cgntin C 0.1 C 0.01 C 0.01 C 0.001 C 0.001 C Stopp Z - Y - Hold C Stopp C Stopp

On this popup be sure to select all axes under 'Set Axes' and the second tool from the list, then select 'Set'. Repeat for any additional tools. The tool offsets are now configured, by selecting a tool from the pull down menu the program coordinates will change.

M Define Tool Offset		×
Use DRO © Erogram © Machine © Relative Set Axes IV M IV Y IV Z	Tool #1 - Plasma #2 - Router #3 #4 #5 #6 #7 #7 #8 #8 #9 #10 #11 #11 #12 #13 #14 #14 #14	
Description: Router	Cancel	

Using Multiple Tools in a Single Program:

Multiple tools can be used in the same program. This feature is quite a bit more advanced and a basic understanding of the driver software's operation is suggested before attempting to configure this type of set up. Following the steps above to configure multiple tools there will be a few additional changes to allow seamless tool changing. Ensure that the 'Configuring Tools' and 'Defining Tool Offsets' sections have been followed as this section will build on those setting changes.

Another M-Code macro will need to be added to turn all of the tools off. This line will set all action lines to '0' turning them off.

- I/O 🗸	M-Code	Definitions												
- Input Lines	M-Code	s to Control Output	Lines	(For Line	Column	. ч·.	- Tur	.0	'0' - '	Turn	DE S	' – NZ	- Act	ion
- Output Lines		General	. Eines	T I I I I I I I I I I I I I I I I I I I	Column	5. 1 *			0 -	r carri	011	- 140	5.00	
Analog Output		General		401				ction					<u> </u>	-
- Programming - M-Code Definitions	M Code	Description	Program Line First Action	M-Code First Action	Delay (sec)	Ln. 1	Ln. 2	Ln. 3	Ln. 4	Ln. 5	Ln. 6	Ln. 7	Ln 8	
- M-Code Execution	50	Plasma On	M-Cd	SetLn	1.5	1		•					-	1
G-Code	51	Plasma Off	M-Cd	Set Ln	1.0	0	•	•	•	-			-	1
Cutter Compensation	52	Plate Marker On	M-Cd	Set Ln	0.3	-	-	1	•	-	-	-	•]
Import	53	Plate Marker Off	M-Cd	Set Ln	0.5	•	•	0	-	-	•	•	-	
- Tools	59	ALL OFF	M-Cd	Set Ln	0.0	0	0	0	0 -	•	•	•	•]
Tool Library			M-Cd	Set Ln	0.0	-	•	•	•	-	-	-	•	
- Tool Change			M-Cd	Set Ln	0.0	•	•	•	•	-	•	•	-	_
Tools in Changer			M-Cd	Set Ln	0.0	-	•	•	-	-	•	•	·	_
Sensing			M-Cd	SetLn	0.0		·	•	·	-		·	-	
Tool Length Sensing				•									►	
Program Zero Sensing														
Touch Probe	M-Code	s to Execute Macr	os											
- Preferences	м				Progr	am -	•							
Viewports	Code	Description	Macro		Line F									
Point List					Actio									
Jogging					M-Cd									
Pendant					M-Cd									
Files					M-Cd									
1.105	┛				M-Cd									
	1				M-Cd M-Cd									

Additional macros now need to be created for tool changes. There will be one macro for each tool. To help keep track of them number the macros 31 for tool 1, 32 for tool 2, and so forth. Each macro will have a similar syntax.

Analog Output	^	M-Code	Definitions												
Programming		M.Code	s to Control Output	Lines	(For Line	Columns	. ч г .	- Turr	Ωn	'0' = ⁻	Turn I	D.FF '-	' – Ne		ion
M-Code Definitions		In code	General	LINGS		Columns				0 -	runn	011	- 140		
- M-Code Execution		<u> </u>	General		H.C. I			A	ction					_	1
G-Code		м	Description	Program Line First	M-Code First	Delay	Ln.	Ln.	Ln.	Ln.	Ln.	Ln.	Ln.		
Cutter Compensation		Code	Description	Action	Action	(sec)	1	2	3	4	5	6	7	8	-
Import		50	Plasma On	M-Cd	Set Ln 👻	1.5	1								
Tools		51	Plasma Off	M-Cd	Set Ln	1.0	0								
Tool Library		52	Plate Marker On	M-Cd	Set Ln	0.3	•		1		•		•	-	1
Tool Change		53	Plate Marker Off	M-Cd	Set Ln	0.5			0				-	-	
Tools in Changer		59	ALL OFF	M-Cd	Set Ln	0.0	0	0	0	0	•	•	-	-	
Sensing				M-Cd	Set Ln	0.0	•		•		•	-	-	-	
- Tool Length Sensing				M-Cd	Set Ln	0.0	•	•	•	•	•	•	•	-	
- Program Zero Sensing				M-Cd	Set Ln	0.0	•	•	•	•	•	-	-	•	
Touch Probe				M-Cd	SetLn	0.0	•	-	•	-	·		·		
- Preferences					▲									•	
···· Viewports	=														
- Point List		M-Code	s to Execute Macr	os											
Jogging		м				Progra		•							
Pendant		Code	Description	Macro		Line F									
Files		20	F 1 1 01 1	7.4		Actio	n								
Messages		20 21	Feedrate Start	if #currtoo		M-Cd									
- Security		31	Feedrate Stop Tool 1 Change	if #currtoo		M-Cd	M-Cd								
General	~	31	Tool 2 Change	1	-										
		32	roorz change	1	-	M-Cd									
OK Cancel	1					M-Cd	-	_1							

Each tool macro will be similar to the one below with T# and H# indicating what tool to change to.

🏙 Edit M-Code Ma	cro		×
M06 T1 G43 H1			
	ОК	Cancel	

Once all the macros are made go to 'Programming' and 'M-code Execution' in here the 'Automatic Execution Mode' needs to be changed from 'Full' to 'Basic' and the 'Start' needs to be 20 and 'Feed Hold' needs to be whichever macro was made for the 'ALL OFF' command.

M Configuration		
Analog Output Programming Programming Grode Execution Grode Execution Grode Execution Grods Tool Library Tool Change Tool Length Sensing Touch Probe Preferences Viewports Point List Jogging Pendant Files Messages Security General OK Cancel	M-Code Execution Automatic Execution Mode C None D n Errors Limit/Safety/Spindle Error: M Basic Start (After Hold): M 20 Feed Hold/Error: M 59 C Full Feedrate Move: M 50 All Other Times: M 51	Execute at Start/End of Motion Start of Motion: M End of Motion: M Execute When Idle On Feed Hold/Safety Tripped: M

Since the mode has been changed from 'Full' to 'Basic' the import options will have to change to ensure that the tool on and off commands get inserted in the program. Go to 'Configuration' \rightarrow 'Programming' \rightarrow 'Import'.

Main Configuration		
Analog Output Analog Output M-Code Definitions M-Code Execution G-Code	Import General Scale: 1.0000 □ Optimize <u>I</u> oolpath Decimals: 4 ☑ Line Numbers	Feedrates XY Feedrate: 70.00 (in/min) Plunge Feedrate: 5.00 (in/min)
Cutter Compensation Import Tools Tool Library Tool Change Tools in Changer Sensing	Join Tol.: 0.00100 (inches)	Circles
Tool Length Sensing Program Zero Sensing Touch Probe Preferences Viewports Point List	Incremental Depth of Cut: 0.1000 (inches) Final Tool Down (Milling): -0.1000 (inches) Final Tool Down (Holes): -0.1000 (inches)	Ellipses and Splines Chord Error: 0.01000 (in)
- Jogging - Pendant - Files - Messages - Security - General ▼	Program Zero Location ○ ∑, Y of Import File: X: -11.0000 (inches) Y: -8.5000 (inches)	Edit File Start: File End: File End: Feature Start (Before Rapid): Feature Start (After Rapid):
<u>O</u> K Cancel		Feature End:

On the import screen there is a section labeled 'Additional G-Code' in this area select the 'Edit' button. This will bring up places where additional code can be entered. To ensure the tools run under 'Start of Feature – After Rapid Move' M20 needs to be added and under 'End of Feature' M21 should be inserted.

Market Edit Additional G-Code		
General	G-Code Added Once	G-Code Added for each Feature Start of Feature - Before Rapid Move
<u>Q</u> K Cancel	End of File	End of Feature M21

The software is now set up to use multiple tools in one program. When a file is imported in now the only editing that needs to be done is specifying when a tool change is to take place. Import a dxf file that contains toolpaths for multiple tools, for help creating these types of toolpaths see the Torchmate CAD guide on 'Multiple Tool Toolpaths'. Import this file as normal.

Torchmate - OVALSQUARE.f				
	Y 80 40			Program Set Machine Set X 0.0000 X N/A Y 0.0000 Y N/A Relative Set Dist To Go
-80 -40	0	40	80 X	X 0.0000 Y 0.0000 Tool: #2-Plate Marker V Length
	-40			Offset: X 0.0000 Y 0.0000 Z 0.0000 Comp: Positive (G43) Diam: 0.0000
1 (File created using T 2 (Import File: 0VALSC 3 (Import Date: 8/8/2C 4 5 5 N10 G00 6 N20 M20 7 N30 G01 9 G0 G0	UARE.dxf) 08) 42		Log Jump To Line ance	Point Home Aux MDI Probe Faster Program Feedrate: 0.0 Slower 100 • % Override: 0.0
8 N40 GO1 X11.8980 Y2.4 9 N50 GO1 X2.8751 Y2.46 10 N60 GO1 X2.8751 Y5.42 11 N70 GO1 X2.8751 Y5.42	860 60 42	Ru	n Time: 00:00:57 To Go: 00:00:57	Reset C Step C Continuous Start Feed Hold (Any Key)

The driver automatically inserts the M codes to turn on and off the tools; the program needs to have the M codes inserted where it needs to make a tool change. To edit the program double click on the lower left window the one that lists all the code.

_		- OVALSQUARE.fgc	
Eile		Help	
		(File created using Torchmate DXF Import)	<u>^</u>
	2 3	(Import File: OVALSQUARE.dxf)	
	3 4	(Import Date: 8/8/2008)	
	-	N10 G00 X2.8751 Y5.4242	
	-	N20 M20	
		N30 G01 X11.8980 Y5.4242 F70.00	
		N40 G01 X11.8980 Y2.4860	
	9	N50 G01 X2.8751 Y2.4860	
	10	N60 G01 X2.8751 Y5.4242	
	11	N70 G01 X2.8751 Y5.4242	
		N80 M21	
		N90 G00 X5.6522 Y8.1939	
		N100 M20	
		N110 G01 X5.6827 Y7.9457	
		N120 G02 X6.4746 Y8.0184 I1.9771 J-17.1916 N130 G02 X7.2695 Y8.0424 I0.9199 J-17.2804	
		N140 G02 X7.8607 Y8.0265 I-0.6126 J-33.6428	
		N150 G02 X8.4499 Y7.9898 I-0.3991 J-11.1558	
		N160 G02 X9.0360 Y7.9185 I-1.0541 J-11.1130	
		N170 G02 X9.6202 Y7.8265 I-4.9435 J-33.2833	
	22	N180 G02 X10.1367 Y7.7133 I-5.6798 J-27.1547	
	23	N190 G02 X10.6475 Y7.5807 I-2.0536 J-8.9635	
		N200 G02 X11.1488 Y7.4158 I-2.6211 J-8.8143	
		N210 G02 X11.6445 Y7.2316 I-9.4192 J-26.0944	
		N220 G02 X12.1737 Y6.9884 I-3.9101 J-9.2080	
		N230 G02 X12.6825 Y6.7049 I-4.6132 J-8.8766	
		N240 G02 X13.0776 Y6.4403 I-3.8745 J-6.2130 N250 G02 X13.4482 Y6.1425 I-4.3980 J-5.8541	
		N250 G02 X13.4482 16.1425 1-4.3980 J-5.8541 N260 G02 X13.7245 Y5.8759 I-3.5642 J-3.9693	~
	50	11200 002 A13.1213 13.0139 1-3.3042 0-3.9093	
		Update Toolpath Close	

Insert the M31, M32, ect. macros into the g-code where they are needed. In here the speed can also be changed if needed for different tools.

M Editor	- OVALSQUARE.fgc		
<u>Eile E</u> dit	Help		
1 2 3 4 5	(File created using Torchmate DXF Import) (Import File: OVALSQUARE.dxf) (Import Date: 8/8/2008) N32	<u> </u>	M32 Tells the driver to select tool 2 and use this tool until told otherwise
6 7 8 9 10 11 12	N10 GOO X2.8751 Y5.4242 N20 N20 N30 GO1 X11.8980 Y5.4242 F50 N40 GO1 X11.8980 Y2.4860 N50 GO1 X2.8751 Y2.4860 N50 GO1 X2.8751 Y5.4242 N70 GO1 X2.8751 Y5.4242	-	The F value here is the speed it will use tool 2 at.
	Neo M21 M31 M31 Nyo GOO X5.6522 Y8.1939 N100 M20 N110 GO1 X5.6827 Y7.9457 F80 N130 GO2 X6.4746 Y8.0184 I1.9771 J-17.1016 N130 GO2 X7.2695 Y8.0424 I0.9199 J-17.2804 N140 GO2 X7.8607 Y8.0265 I-0.6126 J-33.6428 N150 GO2 X8.4499 Y7.9898 I-0.3991 J-11.1558 N160 GO2 X9.0360 Y7.9185 I-1.0541 J-11.1130 N170 GO2 X9.6202 Y7.8265 I-4.9435 J-33.2833 N180 GO2 X10.1667 Y7.7133 I-5.6798 J-27.1547 N190 GO2 X10.6475 Y7.5807 I-2.0536 J-8.9635		M31 switches to tool 1 this needs to be done after M21 and before any other commands. The F value was added in to change speed for plasma.

The program will now run and change tools automatically. The last thing to change is up to personal preference. At every tool change the Torchmate driver software will pause the program and prompt a message that indicates the tool change. The program will then have to be started manually again. This setting can be disabled to allow for transitions to happen automatically with no message. To do this go to

- 40

'Configuration' \rightarrow 'Tools' \rightarrow 'Tool Change'. Change the tool change mode to silent to allow automatic switching.

Analog Output	^	Too	l Change							
Programming		(Automatic T	ause) use With Mess	M06 Macro)	-	🗖 Sense Tool Length after Tool Change			
Tool Change Tools in Changer		Au	itomatic Tool C							
🖃 Sensing			Approach Fe	edrate: 5.00	(in/m	nnj	Monitor T	ool <u>C</u> huck F	'ower	
 Tool Length Sensing 							Inn	ut Line: 10	•	
Program Zero Sensing										
- Touch Probe							Power Or	n State: Noi	rmal 🔻	
Preferences								· · ·		
- Viewports	Ξ	Tool Rack Positions				(Machine Coordinates, inches)				
Point List Jogging		F	°os ×	Y	Z Raised	Z Near Grip	Z Near Release	Z Grip	Z Release 🔺	
Pendant			1 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Files			2 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Messages			3 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Security			4 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
General			5 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
General	÷.		6 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
			7 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
OK Cancel			8 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 🔻	